DEVELOPMENT CORRIDORS PARTNERSHIP

IMPACT ASSESSMENT FOR CORRIDORS: FROM INFRASTRUCTURE TO DEVELOPMENT CORRIDORS

Edited by:
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The Development Corridors Partnership

The Development Corridors Partnership (DCP) is a research and capacity development initiative. It is a collaboration between institutions from China, Kenya, Tanzania and the UK. The main objective is to deliver effective research and capacity-building to help improve corridor planning and management. It aims to ensure that development corridor decision-making is based on sound scientific evidence and effective use of available planning tools and procedures, to ensure that risks are avoided and opportunities exploited. The DCP comprises partners from the University of York, the University of Cambridge, London School of Economics, Sokoine University of Agriculture, the University of Nairobi, as well as the UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC), African Conservation Centre, the World Wide Fund for Nature (WWF), the Chinese Academy of Agricultural Sciences and the Chinese Academy of International Trade and Economic Cooperation (CAITEC).

DCP Partners:

For the purposes of this publication, DCP collaboration was extended to experts representing Netherlands Commission for Environmental Assessment, the Centre for Energy, Petroleum and Mineral Law and Policy at the University of Dundee, the University of Queensland, the Columbia Centre on Sustainable Investment, the GOBI Framework for Sustainable Infrastructure Initiative (comprising the University of Oxford, University of Central Asia and the Independent Research Institute of Mongolia), The Biodiversity Consultancy, the Wildlife Institute of India, the Endangered Wildlife Trust and Ecotecnia Ingenieros Consultores SRL.

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Foreword

In the course of a long and varied working life, I have been privileged to work with, or learn from, a stimulating panoply of individuals who are committed to contributing to the economic, social, and environmental development of all aspects of the United Nations Sustainable Development Goals.

Jon Hobbs and Diego Juffe-Bignoli are, thankfully, two of these individuals. I was delighted to learn that they had come together to produce, for the Development Corridors Partnership, a rich and stimulating collection of research reports, case studies and assessments relating to the array of efforts made under the rubric of 'development corridors'. They were determined to express the conviction that decisions made, primarily by governments, regarding the planning and building of Corridors, really must be informed by an evidence-based understanding of the consequences – positive or negative – of these decisions. And they have succeeded. But Jon Hobbs will never read these words. He was hospitalized after the bulk of the work was complete, and, to the deep sadness and regret of all who knew him, he passed away at the end of September, 2021.

Jon and Diego sought out and recruited a daunting array of researchers, scholars and stakeholders to shed light on the processes currently underlying the world of development corridors today. They certainly succeeded.

The work was initiated before the onset of the COVID-19 pandemic, and as governments turn to the formidable challenge of restoring economic vitality without further damage to the climate, it becomes even more imperative that impact assessment be understood, embraced and improved. Jon and Diego have shown us the way forward for a journey which absolutely must be embarked upon.

They would be first to recognise that the Development Corridors Partnership as a whole must be commended for showing – in many different ways and places – that, not only is the need for impact assessment clear and present, but so are the skills and commitment of researchers, scholars and stakeholders. These are to be found in an impressive coming together of universities, civil society organizations and business groups, and communities.

All are part of an outstanding initiative, funded by the UK Research and Innovation Council, and managed by the UNEP-WCMC. This initiative has been embraced by some of the best minds that have been turned to the task of ensuring that – while we attempt to bring economic and social benefits to people, in line with the United Nations Sustainable Development Goals – we do not risk significant environmental and social costs, and thus actually undermine long-term development successes.

So, I urge you to read this book, and figure out how you might improve your own contribution to the challenges ahead. Jon and Diego have set out a case. It needs to be taken up, not set aside; acted on, not just talked about. It is in your hands.

John Harker

Chair of the Development Corridors Partnership Independent Advisory Board,
Nova Scotia, Canada.

Dedicated to the memory of Jon Hobbs
who was the architect and driving force of this book

Executive Summary

Driven by increasing globalisation, the development aspirations of nations, and the need to access resources, an infrastructure boom is impacting many regions of our planet. New infrastructure projects are traversing diverse landscapes over hundreds of kilometres, often crossing international borders and penetrating into remote areas previously unaffected by industrialisation and urbanisation. These large-scale projects, mostly spanning several regions in a same country, but often linear and transnational in nature, are generically called corridors. Depending on the nature and objectives, they can be transport, infrastructure, growth, resource or economic corridors.

The rapid development of corridors globally presents environmental planning professionals with numerous challenges. **The primary need is to ensure that decisions about these developments are informed by an evidence-based understanding of their consequences – both positive and negative.** This will enable infrastructure development to meet development needs without adversely impacting ecological systems or human welfare. Improving the quality of infrastructure policies, plans, programmes and projects, by ensuring they include the necessary environmental and social scrutiny, is urgently required now - and will be for the foreseeable future. This challenge is the unifying theme of this publication.

Using insights from Africa, Asia and South America, this sourcebook compiles 24 contributed papers written in 2021, covering many facets of the opportunities and challenges presented by the rapidly growing number of infrastructure and corridor developments around the world. Prevailing planning practices are reviewed through case studies along with the efficacy of some of the available tools to conduct systematic and comprehensive impact assessments. The latter includes Strategic Environmental Impact Assessment (SEA) and Environmental Impact Assessment (EIA).

As the title suggests the underlying thesis of this publication is that, where they are justified, **there are significant benefits in ensuring that corridors that contain single purpose infrastructure developments (utility, infrastructure or transport) progress through a carefully planned sequential process of diversification and expansion to ensure the maximisation of benefits in full-blown 'development corridors'.** In this book, development corridors are therefore aspirational. They comprise areas identified as priorities for investment to catalyse economic growth and development. They should be developed with multiple stakeholders and social, economic and environmental interests and interdependencies in mind. With the integration of sustainability principles and appropriate environmental and social standards, development corridors could become true '(sustainable) development corridors'. They should be planned to maximise positive opportunities and minimise negative risks. Without this, today's short-term successes will become tomorrow's challenges and long-term human welfare and ecosystem integrity will be undermined.

Overview of contents

This book brings together a wide range of perspectives from experts, researchers, and practitioners around the world with the purpose to foster greater collaboration and increase our global understanding of corridors and their benefits and potential negative impacts. 13 of the 24 chapters are written by independent experts and researchers from Australia, Bolivia, Brazil, China, India, Kenya, Mongolia, South Africa, Tanzania, UK, and the USA. The book also includes 11 chapters containing material gathered by the Development Corridors Partnership, a programme of work led by UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) and funded by the UK Government via their Global Challenges Research Fund.

The collection of papers in this sourcebook is divided into five sections. First an introductory section where we introduce some key terms and definitions that underpin this work (Chapter 1). We then explore some key principles and aspirations of corridors such as delivering the Sustainable Development Goals (Chapter 2), ensuring theory and practice align (Chapter 3), ensuring financial sustainability (Chapter 4), properly assessing environmental sensitivity (Chapter 5) respecting human rights (Chapter 6), or maximising, co-benefits (Chapter 7).

In the next three sections, we present 15 case studies from three continents: Africa, Asia, and Latin America. These case studies explore key challenges and lessons learned from specific planned, ongoing, and already implemented developments. They are presented as individual stories that readers can explore.

The final and fifth section aims to summarise lessons learned from a 4-year research and capacity building programme specifically aiming to understand the key challenges and opportunities around corridors and that has been the major driving force of this work: The Development Corridors Partnership project (DCP). DCP is a collaborative partnership across UK, Kenya, Tanzania and China, funded by the UK Research and Innovation Global Challenges Research Fund (see Chapter 23).

The book finishes with an overview of the lessons learned from the contributed papers included in this book and develops ten principles for corridor planning and delivering a meaningful and comprehensive impact assessment (Chapter 24), which we summarise here as ten key messages.

Key messages

1

Corridors must seek to achieve positive sustainability outcomes:

The mindset underwriting environmental planning of most infrastructure developments has been to mitigate negative impacts. The planning of few existing corridors is based on their role in supporting a sustainability vision for a country or region in which they are situated. Corridor developments must therefore be based on sustainability principles and support progress towards national, regional and international sustainable development goals. A true development corridor will seek to do good, as well as to mitigate negative impacts.

2

Integrated and inter-disciplinary approaches are needed:

Corridor developments are extensive, complex, multifaceted features traversing many landscapes. They can bring about significant transformational change to physical, economic, social, and cultural systems, and serve as interconnecting features. Yet engagement in corridor planning is often constrained by limited disciplinary and institutional involvement, with projects often superimposed upon communities. Corridor developments need diverse expertise and experience in their planning and management, including local stakeholder knowledge, avoiding disciplinary, institutional, or sectoral silos, that can result in policy conflicts, contradictions, and inconsistencies.

3

Corridor proponents should clearly demonstrate consideration of alternatives:

Corridor options should not be limited to a preferred proposal favoured by an elite. Corridor developments must consider all feasible alternatives (including maintenance of the status quo and no corridor development) and make the risks and opportunities of each option explicit and transparent through meaningful consultation. An important requirement in all corridor planning is to justify the need for a wide choice of options and an explanation of the potential benefits it will bring and to whom, in comparison with the alternatives. Any necessary trade-offs and how any significant potential negative impacts will be effectively managed, and opportunities created must be explained.

4

Public participation and stakeholder engagement should be at the core of corridor planning:

Corridor planning frequently fails to include meaningful participation of all stakeholders. Corridors can profoundly affect the lives and rights of indigenous peoples and local communities, potentially for generations. A common failing is that the first opportunity for local stakeholders to engage arises only after all strategic decisions have already been made and the only option remaining is for them to react negatively to a fait accompli. The meaningful engagement of all stakeholders is necessary to ensure their role is more than reactive. The way corridors are viewed by different stakeholders must be identified, understood, and addressed. Corridor developments must ensure that all interested and affected people are provided with adequate information about a proposal and have meaningful ways to engage in decision-making processes from the outset of strategic planning.

5

Mainstreaming and tiering are fundamental for corridor success:

Corridor planning requires a tiered assessment process, ensuring that environmental and social issues are considered alongside financial and technical considerations from the start of strategic planning or programme development, right though to project specifics. Conceptual corridor planning is frequently dominated by technical and financial suitability criteria with environmental, social, cultural, and human rights sensitivity issues being considered, at best, as externalities, retrospectively, once issues and problems arise. Strategic planning is important because it is when the full range of options is still open for discussion. It also establishes the parameters that will frame and implement a corridor plan or programme. Environmental and social considerations (and the interactions between them) should be considered early in strategic decision-making alongside (and to inform) technical, financial, and economic considerations.

6

An iterative process is needed:

Corridors exist in dynamic environments and need to be responsive to changing circumstances and priorities. Planning must adjust as circumstances and available information changes. The process should identify, map, and engage all interested and affected stakeholders from the earliest stage of corridor planning and throughout the planning and management of the corridor. New concerns and evidence will likely emerge as a corridor development progresses. Corridor planning frequently places undue emphasis on the production of a report (Environmental Impact Report) and its influence on the decision to proceed. The process may not be so linear in nature. It may involve many adjustments and decisions as new evidence emerges and predictions improve. A good-quality report and recommendations is necessary, but they are dependent upon a comprehensive process of ongoing dialogue and engagement with all stakeholders.

7

Corridors must ensure effective use of available tools:

Many corridor environmental impact assessments fail to meet required international standards. Corridor planning and management should make systematic and adequate use of available impact assessment procedures, methods, techniques, and tools to ensure good-quality decisions. The available procedures discussed in this publication (notably Strategic Environmental Assessment and Environmental Impact Assessment) and their associated methods, tools and techniques should be used when appropriate to help ensure that a systematic process identifies all significant potential benefits and development outcomes, and that they outweigh the costs and risks to affected people and their livelihoods and environments. The objectivity and quality of corridor decisions are dependent upon the effective use of the available tools.

8

Plan corridors with resilience and adaptability in mind:

Prevention will always be better than cure in addressing the negative impacts of corridors, and this should be the priority. However, some circumstances dictate an inevitability of negative impacts. Corridors, therefore, need to be designed to be made resilient to anticipated changes and adaptation measures may be necessary as 'coping' mechanisms or to offset unavoidable impacts, such as the impacts caused by climate change. The suitability of measures will require ongoing monitoring and adaptation as needs arise.

9

Seek impact, influence, and implementation capacity:

The decision to proceed with a corridor is ultimately the responsibility of decision makers. They are usually the representatives of all stakeholders' interests and custodians of their natural resources. Any impact assessment report must provide adequate information to ensure sufficiently good-quality decisions. If they are to be effectively implement the recommendations provided. Attempts to improve the performance of planning and associated assessment processes of corridors must tackle the ways in which outcomes are shaped by political contexts and institutional capacities. Approaches to working on assessment processes should integrate political economy analyses and institutional capacity assessment from the outset and on an ongoing basis. Resulting insights should inform the design and implementation of interventions intended to improve planning practice.

10

Evolve from Infrastructure to Development Corridors:

The prospects for linear infrastructure projects to evolve into comprehensive development corridors are often left to chance and spontaneity. Infrastructure projects are often developed in isolation and in an incremental way. For infrastructure projects to progress and become true development corridors, the transition must be systematically sequenced into planning from the start. Assessments must include consideration of potential induced, secondary, synergistic, transboundary, and cumulative impacts likely to result from the corridor development. The progression from infrastructure to development corridors must be based on a systematic, comprehensive, and integrated assessment of the potential positive environmental, social and economic opportunities and the rigorous avoidance or management of negative impacts.

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Introduction

01

Context and Definitions

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1.1 Why this publication?

An infrastructure boom is impacting many regions of our planet, driven by increasing globalisation. New projects are traversing diverse landscapes over thousands of kilometres, sometimes crossing international borders and penetrating remote areas that have, to date, been relatively unaffected by industrialisation and urbanisation. These large-scale projects, mostly spanning several regions in a same country but often linear and transnational in nature, are generically called corridors. Depending on the nature and objectives of these they can be transport, infrastructure, growth, resource or economic corridors (See Juffe-Bignoli et al. 2021 section 1.4)

This process is both a threat and an opportunity. Integrating marginalized regions and peoples into development processes is an urgent need. However, it also presents risks to the integrity of ecosystems and the services they provide to support human livelihoods, welfare and biodiversity. It is essential to ensure that decisions about new developments are informed by a sufficient understanding of their potential consequences, both positive and negative. This will help enable corridors to meet development needs, while not undermining their sustainability-and as such can be labelled as true development corridors. To improve the quality of decisions about infrastructure policies, plans, programmes and projects, scrutiny of their potential effects is necessary before they are implemented. Adequate safeguards during their construction, operation and eventual dismantling must also be in place throughout the rest of their life cycle.

This challenge is the unifying theme of this publication. As the title suggests, the underlying thesis is that, where they are appropriate and justified (and that is not true for every case), there are significant benefits in ensuring that corridors with a single (or limited number of) infrastructure development objectives (such as transport, electricity, telecommunications, water and sanitation, oil, gas and chemicals etc.) progress through a planned sequence of diversification and expansion to ensure maximization of benefits and minimization of risks in 'development corridors'.

Using insights from Africa, Asia and South America, this publication addresses many facets of the opportunities and challenges that the rapidly growing number of infrastructure investments present for all stakeholders. Prevailing planning practices are reviewed (along with the efficacy of some of the available tools) through case studies based on literature reviews and field work. In this introduction, we briefly explore the global infrastructure boom and its drivers. We propose a corridor typology and offer

some definitions to help clarify what can be a very diverse and confusing vocabulary. We reflect on how corridors might (and should) evolve over time into the aforementioned strategic and comprehensive initiatives. That is, (sustainable) development corridors. We provide references to indicate in which chapters more detailed analysis of an issue or a case study can be found within the publication. The final chapter provides recommendations for successful development corridor planning based on the views of all authors in this publication.

1.2 Drivers of infrastructure growth

1.2.1 Infrastructure deficit

The current acceleration in infrastructure provision is attempting to address the widespread deficit that exists, especially in developing countries. This is nothing new, and it has been progressing sporadically over decades. Estimates suggest that the global gap between the required investment in infrastructure provision and the projected need will reach US$15 trillion by 2040.[1] Financial institutions (European Bank for Reconstruction and Development [EBRD], Canada's Infrastructure Bank, Asian Infrastructure Investment Bank etc.) and international initiatives such as the Asian Development Bank's Greater Mekong sub Region Development Corridor's programme, the African Union's/New Partnership for African Development (NEPAD) flagship Programme for Infrastructure Development in Africa (PIDA) (African Development Bank 2015) and the Initiative for the Integration of Regional Infrastructure in South America (IIRSA). One international infrastructure programme that is referenced in several chapters of this publication is the 'Belt and Road Initiative', (BRI), which was formally launched by China's President Xi Jinping in 2013.[2]

1.2.2 Development multiplier

A lack of infrastructure puts the brakes on economic development, growth and productivity, and limits access to basic services, jobs and markets. The importance of infrastructure as a development catalyst has been recognized in the United Nation's Sustainable Development Goals (SDGs) (adopted by the United Nations General Assembly in 2015). SDG 9 ('Industry, Innovation and Infrastructure') expressly highlights the specific need to "build resilient infrastructure". Corridors, and the projects within them, can also play a cross-cutting role that is essential for delivering all of the 17 SDGs. (especially SDGs 11 and 13 [see Chapter 2] (United Nations 2012)). However, poorly planned projects risk increasing development inequities.

1.2.3 Economic growth and recovery

The enthusiasm for infrastructure projects fluctuates with cyclical economic fortunes. At their most basic, they are a region's conduits for moving goods, services and people efficiently, and are often associated with resource extraction projects. During times of high commodity prices, the economic feasibility of exploiting new prospects of natural resources in ever-remoter regions of the world escalates. If resource surveys prove that previously inaccessible or economically marginal deposits of minerals, timber and so on have now become viable for exploitation,

1 G20's Global Infrastructure Hub 2019. See: https://outlook.gihub.org.

2 For current status of Belt and Road Initiative projects in over 70 countries, see: www.beltroad-initiative.com/projects.

infrastructure will be needed to ensure a supply of inputs (energy, water, construction materials, labour etc.) and delivery of outputs (to ports, mills, refineries, smelters and, ultimately, markets). These services are provided by corridors of one sort or another. As exploration expands, regions that may be particularly socially, economically, culturally or ecologically sensitive may be adversely impacted (see Chapter 5). By virtue of their previous inaccessibility, they may host vulnerable indigenous and ethnic groups and have wilderness or high conservation values. Among other things, this raises issues of protection of rights and adequate compensation for loss of livelihood or cultural resources (see Chapters 6 and 20). 'Pioneering' and explorative developments may seem insignificant at first, but they may initiate major land use, economic, social and political changes.

However, even during periods of commodity price falls, when interest in exploration for new investment opportunities reduces, infrastructure developments often still continue in anticipation of an economic upturn, albeit with less urgency than previously.

Infrastructure provision also serves as an attractive stimulus to aid economic recovery (including after pandemics and associated economic recessions). As is evident in many countries' post-COVID-19 pandemic plans, infrastructure investments are promoted as vehicles for job creation and to encourage public and private sector investments. While investment in infrastructure of all kinds is being prioritised as countries seek to reboot their economies, it is also important to ensure that this is done with appropriately rigorous assessment of the risks and opportunities. Of concern is that this urgency may be accompanied by an imprudent relaxation of planning regulations.

1.3 Defining infrastructure

Infrastructure can be widely defined to include almost all supporting elements of society and economy. However, a general distinction can be made between hard infrastructure (e.g. physical facilities) and soft infrastructure (e.g. policies, regulations, strategies, programmes institutional frameworks and financing mechanisms).[3] In this publication, the term is used primarily to describe hard infrastructure; that is, roads, railways, pipelines, conveyors, transmission and distribution systems and networks. It also focuses on infrastructure developments that have linear characteristics and the associated considerations that are not always evident in non-linear infrastructure developments.

Linear developments impact diverse landscapes and communities, cover extensive distances, include transboundary (including transnational) characteristics, involve numerous jurisdictions, may have 'transit-only' needs, pose extensive barriers to and cause fragmentation of other land uses, while also often having cumulative and induced secondary impacts.

For the purposes of this publication, therefore, infrastructure comprises the components within corridors. For a more thorough review of infrastructure definitions, see United Nations Environment Programme (2021). Hard, linear infrastructure comprises the facilities and structures existing within corridors.

3 With a further distinction drawn between strategic infrastructure (the 'backbone' of a system) and support infrastructure (feeding into a strategic system).

1.4 Defining corridors

The diversity of labels developed over the past decade to define different types of corridors can be mesmerizing. Corridors mean different things to different people. Different labels may be attached to the same corridor type. In addition, the development of corridors is often a dynamic process. A transport corridor comprising a highway may progress to become a much more diverse entity (Juffe-Bignoli et al. 2021).

The labels developed tend to reflect the specific interests of their protagonists, although interests may often overlap. Consequently, the way corridors are viewed by different stakeholders must be identified, understood and addressed if policy inconsistencies, conflicts and misunderstandings are to be avoided.

1.4.1 Governments' perspectives

For governments, enthusiasm for corridors is varied, and is motivated by their value in:

- Encouraging trade, investment and growth
- Their inclusion of lagging, economically marginalized areas
- Their inter- and intra-connectivity
- National competitiveness
- Attracting private sector and development finance
- Raising prospects for increased tax revenues (national and international)
- Regional integration
- Expanding geopolitical and cultural influence
- Increasing and better managing natural resource exploitation
- Opening landlocked countries' access to international trade and
- Meeting the demands of growing populations for efficient services and so on.
- The terms 'investment', 'access', 'supply' and 'regional' are used to emphasize these key aspirations.

1.4.2 Business perspectives

For the private sector, the dominant interest in corridors is primarily in facilitating improved supply chains and logistics, improving efficiencies, creating economies of scale and opportunities for shared use, opening new areas for extraction of natural resources, providing a service or delivering a commodity. For business, a new corridor initiative will be an opportunity for removing barriers to trade and investment, reducing freight and transport time and costs, encouraging value added processing, reducing customs and administrative red tape, upgrading dilapidated facilities, creating and accessing new markets and so on. The terms 'resource', 'trade', 'utility', 'transport' and 'economic' are used to emphasize such aspirations.

1.4.3 Development agencies' perspectives

For development agencies, infrastructure interest is dominated by the possibilities presented to catalyse or multiply development and poverty reduction by creating jobs and small business opportunities. They will also improve the reach of energy, health and food security, and provide opportunities for better governance by promoting human rights due diligence and eliminating bribery and corruption, and other essential components of growth and development (see Chapter 6). Corridors are a platform for a progressive process upon which to build development programmes and explore 'co-benefit'[4] opportunities (see Chapter 7) (Brauch 2017). They provide an opportunity to sequence a series of projects that have the potential to multiply a single investment into comprehensive development opportunities. The terms 'growth', 'development', 'value', 'resource' and 'economic' are used to emphasize these aspirations.

1.4.4 Environmental perspectives

For the environmental (and social) sector the term 'development' is used to label corridors, but with the implicit qualification of 'sustainable', to stress that they should not be developed at all costs, without justification or without an effective integrated social, economic and environmental assessment of their consequences. The COVID-19 pandemic has highlighted interconnectivity, and demonstrated the need for systems approaches. Similarly, corridors may be significant vectors for the spread of other diseases, and the introduction of alien and exotic species.

Corridors concentrate otherwise numerous independent projects into a common but differentiated entity. They also present opportunities to phase out environmentally damaging technologies and introduce more sustainable options. This could also include providing platforms for improving resource use efficiencies (e.g. cleaner production, eco-efficiency, pollution prevention strategies, industrial symbiosis, industrial ecology). To use a cliché, corridors are an opportunity to build back better' and with greater resilience (see Chapter 10).

By virtue of their potential for causing barriers to wildlife movement and migration – dissecting, degrading and fragmenting the cohesion of important habitats, high value conservation areas or protected areas – they may also be regarded as more of a threat than an opportunity.

Meanwhile, the term 'green infrastructure' (e.g. ecosystems such as rivers (See Chapter 18) has been used as a counterpoint to industrial or 'brown', man-made infrastructure and terms such as 'ecological' and 'wildlife' corridors are used to emphasize the need to maintain connectivity between areas of importance for ecological processes and biodiversity.

Given these diverse and complex interests, an integrated systems, inter-disciplinary and cross-sector approach is fundamental to

4 Development corridors will maximise economic, environmental and social co-benefits.

corridor planning and design. It is important, therefore, to find common ground between the diverse objectives of corridor advocates.

1.4.5 Towards a corridor typology

Estimates of how many corridors exist or are planned vary widely.[5] This is not surprising given the wide range of interpretations of what constitutes a corridor. As well as their protagonists' interests, they can also be defined according to the stages of a development continuum through which they progress, with infrastructure or utility corridors being the most rudimentary, and diversified development corridors being the most advanced.

5 Recent research by the Development Corridors Partnership (DCP) suggests that there are at least 88 in Africa alone (Thorn et al. in press). A geospatial and tabular database of all development corridors across Africa was created in 2021

Table 1.1 Most common general terms used for corridors

Name of corridor	Description
Transport corridors (e.g., trade, transit, arterial, etc.):	Physical transportation links between nodes or areas within a region or country facilitating the flow of people, vehicles and freight. They may include security, safety and potential areas for future expansion needs. They are usually legally protected by 'easements', 'permits', 'way leaves', 'rights of access/way' and other mechanisms that have tended to exclude opportunities for shared use and co-benefits. An example of a transport corridor is the Maputo Development Corridor (see Chapter 15). Initially developed to connect the urban and industrial centres of Gauteng Province in South Africa to the port of Maputo in Mozambique, it has progressed to unlock the landlocked provinces of Mpumalanga and Limpopo in South Africa as well as the country of Eswatini (formerly Swaziland). It is the planned first stage in linking the Atlantic and Indian Oceans linking with the Botswana-Namibia Trans-Kalahari Corridor. Similarly, the Standard Gauge Railway in Kenya (see Chapters 11, 12 and 13), and the Lamu Port-South Sudan-Ethiopia transport corridor (LAPPSET) (Chapters 11 and 13) combine transport and resource extraction objectives from the African interior to the coastline. They may be regarded as a foundational stage in a potential transition to a development corridor (see Chapters 16, 18, 19, 20 and 21).
Utility corridors (e.g., service, transmission, trade etc.):	Land that accommodates (or is reserved for) pipelines, transmission lines and so on, through which oil, gas, chemicals and electricity are transported. They may be used to support more than one service (and, where feasible, this is preferred to independent routing across the landscape). Distributive in nature, they are also defined by safety needs in case of potential hazards such as leaks, spills and electromagnetic field effects.
Resource corridors (e.g., export, value etc.):	Initially with a focus on resource extraction but favoured by, among others, the World Bank as a development designed to leverage a large extractive industry investment (e.g. a mine, forest or oil field etc.) into a more comprehensive economic development (with the recognized potential to support diversification in shared-use and co-benefits) (see Chapters 7, 12, 19, 20 and 22). They are also known as 'value' corridors. Some developments may upgrade existing infrastructure (i.e. strengthening bridges, improving and maintaining surfaces etc.) but many develop new facilities. Examples of resource corridors in Africa include the Zambezi Valley Development Corridor (Zimbabwe-Zambia-Malawi-Mozambique), Nacala-Tete (Malawi-Mozambique), Guinea's proposed corridors and Tanzania's Mtwara Corridor[6] (see Chapter 8) and, in South America, the Carajas Corridor (see Chapter 20).

6 For a discussion on the role of resource corridors in a conflict zone, see Shroder J (2013) Building Resource Corridors in Afghanistan: A solution to an interminable war?, Earth, 2 September 2013. www.earthmagazine.org/article/building-resource-corridors-afghanistan-solution-interminable-war. Accessed 1 April 2021.

Economic corridors (e.g., growth):	These involve, not only the development of infrastructure and transport, but also laws, regulations and institutions to facilitate business practices and provide access to markets . "The objective from the start is to achieve a combination of hard infrastructure, transport and logistics services, institutional instruments and community involvement that results in broad-based development of unrealised economic potential" (Hope and Cox 2015). They include activities necessary for trade, investment and development in a comprehensive and diverse manner. The reason they may not yet be 'development corridors' is because they are frequently planned with economic benefits in mind, paying only limited attention to environmental and social impacts. They may have a number of secondary transport spurs or support infrastructure to increase connectivity. They may potentially integrate into road and rail networks that connect regions, countries and centres of supply and production (such as manufacturing hubs, factories, industrial clusters and economic zones) with centres of demand (such as major urban and industrial nodes). Examples include the Beira Development Corridor, the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) (see Chapter 9 and 10) and the Maputo Development Corridor (MDC) (see Chapter 15).
Ecological corridors (e.g., wildlife or green infrastructure):	Linear features to maintain connectivity and protect biodiversity, gene and ecological processes. The International Union for the Conservation of Nature (IUCN) defines ecological corridors as "clearly defined geographical spaces that are governed and managed over the long-term to maintain or restore effective ecological connectivity" (IUCN 2019). Where natural processes are interrupted, artificial alternatives may be provided (e.g. bridges, ladders, underpasses, tunnels), to maintain ecological functions between natural zones. Sometimes, this is done with specific species in mind and this is particularly important for ensuring gene pool mixing, important areas to access feeding and breeding areas, maintaining contiguous units within protected areas or connections between roosting and foraging areas and so on. Ecological corridors can reduce the risk of mortality to both humans and wildlife from road and rail traffic accidents. When planned in harmony with other corridor projects they can be an integral part of a development corridor (see Chapters 14 and 17) (Asia Development Bank 2019).
Development corridors:	These are identified as priorities for investment to catalyse economic growth and development. They should be developed with multiple stakeholders and sectoral (social, economic and environmental) interests and interdependencies in mind (see Chapters 6, 9, 11, 13 and 18). With the integration of sustainability principles and appropriate environmental and social standards, development corridors could become true '(sustainable) development corridors'. They require collaboration and coordination for effective implementation. Development corridors are currently largely aspirational.[7]

Note: The labels are not mutually exclusive and many corridors will have elements of each.

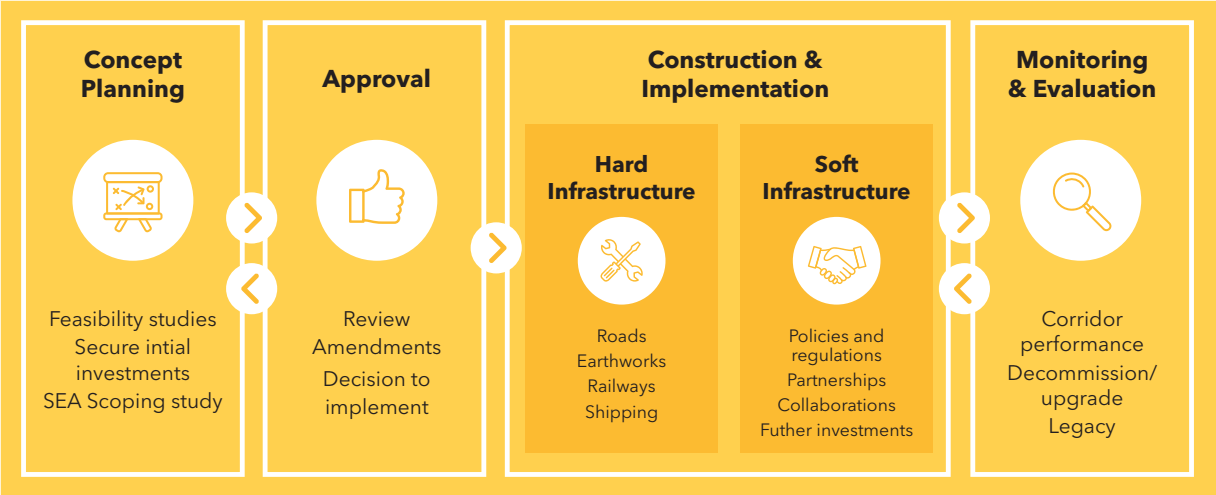
7 Many other corridor types and labels exist, ranging from maritime corridors, transboundary or transnational corridors, military and political buffer/access zones (e.g. the long-standing Caprivi strip, Namibia), cordons (e.g. livestock veterinary cordon fences, Botswana) and so on.

BOX 1 – KEY PHASES COMMON TO ALL DEVELOPMENT CORRIDORS

(Adapted from Juffe-Bignoli et al. 2021)

The Development Corridors Partnership Project (see Chapter 23) identified four broad phases that are common to an ideal development corridor process (Fig. 1.1). These phases apply to the corridor as a whole and aim to ensure systematic and comprehensive assessment of the development strategy with all its associated projects. These corridor phases are described below.

Figure 1.1 Main phases of a development corridor.



1. **Concept planning:** The aim of concept planning is to determine whether the proposed development corridor in a country or region is economically, social and environmentally viable. This is often led by government agencies and financial institutions. When an agreement is reached, feasibility and scoping studies are conducted, initial projects are identified, initial stakeholder consultations take place, and initial investments are secured, ideally conducted under a Strategic Environmental Assessment (SEA) framework. While SEA is recommended for the corridor, specific project level surveys, baseline assessments, feasibility studies, and Environmental Impact Assessment (EIA) should be conducted for each of its component projects, following the laws and regulations of the countries where they are implemented and complying with the standards and procedures required by lenders. Risks and potential significant social and environmental impacts should be identified, and plans made for minimisation, restoration, and compensation. Impact assessment should include direct, indirect, and cumulative impacts (Juffe Bignoli et. al 2021) and apply the mitigation hierarchy framework (see Chapter 4).

2. **Approval:** Approval to undertake the initiative occurs when assessments (e.g., scoping, feasibility or SEA reports) and plans developed in the first phase should be scrutinised for compliance with legal and lender requirements. If some changes are required, the process could come back to phase one (concept planning). If the initiative is not approved the programme is put or hold or reformulated.

3. **Construction and implementation:** Implementation involves the construction of the projects that form the development corridor. Implementation may last for many years or constantly evolve as operational projects are decommissioned or closed, others are expanded or upgraded, and new projects are proposed and developed. This phase is coordinated by designated authorities which could be a new or an existing institution (e.g., Lamu Port, South Sudan, Ethiopia Transport corridor (LAPSSET) is coordinated by the LAPSSET authority). Agreed design and plans are implemented through hard and soft infrastructure supported by further investment. Hard infrastructure refers to physical projects that compose the corridor, implemented sequentially or at different times (e.g., a road to a mined area, a dam, or railway). Soft infrastructure refers to the policies, regulations, partnerships and collaborations, including capacity building, need to facilitate implementation of the development corridor.

4. **Monitoring and evaluation:** This phase involves tracking the economic, social, and environmental performance of the development corridor and its individual projects. Evidence of positive and negative impacts is documented as in post development audits. Monitoring and evaluation is led by designated corridor authorities and lenders and government agencies of individual projects and it starts at the construction and implementation phase. During monitoring and evaluation it can be assessed how well the predictions and recommended management measures perform in practice and apply the necessary corrections.

1.4.6 From infrastructure to development corridors

Infrastructure developments have traditionally been planned as single-purpose projects in utility or transport 'corridors' dedicated to a specific anchor project, with a narrow focus on objectives. They are designed to provide a core service (e.g. electricity reticulation, transport links or oil pipelines). They have characteristically been developed to minimize construction and eventual operating costs and follow 'routes of least resistance' between two or more nodes (i.e. the most direct and technologically feasible route, within the bounds of topography and, increasingly, community resistance). They tend to be planned on a project-by-project basis. Over time, they are likely to bring about significant changes to land use, natural resource management, settlement patterns and market dynamics, whether intended or not.[8] (See Chapter 20, which considers a railway project serving an iron ore anchor project in Brazil that included incremental 'shared use' options that were not adequately assessed for their implications.)

Resource corridors are often associated with 'anchor' projects such as a new mine (i.e. infrastructure needs are particularly extensive for low-value, high-volume commodities such as iron ore, coal, copper etc.; see Chapters 4 and 20). Potential development opportunities beyond mines' immediate needs have usually not featured highly on planners' agendas. Infrastructure development for exclusive use by the extractive industry does not necessarily contribute to diversification and industrial development, and needs to be planned. It is not unusual for mine-related infrastructure to serve the exclusive use of an operator and without consideration of potential 'co-benefits' for communities (IISD 2017) (see Chapter 7) or 'shared benefits' with other companies (Cameron and Stanley 2017) (see Chapter 20). For example, it is common to see infrastructure developments that bypass communities that do not obtain any benefits from them. For example, people can be prohibited to pass under access-electricity transmission lines to collect fuel wood. In other cases railways convey bulk commodities to a main port while the communities that they by-pass struggle to reach their local markets. This is sometimes for security and safety reasons, but not always.

Individual infrastructure projects will invariably have some development benefits in their own right, but these will be limited if they are coincidental 'spin offs' from a major project. The prevailing situation of 'disjointed incrementalism' or 'muddling through'[9] is very different to a systematically planned and sequenced development strategy, within which synergies can be devised, multiplied and diversified (see Chapter 7). Rarely is the full range of development opportunities systematically investigated at the conceptual stage of corridor planning. Instead, the level of environmental and social assessment for non-core components (such as infrastructure) may be cursory and overshadowed by the needs of the assessment of the main anchor project (see Chapter 3 and 12). There are some exceptions (see Chapter 9). Development corridors should aim to provide benefits far beyond those that any single infrastructure corridor project can deliver. Table 1.2 shows key areas in which development corridors differ from more rudimentary transport, infrastructure corridors.

8 Although they may range in scale from small to mega-projects, this does not necessarily equate with scale of impact. For example, a 765kV electricity powerline is clearly of greater magnitude than a 44kV electricity distribution line. The latter may, however, pose a more significant electrocution threat to birds with a large wingspan, because the distance between live conductors on the poles used by these birds may be more easily bridged. On the larger transmission line, the distances may mean that it is impossible for them to cause electrocution and thus will be no significant threat.

9 A pattern of planning decision-making, identified by the American political scientist Charles Lindblom, in which decisions are taken step by step, as a problem unfolds (Lindblom 1959).

Table 1.2 Differences between 'infrastructure' and 'development' corridors

Infrastructure corridors	Development corridors
Narrow focus on single infrastructure	Broad framework for multiple and diverse investments
Relatively short-term focus on output	Long term focus on outcomes
Linked to specific anchor project's needs	Linked to National/Regional policies/plans/ programmes
Area of influence well defined	Area of influence potentially expansive and more flexible
Piecemeal, ad hoc, incremental approach	Strategic, sequenced, and structured approach
Limited range of alternatives	Flexibility in considering diverse alternatives
Project-specific scale	Regional/Landscape scale
Linear decision-making process	Iterative decision-making process
Sector-specific planning priorities	Cross sector dialogue and planning needed for consistency
Weak political engagement, usually private sector or parastatal lead	Potentially led by public sector and potentially corridor programme management entity
Suited to project EIA processes	Suited to plan and programme SEA processes

The process of sequencing developments within corridors has environmental risks, as well as benefits. A poorly planned process could lead to undesirable secondary, synergistic or cumulative impacts (see Chapter 20, 21 and 22). One individual project may have limited negative impacts on its own, but it may set a precedent for numerous additional projects that in combination and, over time, may result in significant adverse cumulative impacts and undesirable land use changes. Single-purpose corridors must be planned sensitively, keeping in mind the possibility that they may become complex and diverse corridors in the future (see Chapter 17).

As the title suggests, the underlying thesis of this publication is that, where they are justified, there are significant benefits in ensuring that single (or limited) purpose infrastructure developments progress through a carefully planned sequence of diversification and expansion to ensure maximization of benefits in 'development corridors'.

1.4.7 Environmental assessment terminology

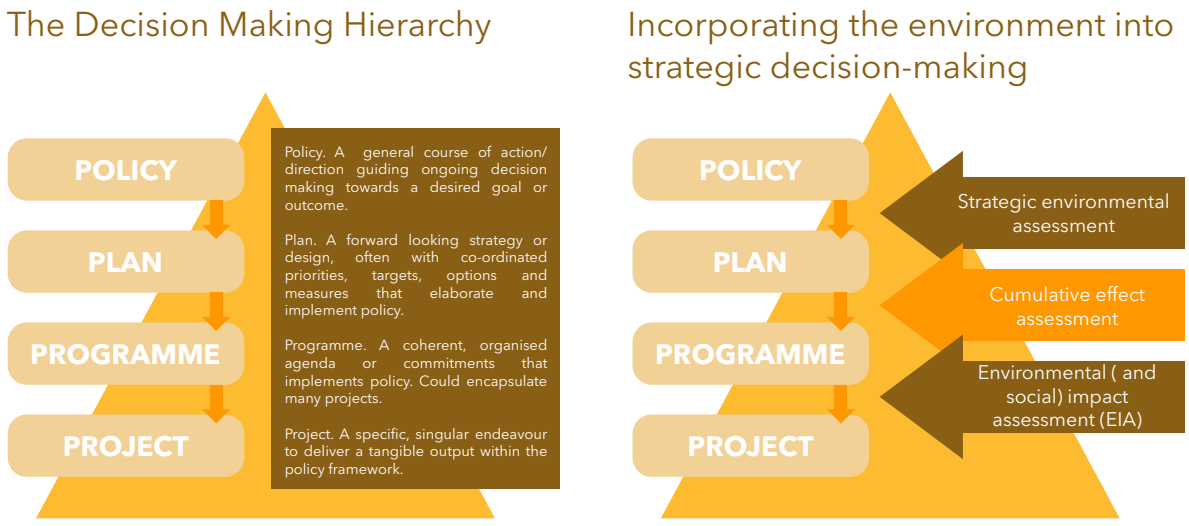
The linear nature of corridors means that there are many unique characteristics that are not present in non-linear investments that require adaptation of impact assessment methods and techniques. Throughout this publication, environmental assessment (both Strategic Environmental Assessment [SEA] and Environmental Impact Assessment [EIA] and their various derivatives) is recognized as the critical requirement to ensure corridors are planned to be more economically, socially and environmentally sustainable. To assist the DCP partners, a quality assurance tool for EIA and SEA was provided to help evaluate both the process and content of assessments that have been reviewed. Here, we offer only a brief overview of the key terminology applicable to planning and assessment. Some of these terms also have a variety of applications, and are sometimes used interchangeably, so we give a general overview on how they are used in this publication.

Environmental assessment (EA) is the 'umbrella' term used for all levels of assessment (policy, programme, plan and project). The term 'impact assessment' may also be used in the same generic way. The objective of all EAs is to ensure that quality environmental information is provided in a timely way so that it can be effectively used in decision-making processes, initially to decide whether or not a proposal should proceed, and if so, under what conditions. A corridor programme will characteristically have multiple and diverse sub-projects, all of which must be assessed – both cumulatively and independently. Fig. 1.1 shows conceptual diagrams of (1) the decision-making hierarchy and (2) inclusion of the points of application of key different but related assessments.

A point of contention in EA has been its scope, whether confined to effects on the physical environment or inclusive of effects on the social and economic dimensions. Some of the earliest EIAs were criticized for their scope being limited to the natural environment. This has been addressed by clarifying that the term 'environment' should refer to the physical, biological, social, economic and cultural components and surroundings and recognition of their interdependencies in a holistic sense. Increasingly, the importance of governance is also being recognized and included. Nonetheless, some practitioners consider it important to add and emphasise 'social' after 'environmental' assessments, and others have promoted stand-alone social impact assessments (SIAs) (among many other topic-specific derivative assessments). Chapter 19 makes a strong case for this, as well as separate human rights assessments, and indicates that one country, Mongolia, has legislated for separate SIAs (see also Chapters 6, 11, 13 and 19). In this publication, 'environment' is generally defined holistically, because any EA (SEA or EIA) that does not address all dimensions of 'environment', and the interplay and potential trade-offs between them, would not be an adequate assessment. However, we do not preclude the need for separate assessments if warranted by specific circumstances. The important requirement is that, in the final analysis, the assessment process must always include an integrated consideration of all facets. Recognition of this need for interdisciplinarity in corridor assessment processes is a fundamental recommendation of this publication[10] (see Chapter 24).

EIA and SEA are the two main procedures under the EA umbrella. They are applied to the decision-making hierarchy in a *tiered* fashion.

Figure 1.2 Decision-making hierarchy and the role of SEA/EIA



10 The key definitional reference used here is the internal report prepared by the Multilateral Financial Institutions Working Group on Environment: "A Common Framework for Environmental Assessment". This was developed in 2005 as a note to guide International Finance Institutions in good practice and to promote convergence and harmonization among international finance institutions , bilateral aid agencies, export credit agencies and so on on institutional requirements, processes and practices for EA of their public and private sector interventions. This work informed the development of policies, procedures and Performance Standards of IFI's (see Chapter 4).

EIA: (i.e., Environmental and Social Impact Assessment) The International Association for Impact Assessment (IAIA) defines EIA as "a procedure of identifying, predicting, evaluating and mitigating the biophysical, social and other relevant effects of proposed projects and physical activities prior to major decisions and commitments being made" (IAIA/IEA 1999).[11] An EIA process is designed to provide decision makers with sufficient information upon which to base their decisions. The systematic process for examining the environmental and social consequences of a proposed activity is outlined below and culminates in a report (or statement) on whether or not to permit the development to proceed.

EIA involves several components. *Procedures* (sequenced requirements for carrying out an EIA, which may be detailed in legislation) and *methods*[12] (matrices, checklists, network analysis, environmental flows, overlays [particularly valuable in assessing linear developments]. In addition also *checklists*, multi-criteria analysis, delphi, among others) to clearly identify, predict, assess and communicate, impacts, their significance, and to evaluate alternatives, and achieve consensus among disparate groups) and *techniques* (to understand and explain specific effects and their projected consequences (e.g. air and water quality modelling, livelihoods analysis, ecological services and environmental flows analysis etc.).

The EIA process generally follows a linear sequence of steps, as shown in Table 1.3. This process is likely to be fluid as new information emerges.

Meaningful and inclusive public participation is fundamental to the EIA process. This should be built on an understanding of interested and affected stakeholders based on stakeholder mapping and analysis to ensure inclusion of disadvantaged groups (see Chapters 7, 12, 14 and 20). A distinction must be drawn between interested and affected people, to ensure that the stakeholders with a legitimate mandate are engaged (Hobbs 2020). Increasingly, the concept of a social license to operate (SLO) is being explored to give communities rights of veto over proposals they consider unacceptable. This right is currently limited to indigenous peoples and is germane to corridors when they encroach into areas such as the Amazon (see Chapters 6, 11 and 13).

As several authors note, the extent to which the EIA process and EIR actually impact eventual decisions is variable (see Chapters 3 and 13).

11 The terms and acronyms EIA and ESIA are used interchangeably but EIA is the term more commonly used in legislation and is therefore favoured here.

12 Organized, systematic and interdisciplinary approaches to identify, predict and assess impacts to ensure that currently unquantified values are given appropriate (and weighted) consideration, alongside economic and technical considerations.

Table 1.3 Generic steps in the Environmental Impact Assessment process

Step	Description of step	Undertaken by
1. Screening	Determines if an assessment is required and the level of detail necessary if it is. It is likely that most corridor developments will require a full, comprehensive (rather than a 'rapid' or 'initial' EIA (see Chapter 18)). Initial studies will determine the broad context and nature of the proposal, location (or route) options, scale and zone of influence, key stakeholders, justification for the proposal, initial indications of significant and potential for cumulative impacts and the general compatibility of the proposal with any prevailing strategic priorities, such as those generated by an earlier SEA etc. This will help develop parameters (resource needs, timeline, and Terms of Reference for commissioning consultants to undertake a more detailed process). Any immediate 'fatal flaws' will signal a need to reject the proposal (see Chapter 3).	Government authority
2. Assessment	A detailed assessment and prediction of the consequences of 'significant' impacts. During both the scoping and assessment phases an important requirement is the identification and consideration of the effects of alternatives that would achieve the same functionality and objectives in different ways (locational, technological, scale, timing, design, procedural etc.). For corridors, this will include assessing alternative routes. The 'no go 'option should be one of the alternatives considered. The identification of the significant consequences of each alternative will help identify preferred options based on social, economic and natural environment considerations. Measures that could be used to avoid, minimize and offset significant adverse impacts and maximize positive opportunities for co-benefits will be included.	Delegated authority: Consultants in the employ of the proponents (and investors and lenders if appropriate)
3. Scoping	Determines and prioritizes more detail on key issues to be addressed (often involving specialists' technical input, but also the views of those potentially directly affected by the proposal). It will also indicate the information needed, the geographical area to be covered, the stakeholders to engage, the alternatives to be considered in more detail and the level of analysis required to adequately assess predicted impacts and compliance needs with prevailing laws, policies, standards, etc. Dialogue with all stakeholders will take place as an ongoing process. Baseline information will identify the key suitability and sensitivity criteria associated with the proposal and its location and any necessary additional research required to fill in information gaps (see Chapter 5).	
Environmental impact report (EIR) or environmental impact statement (EIS) And (draft) Environmental Impact Management Plan. (EMP)	Concludes the assessment process. Initially, a set period allows for adequate public comment on the findings and recommendations laid out in the draft EIR (the substance of the report and adequacy of the procedures follow). The EIR will recommend appropriate measures to ensure compliance with the conditions of approval in an environmental management plan (EMP). The formulation of the EMP will begin during the EIA process but, given that the proposal may be rejected, not in great detail. This is necessary to provide assurances that the identified negative impacts will be adequately managed, and positive opportunities enhanced. The EIR will indicate how to incorporate the necessary measures into project design and implementation, and they will be modified and developed as necessary. The EMP will include compliance registers, action plans and so on to address specific issues: a biodiversity action plan, community engagement action plan, resettlement plan, grievance mechanisms and so on, against which the project's development should be monitored and audited. An EMP may include the need for additional studies that were not considered necessary to resolve before a decision on approval or rejection of the proposal was reached	
4. Review and formal approval	A process that will result in a decision to proceed or not; and, if the former, under what conditions.	Accountable agency (and other decision makers)

Key failings of many EIA processes evident in the chapters of this publication include:

- Failure to do an SEA or EIA in spite of EIA (and, increasingly, SEA too) being a legal requirement in many countries.
- Failure to prioritize issues to be addressed (achieved by the interpretation of 'significance' by both technical, scientific experts, and interested and affected stakeholders). This results in either skeletal or encyclopaedic reports that are of little value to decision makers.
- Lack of balanced assessments and partiality of consultants who favour the interests of their sponsors (the proponents).
- Impartiality of the approving agency.
- Inadequate definition of sphere of influence and consequent failure to identify induced impacts – secondary or delayed – outside the immediate project area (e.g. a corridor may open access to new resource exploitation possibilities; access roads and quarries needed for construction of a major infrastructure project may be omitted.)
- Failure to analyse cumulative impacts, that is, the combined impacts of a number of projects implemented over a period of time. This is a failing particularly germane to corridor developments.
- Dismissal of associated facilities as insignificant when assessing a megaproject.
- The lack of capacity to implement and monitor the conditions of approval.
- Failure to have influence and impact on decision makers.
- In both EIA and SEA, a tendency exists to consider the product (a report) as the objective. The inclusive and transparent process that results in the final product is equally important.

In spite of the failings of EIA, it is the general consensus of this publication that the tool is the best we have. It is not necessarily the failure of EIA per se, but that of decision makers and developers to understand EIA's importance in helping improve the quality of their decisions (see Chapter 3). This makes evaluation of the capacity and performance of implementing agencies in dealing effectively with anticipated impacts an important and integral requirement in EA processes. If there is limited capacity or 'political will' to implement the EIA's recommendations, this deficit needs to be addressed.

SEA (i.e., strategic environmental and social assessment, sustainability appraisal) it mainstreams and upstreams environmental considerations into the decision-making hierarchy (See Fig. 1.3). As mentioned earlier, the critical distinction between SEA and EIA is in their respective 'entry points'. The Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee SEA task team defined SEA as "a range of analytical and participatory approaches that aim to integrate environmental considerations into policies, plans and programmes" (as opposed to EIA's focus on projects) and evaluate the interlinkages between multiple sub projects with social and economic considerations. (Organisation for Economic Co-operation and Development 2006.) The latter qualification has led some authors to offer the term 'Sustainability Appraisal' as more relevant alternative to the label SEA (Dalal-Clayton and Sadler 2014).

Figure 1.3 Corridor planning in the decision-making hierarchy

Corridor planning in the decision-making hierarchy

PLAN	Broadly defined corridor to link sectors, regions, and countries as part of national development strategy (related to a national policy). Infrastructure needs are defined. May not have geographical expression at this stage.
PROGRAMME	Investment programmes for specific area or sector based on the above strategy. Alternative types and routings are considered (e.g. Road or rail).
PROJECT	Concrete projects inplement the above. Extract routes are defined and technology choices decided.
A corridor may be totally new or build on/upgrade existing facilities	

Policies are developed at the initial stages of planning (and are the pinnacle of the decision-making hierarchy). They establish the frameworks, principles and priorities that will guide the plans and programmes that will put the policies into effect. SEA is a tool to help develop and assess such policies for their sustainability characteristics. Numerous projects (such as infrastructure investments) will then implement them (and must be subject to detailed EIA procedures). The aggregation of such projects leads to a corridor.

SEA allows for stakeholder participation early in the strategic and conceptual stages of the decision-making process. Too often, community engagement in projects is left until the project appraisal stage (EIAs). It, therefore, effectively limits attention to mitigation of anticipated negative impacts and precludes debate on fundamental strategic choices. This is a recipe for antagonism, misunderstanding, lack of trust and conflicts. SEA, through its early engagement in strategic decision-making, can help ensure that environmental (and social) impacts are not left as an afterthought in corridor planning. Engagement at the strategic stage allows greater flexibility in considering alternatives in contrast to projects that have been already well defined and in which investments already made. For example, a corridor based upon fossil fuel extraction will have already passed the stage of feasible consideration of whether or not fossil fuel extraction is a priority for the sustainable development of a country. The assessment will be limited to the risks and opportunities of fossil fuel-based corridor projects per se, not the principle of them (see Chapter 8).

An important tool that is used in SEA is scenario planning (see Chapter 12). This tool systematically considers a variety of futures and helps identify a strategy to achieve a preferred option, preferably with the least ecological and social stresses involved. Planners and decision makers, once they understand the range of future possibilities, can then steer developments in the preferred direction, while taking account of trends that dictate the need for building in resilience of plans, programmes and projects to possible political, technology and environmental changes (see Chapter 10).

Two approaches to SEA exist, with differentiating general entry points:

'Policy-oriented' SEA that helps to develop or evaluate policies and their eventual plans and programmes. This will assess development (of new) or review (of existing) policies and will enable policymakers to better integrate a sector or policy priority into the long-term vision of the sustainable development of a country (see Chapters 2 and 20).

'Impact-centred SEA', which tends to upstream basic EIA procedures to the strategic level and is closely aligned to regional and land use planning, thereby having a physical manifestation not necessarily exhibited in policy-oriented SEA in (1) above.

SEA can therefore have a spatial emphasis (regional assessment) (see Chapter 8), or policy sectoral assessment (see Chapter 22). Impact-centred SEA is the most commonly used form, especially when applied to corridors. This is because there are few specific corridor policies, per se. Other policy priorities drive corridor developments (such as the 'policy drivers' referred to earlier (regional integration, inward investment etc.). Corridors are a means to an end (policy attainment), not a policy in their own right. In the case of corridors, a plan or programme will be implementing a policy or policies.

Finally, SEA is a governance tool. Placing corridors in a strategic plan or programme requires an institution with the capacity to manage the process. As with EIA, some agencies add 'institution-centred' before the term SEA to emphasize the governance need and the futility of making recommendations if there is limited capacity to manage a corridor development programme. Several of the programmes discussed in the publication have established corridor authorities to manage implementation of specific corridor programmes (e.g. SAGCOT in Tanzania, LAPSSET in Kenya).

1.5 Conclusion

Corridors are, by design, transformational developments. This publication highlights the urgency for better planning and management of corridors and postulates some of the good and bad transformations that they will potentially bring about.

The international benchmarks for the necessary environmental and social Performance Standards (including Environmental Impact Assessment requirements) have been well developed by international financial institutions (see Chapter 4). Their effective use is increasing, but it is still largely limited to developments in which international financial institutions are directly engaged and exercise their due diligence.

The entry of relatively new actors in corridor initiatives (such as the BRI) and the current post-pandemic recovery and consequent growth in interest in corridors has increased not only the challenges but it has also created opportunities. A window of opportunity exists for renewed and urgent effort to ensure greater uptake of the appropriate standards. In the final chapter, we recommend some fundamental principles needed for effective corridor design, planning and implementation.

Image credits: Jon Hobbs

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02

Achieving the Sustainable Development Goals through Integrated Approaches to Development Corridor Planning

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ABSTRACT

Many corridors are developed with a long term 'vision' but this is usually limited to short-term- economic and geopolitical benefits. Rarely is there a vision based on sustainability principles. The United Nations' 17 Sustainable Development Goals have been agreed at the international level. In many cases they have also been 'domesticated' into national level development strategies, at least in part. Corridor plans need to relate to these and ensure that the long term 'vision' for them is supportive of, and aligned to, SDG attainment. To achieve this an integrated approach is needed that will address the disjointed sectoral approaches that currently prevail. An important tool by which to achieve this in a systematic and structured way is Strategic Environmental Assessment (SEA).

2.1 Introduction

The Sustainable Development Goals (SDGs) are a development framework led by the United Nations that, although non-legally binding, national leaders have committed to deliver within their own national contexts by 2030. The SDGs are mobilized around 17 development goals, 169 targets and a commitment to equitable development, captured in the pledge to "leave no one behind" (United Nations 2015). It is generally assumed that development corridors will contribute to the achievement of the SDGs. Indeed, the potential for the resources needed to achieve Agenda 2030 to be unlocked through development corridors has been recognized at national and international levels.

"The Belt and Road Initiative, given its massive investments and financing flows, can potentially unlock the resources needed to achieve the 2030 Agenda for Sustainable Development"

United Nations Under-Secretary-General, Tegegnework Gettu at the 2018 High-Level Policy Forum on Global Governance (Gu, Corbett and Leach 2019).

Given the extensive financial and political resources that are being diverted to corridor implementation, it is essential that this potential is realized. Recent research, however, has highlighted that development corridors often generate very uneven impacts and exclude vulnerable populations (Hughes 2019; Lesutis 2019; Bersaglio et al. 2020; Chome 2020;). In fact corridors often involve a range of large-scale social, political, economic and environmental trade-offs.

In many ways, this is not surprising. A diverse range of development objectives are pursued through corridors and the SDG agenda is clear that the SDG's can produce a range of positive and negative interactions, wherein progress towards one goal may support or limit progress towards another. Using coal to further energy access targets under SGD 7, for example, could accelerate climate change and ocean acidification, counteracting progress to SDGs 13 and 14 (Nilsson, Griggs and Visbeck 2016). For these reasons, the SDG development framework emphasizes that SDG goals and targets must not just be ticked off, one by one. Rather, the SDGs, including the means of implementation, are "indivisible and interlinked" (United Nations 2015, p. 36) and they should be planned for coherently.

Achieving such integrated development planning, however, is not straightforward. The SDGs rely on governments and other stakeholders, determining their own strategies for 'domesticating' the SDGs into national development planning. Yet the governance challenges required to implement such integrated policymaking goes largely unaddressed in the SDG framework. The conceptual underpinning of SDG interactions is also in its infancy (Nilsson, Griggs and Visbeck 2016; Fuso Nerini et al. 2018).

In this chapter, I draw insights from the SDG and development corridors governance landscapes in Tanzania and Kenya to outline ways in which integration of the SDGs is currently fragmented in development corridors; and fragmented to an extent that development synergies and trade-offs are not being considered holistically at any point in the development process. With this insight, I close this chapter with a discussion on impact assessment, asking whether and in what ways Strategic Environmental Assessment (SEA) processes might be able to overcome this fragmentation to support coherent delivery of the SDGs.

2.2 Domesticating the SDGs in Kenya and Tanzania

At the national level, Kenya and Tanzania have seemingly quite developed policy and institutional environments for implementing and monitoring the SDGs, which are summarized in their latest Voluntary National Reviews (VNRs) of the SDGs, presented to the United Nations High Level Political Forum (Republic of Tanzania 2019; Republic of Kenya 2020). Both countries pursue state-led development frameworks,[13] which are operationalized in five-year, medium-term plans.

In their VNRs, Kenya and Tanzania are described as having mainstreamed the SDGs into these development blueprints through the latest five-year plans, as well as in the five-year County Integrated Development Plans under Kenya's devolved governance system. These national five-year plans are intended to guide the activities of all ministries, departments and agencies (MDAs), and both countries accordingly give government agencies responsibility for mainstreaming the SDGs into sector plans. Both Kenya and Tanzania have also mobilized a range of institutional infrastructure to support SDG coordination, including through the national finance and planning ministries, and initiated national monitoring frameworks through the National Bureaus of Statistics.

Implementation and ownership of the SDGs nevertheless, remains varied and fragmented. The current five-year plans in both Kenya and Tanzania note their alignment with the SDGs (Republic of Tanzania 2016; Government

13 See – Kenya Vision 2030 (Republic of Kenya, 2007) and Tanzania Vision 2025 (Republic of Tanzania, 1999).

of Kenya 2018;). Yet, in practice, not all SDGs are explicitly addressed within either country's current five-year plan. Moreover, SDG synergies and potential trade-offs are not directly considered in these high-level development strategies, with other related documents, such as Kenya's Roadmap to SDG implementation, also failing to directly consider SDG synergies and trade-offs (Government of Kenya 2016).

Fragmentation is also seen at sector level. Many sectoral plans were developed before the SDGs were mainstreamed, meaning SDG integration often lags behind, or remains a parallel agenda, until the next sector plan is due. Where the SDGs have been introduced in sector plans, the extent to which the SDGs are given explicit consideration also varies. And in interviews conducted during our research with the Development Corridors Partnership (Gannon et al. 2022), respondents from national MDAs in Kenya and Tanzania suggested that the SDG framework has only a very limited role in directly shaping institutional strategies in practice.

Domestication efforts have also generally focused on vertical integration – mainstreaming the SDGs into sectors from national to local levels – with less investment given to building horizontal linkages between sectors and departments. National policymakers and planners typically operate in silos and face a range of other budgetary and institutional barriers to working together (Pardoe et al. 2018; Averchenkova, Gannon and Curran 2019; Newell et al. 2019). As a result, sector development plans are typically being developed by individual sectors, with limited coordination. If these plans consider the SDGs, they generally focus on individual SDGs, related to their own mandates, in isolation from other goals.

What this means is that multiple public bodies – with different levels of commitment – ultimately have responsibility for different aspects of SDG implementation, and opportunities for strategic management of development synergies and trade-offs are inevitably limited by this structure. As such, Kenya's latest VNR explicitly identifies weak institutional coordination as "*the key challenge* to implementation of the SDGs" (Republic of Kenya 2020: p 9 emphasis added).

2.3 Delivering the SDGs in Development Corridors

Development corridors bring together different policies, institutions, and multiple interlinked investments. The Lamu Port, South Sudan and Ethiopia (LAPSSET) Corridor in Kenya, for example, includes a range of envisaged transportation infrastructure investments (port, oil pipelines, road and rail networks). But it also has other projects attached, such as hydropower development and a series of development zones and activities, focused particularly on agricultural development, tourism and urbanization. In this way, corridors cross-cut multiple SDG development objectives, and thus appear quite responsive to achieving the integrated approach to development set out in the SDGs. By creating new spaces in which actors interact, and serving as a focal point in the activities of multiple sectors, corridors also have potential to serve as a particularly effective space to harness synergies across SDGs, to amplify and upscale their achievement.

This integrated planning, however, is not happening in practice, and there are some notable reasons for this. Firstly, institutions within corridor landscapes sit within the fragmented policy integration landscape already discussed. As a result, MDAs active in corridors often lack clear mandates to (holistically) consider their contribution

to the SDGs in their work. Secondly, development corridors are generally branded as a single initiative and African governments sometimes create an institution or agency to coordinate the development of a given corridor. In Kenya, the LAPSSET Corridor Development Authority (LCDA), for example, was established in 2013 through a presidential order to "plan, coordinate and manage the implementation of [LAPSSET]" (LCDA 2020), while the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) Centre works as a broker and catalyst of partnerships in the Southern Agricultural Growth Corridor of Tanzania (SAGCOT 2018; and Chapter 9). Yet, despite this, corridors are actually being mobilized as a series of quite independent projects and programmes, which cut across the institutional mandates of different government departments and often develop quite incrementally.

Thirdly, countries are generally not adopting specific high-level strategic development corridor policies to guide corridor development. Where development corridor policies and plans do exist, attention given to the SDGs is mixed and often focuses on individual components of corridors.

This inevitably limits the opportunity for decision makers to consider cumulative impacts, and potentially synergistic or conflicting interactions, across different elements of the corridor.

Fourthly, corridor coordinating bodies do not necessarily have the political power to enforce a corridor strategy, even if they were to develop one (see Chapter 3). Fifthly, systematically considering and evaluating the relationships between the SDGs and planned corridor interventions is no easy task. There is limited empirical or theoretical research understanding how the SDGs and corridors interact, in theory or in practice, and policy makers do not necessarily have the tools and capacity to coherently assess potential and realized development interactions and trade-offs over time and space in corridors.

The implication of these fragmented corridor governance landscapes is that they rely on the MDAs of individual sectors to take the lead on mobilizing – and coordinating – the SDGs within corridors. There is likely to be a lack of clarity across sector MDAs, surrounding how policies will be jointly implemented. Weaker MDAs, such as environment ministries, are likely to be less well positioned to negotiate terms of collaboration and ensure policy alignment (Averchenkova, Gannon and Curran 2019). Not having a highly placed institution with a clear strategy and mandate to lead and coordinate implementation can also limit opportunities for the public sector to signal direction to other stakeholders. This is especially relevant in corridors where delivery hinges on international investment and private sector finance.

Such fragmentation also risks parallelism, duplication of efforts and incompatibility across activities and initiatives, as well as conflicting and inefficient plans and actions. It also inevitably means opportunities to maximize efficiencies and synergies across SDGs and development action are being missed. And trade-offs will likely be made, at least in part, as an outcome of the power structures between individual actors, rather than as a result of strategic management decisions.

2.4 Development synergies and trade-offs in development corridors

Monitoring and evaluation of the development outcomes of corridors, especially in relation to the SDGs, are also fairly limited. This is exacerbated by notable data gaps and chal lenges, which in some cases are made worse by political and legal sensitivities surrounding

corridor implementation limiting data access. As a result, there has often been limited understanding of how corridors are delivering on the SDGs and of what kind of development is being realized through corridors, and for whom. Recent research from inside and outside the Development Corridors Partnership, however, has observed some of these trade-offs materializing in East Africa's development corridors with enormous social and environmental consequences.

In recent research published in Gannon et al. (2022), for example, with colleagues from the Development Corridors Partnership, we explored the way in which development actors understood the SDGs to be interacting within five development corridors in Kenya and Tanzania, using a research design based on Q-Methodology. Through this approach, which uses factor analytic techniques, we identified shared understandings around the ways in which key actors involved in the design and delivery of these corridors perceive corridors to be likely to support, or limit, achievement of the SDGs within the Agenda 2030 timeline. In doing so, we also mapped key interactions between SDG goals and targets identified by these stakeholders using the SDG interactions framework developed by Nilsson, Griggs and Visbeck (2016).

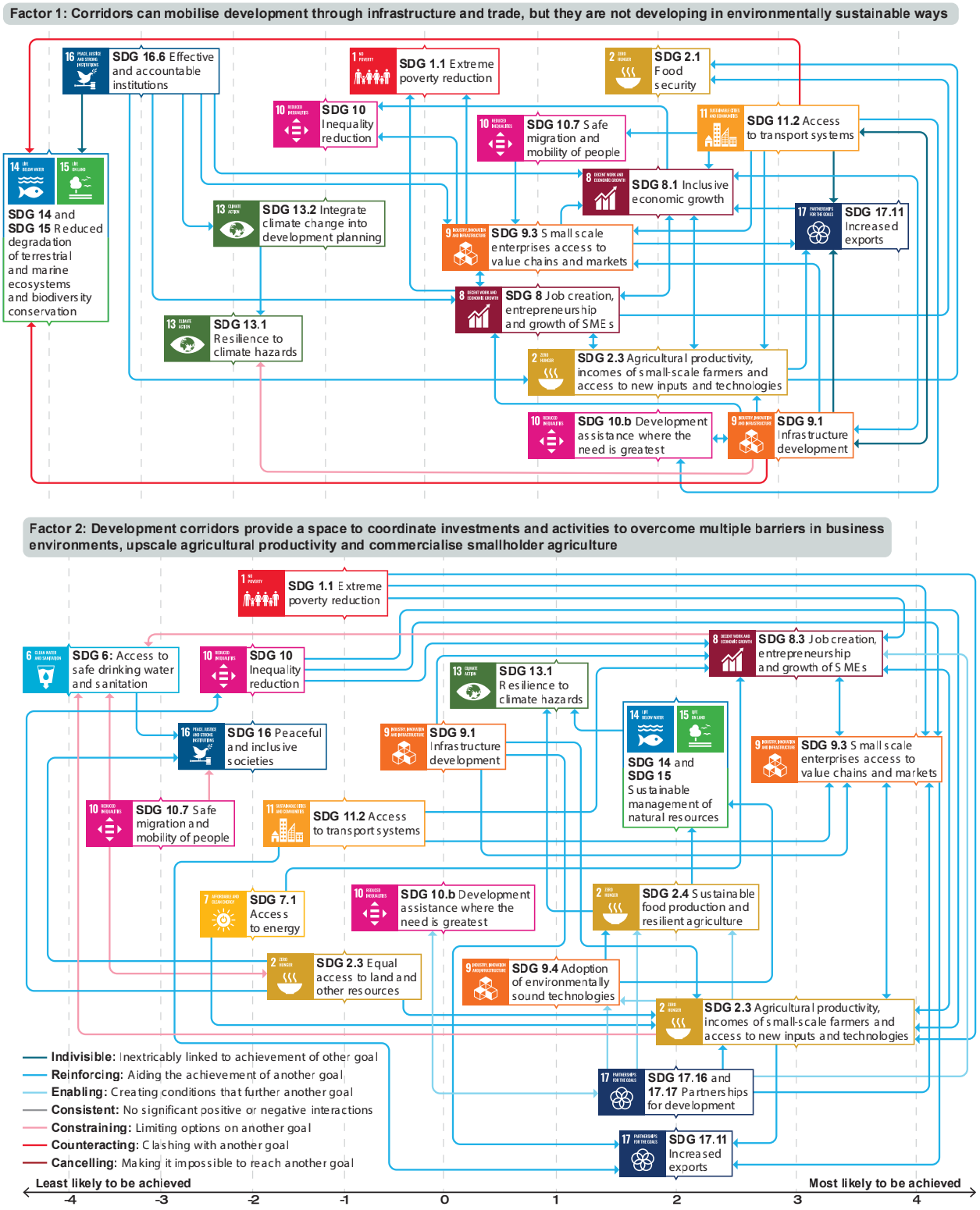
The most prominent interactions identified by respondents, and the perceived likelihood of these occurring, are represented in Fig 2.1. These viewpoints ('factors') identified in the research highlight perceived trade-offs and inequalities in progress towards SDG goals and targets in corridor development trajectories, suggesting notable opportunity for learning and reorientation. Specifically, they identify ways in which, following current corridor trajectories, progress towards some SDGs is likely to directly threaten progress towards other goals and targets. Of particular note, the analysis identifies biodiversity conservation (SDG 14/SDG 15), sustainability (SDG 11, SDG 12, SDG 13) and secure and equal access to land (SDG 2.3) to be potential trade-offs to other development gains in current corridor trajectories and suggests corridors are not on track to achieve the Agenda 2030 pledge to 'leave no one behind'.

Our analysis nevertheless also suggested stakeholders mostly find SDG goals and targets to be synergistic in corridor landscapes (i.e. progress towards one of the goals creates conditions that aid the achievement of others). It also identified specific clusters of goals and targets that stakeholders consider to be directly mutually reinforcing and which should be strengthened and addressed in parallel, to harness synergies, and upscale and maximize development within corridors.

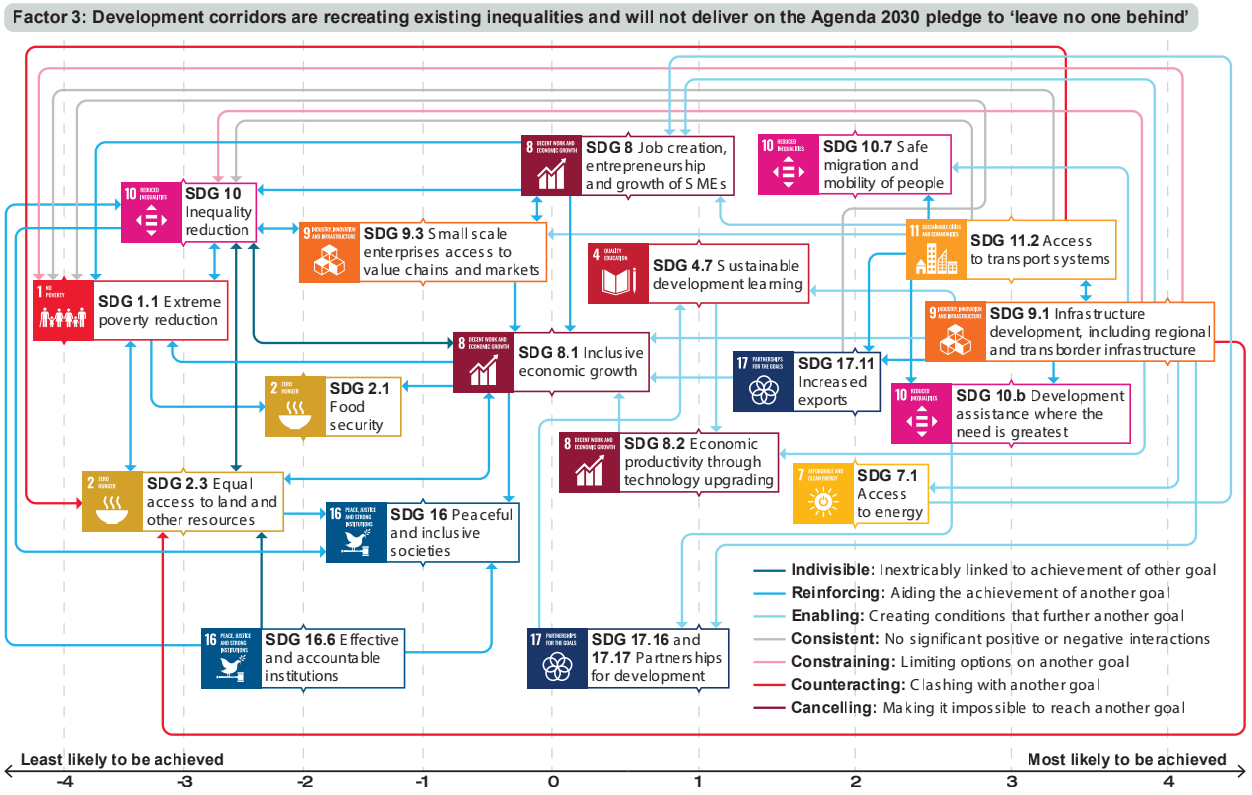
Successful development corridors were seen to depend, for example, on the development of a backbone of supportive infrastructure (SDG 9); to connect remote regions (SDG 10 and SDG 11); to enable trade and exports and promote economic growth (SDG 17 and SDG 8); to attract and remove barriers to further investment (SDG 17); to mobilize an enabling environment for businesses (SDG 9); to support, particularly agricultural, value chain development (SDG 2); and to support economic productivity and growth (SDG 8). Indeed, in our research these development objectives were seen as inextricably linked to the achievement of each other in corridors.

The research, however, also emphasized that hard infrastructure investments alone will not deliver the broader social benefits, agricultural transformation and employment creation that is envisaged within corridor development paradigms. Rather, if corridors are to benefit surrounding communities and mobilize wider investment, the social, economic and physical development of corridors requires strategic coordination, and packaging of investments, to harness synergies and address broader barriers in business-enabling environments and economic participation. It was apparent that the development actors interviewed in our research did not consider these synergies to be being maximized in any of the corridors explored within the study.

Figure 2.1. Key SDG synergies and trade-offs envisioned in development corridors by each factor viewpoint. Reproduced from Gannon et al. (2022)



SDG interactions interpreted through the Q-Methodology factors in Gannon et al., (2022) are represented using Nilsson et al.'s (2016) seven-point SDG interaction framework. Uni-directional relationships (objective A affects B, but B does not affect A) are indicated with a uni-directional arrow, and bi-directional relationships (objective A affects B, and B affects A) are indicated with a bi-directional arrow. Key SDG goals and targets for each factor are arranged along an x-axis, according to the position their corresponding Q-statement was given on the Q-Methodology grid in the original study.



2.5 Delivering the SDGs through corridors: An integrated governance challenge

Notably, participants in our research in Gannon *et al.*, (2022) did not view any of the SDGs to be fundamentally incompatible in corridors (International Council for Science 2016; Nilsson, Griggs and Visbeck 2016). Instead, negative interactions between SDGs were seen to signal priority areas for policy reorientation, and where new or strengthened safeguards are required, to maximize positive SDG interactions and minimize negative ones. Managing development trade-offs – and maximizing development synergies – in corridors is therefore a governance challenge.

In the context of the fragmented governance landscape outlined above, the scale of this challenge cannot be underestimated. Indeed, more generally, the institutional landscape is an area where our research suggested development actors in Kenya and Tanzania consider corridors to be currently performing least well. Among those included within the study, SDG 16.6, "Build effective, accountable and transparent institutions" was the SDG target that respondents considered least likely to be achieved within corridors (Gannon et al. 2022).

Corridors are a product of their broader institutional and political environments, so many corridor governance challenges can only be addressed at national levels. For example, equitable and sustainable development in corridors is likely to require notable investments in land tenure institutions and in reforming weak land tenure to protect corridor communities, and women in particular (PRIndex 2020), who may otherwise lose access to resources, rather than benefit from the arrival of a corridor. However, the idea that governance challenges often coalesce around policy enforcement, rather than an

absence of sustainability, environmental protection and inclusion policies, was an idea echoed by respondents in our research in both Kenya and Tanzania. Respondents suggested, for example, that there is little evidence of the integration of climate risks into Kenya's development corridor planning processes, despite Kenya having a strongly developed climate change strategy and institutional structures. Strengthening enforcement of existing policies is therefore also likely to be an important step in enhancing the delivery of SDGs in corridors.

Image credits: Kate Elizabeth Gannon

The appearance of these trade-offs and synergies in corridor contexts, however, also reemphasizes the need to develop more coordinated and cross-sectoral forms of corridor planning. This needs to support high-level, systematic and proactive assessment of potential interactions across different policies, investments, projects, institutions and sectors, and to make space to account for the trade-offs and complementarities that emerge around action taken to mobilize interdependent SDGs.

Overcoming current fragmented and siloed corridor and SDG governance landscapes will require learning from the growing literature on policy coherence and integration (Pardoe et al. 2018; Averchenkova, Gannon and Curran 2019; Newell et al. 2019), which suggest a number of specific policy recommendations outlined below.

Recommendation 1:	The importance of cross-sectoral coordination on the SDGs, and within development corridors, needs to be recognized at a high level (Office of the President).
Recommendation 2:	Reaffirming and strengthening responsibilities for delivering and coordinating on the SDGs among corridor coordinating authorities (such as LAPSSET Corridor Development Authority and SAGCOT Centre), as well as across other public MDAs active in corridors, is likely to be key.
Recommendation 3:	MDA SDG monitoring frameworks should be strengthened to identify broader responsibilities for delivering the SDGs, outside of sector silos, and coherent SDG indicators should be integrated within corridor monitoring and evaluation (M&E) frameworks (e.g. researchers from the Development Corridors Partnership, in collaboration with the SAGCOT management authority [SAGCOT Centre], have sought to directly seed SDG indicators within the evolving M&E framework: the SAGCOT Strategic Plan Results Framework).
Recommendation 4:	Continuing to enhance, enable and resource interministerial and multi-stakeholder corridor fora may support inter-agency strategic management of SDG interactions in corridors and support policy coherence.
Recommendation 5:	Consultative and participatory development of an overarching corridor strategy, which sectoral ministries can use to update and review their own policies and plans, may also support SDG policy coherence in corridors.
Recommendation 6:	MDAs need to be compelled or encouraged to collaborate in strategic corridor management processes (e.g. through empowering corridor coordinating authorities or allocating specific budgets for cross-sectoral corridor planning and projects).
Recommendation 7:	Investments in capacity-building and tool development are needed, to support decision makers to navigate integrated corridor development planning.

2.6 A way forward through Strategic Environmental Assessment?

Image credits: Kate Elizabeth Gannon

Strategic Environmental Assessments (SEAs) are environmental assessment processes carried out at strategic levels of decision-making. Research recommends their use by a range of development actors, including national governments and their development partners, to support a high-level, upfront, proactive and integrated assessment of sustainability issues in the design of policies, plans and programmes, including in assessment of policy objectives and alternative strategies. Within complex, multidimensional regional integration and spatial planning initiatives, such as development corridors, SEA processes may therefore be able to offer a key function as a systems-oriented tool to pre-emptively explore potential interactions across the different policies, investments, projects, institutions and sectors incorporated within corridors to support an assessment of potential conflicts and synergies across high-level development objectives; and to facilitate more integrated assessment of their anticipated cumulative outcomes to inform decision-making (Madrid, Hickey and Bouchard 2011; Hegazy 2015). Such an approach may therefore be responsive to examining interdependencies across SDGs in corridor landscapes and to making strategic choices about manging the environmental, social and economic trade-offs associated with the SDGs, across multistakeholder groups, that are currently overlooked within the current fragmented governance landscapes.

However, SEA is also not reliably or routinely being applied in corridors. Meanwhile, the more widely employed Environmental Impact Assessment – which is focused on assessing

and managing the impacts of specific projects – faces well-recorded challenges around late application in the decision-making process, low technical standards, enforcement and buy-in. Many of these have been outlined in Chapter 1 and are elaborated on in later chapters.

A final specific recommendation from this research is, therefore, that opportunities to revise and enhance SEA approaches, to support coordinated alignment of development corridors with an integrated SDG agenda, should be investigated and prioritized by corridor coordinating institutions, national governments and their development partners. Particular consideration should be given to the questions of at what stage and by whom SEA should be undertaken, if SEA is to avoid reproducing and reinforcing the current fragmentation in corridors and eschew outcomes led by institutional hegemony, rather than strategic balancing of development objectives. There is much to be learned from the following chapters of this publication to facilitate this process.

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03

Tackling the EIA Impact Gap: Addressing Political Economy Realities to Bring Actual Practice Closer to Best Practice

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ABSTRACT

Environmental impact assessment (EIA) processes are intended to serve as crucial mechanisms to identify and address social and environmental impacts of proposed development projects, including corridors. In practice, key aspects of these processes – the production of EIAs, consultations around the findings and implications of reports, and the actual use of the content of reports to inform key project decisions – are at times considerably distorted by power and incentive dynamics rooted in the political economy of a given context. The result is too often watered-down 'box-ticking' exercises in which the impact of the EIA process on social and environmental protection is greatly reduced. Technocratic approaches that emphasize best practices and capacity on their own will not improve the performance of EIA processe. Politically savvy approaches are needed to address the political challenges associated with EIAs. In exploring these issues, this chapter concludes with some specific examples of what politically informed approaches to more impactful EIA processes might entail.

3.1 Introduction

Successful development policies and reforms must bring together form and function; that is, ideas for 'good practice' with real-world steps to put these into meaningful practice. Without the latter, the former can become superficial victories which fail to have a meaningful impact. That is, institutions and policies that do not end up doing the main things they 0were created to do. Unfortunately, reforms on paper are often unmatched in reality when it comes to various areas of development practice.[14] Environmental impact assessment (EIA) processes are no exception.

14 These points were underscored in the World Development Report by World Bank (2017) and have animated the work of development practitioners across the world, including those contributing to the TWP Community of Practice such as Laws and Marquette (2018).

At a broad level, EIA processes are intended to:

- produce timely, relevant and reasonably comprehensive analyses that anticipate the main environmental and social ramifications of a particular development project;
- engage the broader population of a community, region or country for input, scrutiny and feedback on these findings; and
- deploy the outcomes of the assessment and subsequent feedback to inform decision-making about whether projects should proceed or not and, if so, what plans can be put in place to avoid or mitigate negative social and environmental consequences of the project and measures needed to enhance potential positive impacts.

However, even while becoming fairly ubiquitous legal requirements, EIA processes rarely function as intended, falling short at various points along the way and too often becoming mere 'box-ticking' exercises, particularly in developing countries.[15]

While much attention has been paid to the technical causes of EIA under-performance, there is another set of factors that merits close consideration. Major misalignments on the political front often prevent the potential of EIA from being realized. These misalignments of power and interests – long recognized in the literature,[16] but rarely tackled in EIA practice – cannot be adequately addressed through technocratic interventions focused on increasing knowledge of best practices and capacity to implement these. This chapter explores how political context can contribute to EIA impact gaps, and how these concerns can be addressed more systematically to enhance EIA performance moving forward.

3.2 EIA processes – best practice versus actual practice

3.2.1 EIA production

The cornerstone of an EIA process is the actual assessment itself, the piece on the basis of which subsequent discussions, planning and action would be built, and key decisions informed. The activities and decisions associated with the production of an EIA would ideally involve the decision to carry out an EIA for a relevant project and the production of as complete, accurate, unbiased, and contextualized an assessment of the anticipated environmental and social risks as possible, based on the best available information and analysis. Table 3.1 compares notions of best practice in various aspects of EIA production with some of the suboptimal practices that often actually emerge in their place.

15 See Kolhoff et al. (2018) on EIA performance in low and middle income countries, assessed on both procedural and substantive grounds.

16 Formby (1990) almost in its entirety resonates with many of the political factors impeding EIA performance three full decades later.

Table 3.1.Best practice vs Actual practice in Environmental Impact Assessment production

	Best practice	Actual practice
Screening	Decisions about whether an Environmental Impact Assessment (EIA) is required made on the basis of project size, anticipated scale of impact, nature of project or sensitivity of potential area in question.	Government decisions are sometimes made on the basis of a desire to minimize costs and inconvenience to project developers, resulting in some projects not requiring an EIA when they should on the basis of best practice criteria around significance and/or magnitude of impact (e.g. a project may be split into smaller components so it does not reach the size or impact threshold that would trigger an EIA process).[17]
Scoping	Identification of the issues, types of impact, indicators and geographic areas to be covered in the assessment on the basis of relevance and appropriateness.	Inadequate or incomplete coverage of the reach and of important variables shaping likely environmental and social impacts.[18]
Prediction	Forecasting likely social and environmental effects of projects, specifying their probability and magnitude with reasonable accuracy, and adequately contextualized.	Absence of specification of assumptions behind predictions and of range of uncertainties, resulting in inaccurate or partial assessments and misdirecting where to focus mitigation efforts.[19]
Evaluation	Unbiased assessment of significant impacts and the acceptability of unavoided or unmitigated impacts.	Biased reports[20] and acceptability decisions skewed in favour of projects proceeding;[21] thresholds are set too high, allowing more risks to stay unmitigated.

17 For example, see Enriquez-de-la-Salamanca (2016) for a discussion of "project-splitting" as a way to circumvent EIA requirements.

18 For instance,a study of Sonter et al,(2017) finds that by controlling for broader spatial determinants of deforestation caused by mining project , the actual impact of project is 12 time higher han that the figurestated in respected mining leases.Yet, because of the inadequacies of the orignal EIA, The burdens of the cost for addressing such colossol difference between the anticipated impact and actual impactadn passed from campany to society (Laurence and Salt, 2019)

19 For instance, through an analysis of environmental impact statements and decision documents, Tenney et al. (2006) found that 43% of such documents do not mention uncertainty or indicate potential variability in the numbers presented and 23% in of the documents, uncertainty was alluded to but not explicitly referred to as uncertainty.

20 See, for instance, Human Rights Watch's (2012) reporting on inaccurate, at times deliberately falsified, EIA reports. One of the cases they looked at of EIA reports in India involved significant amounts of the text having been cut and pasted from an EIA for a bauxite mine in Russia.

21 The Grez et al. v. Environmental Evaluation Service of Chile climate change litigation case in Chile underscores the non-technical basis for some determinations of acceptability/favorability (2018).

3.2.2 EIA consultations

In theory, meaningful public participation in EIA processes is a fundamental tenet of good environmental governance.[22] Public consultations are the main vehicle for such participation, typically by way of public hearing or workshop (although in some developing country and remote rural situations this may include other forms of popular engagement in some circumstances such as role play). There are some generally accepted principles of good practice in EIA consultation,[23] which are set out alongside the typical reality of each of these, in Table 3.2.

Table 3.2. Best practice vs Actual practice in Environmental Impact Assessment consultation

	Best practice	Actual practice
Participants	Inclusive participation, drawing on a range of relevant stakeholders (both interested and affected)[24] including marginalized groups, e.g. indigenous and local communities, women, youth, etc.	Often limited or narrow groupings of participants chosen on the basis of their likelihood of acquiescing or supporting a project, rather than more comprehensive representation of interested and/or most affected parties.[25]
Nature of participation	Meaningful dialogue among participants sharing their different perspectives and being confident that their views will influence outcomes.	One-way information transfer from companies or governments to participants, more like passive 'briefings' than active discussions; exercise to collect a list of participants and appear to have consulted them, while actually doing little more than assembling them.[26]

22 Arnstein (1969) provides a useful typology for understanding different forms of participation, including those that are far from "meaningful" and amount to masked non-participation or some form of tokenism.

23 For instance, the International Association for Impact Assessment has compiled a FasTips series -- an expansive list of different forms of IA -- aimed at assisting EIA professionals with practical insights on applying best practices (IAIA, 2018).

24 See Hobbs (2020) for discussion of "affected" versus "interested" stakeholders and the different perspectives they represent. The latter tend to be most concerned with whether or not mining is desirable at a national economic level while the former are most concerned with the more localized and immediate effects of mining projects. While there is not yet agreement on best practice around interested versus affected parties in EIA consultations, one might assume that ideally there should be some combination of the two and that decisions on participation would be made on the basis of relevance/appropriateness rather than the anticipated speedy acquiescence of certain stakeholders.

25 See Wells-Dang (2016) for various examples of this from the Mekong region. Another study, in the Maldives, found no regulation in place that would ensure the notification of affected communities prior to either for the report preparation phase nor the preview phase and suggests that criteria for participation can lead to de facto exclusion of various groups (Zuhair and Kurian, 2016, p.134).

26 Capturing this problem, a study in South Africa concluded that in the mining and gas industries, stakeholders, during participatory processes, expressed "concern that despite engaging with the public participation process they do not feel confident that their concerns would be incorporated into the decision making. They were specifically concerned that their raised issues would be subordinated to the economic and strategic resource development agenda of the development" (Simpson and Basta, 2018, p.67).

Capacity/ technical expertise	Participants have requisite expertise to engage with subject matter of consultations effectively, or access to intermediaries to help them to do so.	Major asymmetries between project proponents and participants, the latter often lacking the capacity (including language skills) and access to technical expertise to participate effectively.[27]
Timeframe	Sufficient time is allocated for participants to digest relevant information and prepare for effective participation.	Short timeframes that do not allow participants to review information, meaningfully deliberate and formulate an informed response.[28]
Timing and frequency	Begins early enough in project development to have an influence on eventual decision-making and is iterative/ongoing throughout the lifetime of a project.	Typically, a one-off event that takes place after key decisions have already been made and sometimes, even after projects are already under way.[29]
Inputs	Transparency of (and access to) all relevant information on key issues covered in the assessment, provided in an impartial, contextualized, accessible and culturally appropriate form.	Information given to participants is sometimes biased, misleading (including inflating potential benefits) or incomplete; and often is presented in long, highly technical reports that are inaccessible to anyone who is not a technical expert; dissemination often culturally insensitive.[30]
Outcomes	Consultations inform and influence subsequent decisions to grant or refrain from granting an environmental license, and actions taken to mitigate environmental and social impacts of project in question.[31]	Consultations tend to be one-way information transfers to those being 'consulted' and rarely do they serve to collect and apply input to key decisions or actions, some of which may well have already been taken prior to the consultation in question.[32]

27 Simpson and Basta (2018) also note that mismatches between educational and language requirements and the realities of would-be participants, could impede meaningful participation by local populations (Simpson and Basta, 2018, p.67).

28 For instance, meaningful Aboriginal participation in EIA in Canada has been undermined by shorter timelines, in the name of government efficiency and industry desire to streamline EIA processes. They require the communities to provide comments or concerns in writing within 21-45 days, with the anticipated timeline for government's decisions 30-90 days from time of notification (Udofia, Noble and Poelzer, 2017).

29 For instance, in India, in 2012 the Ministry of Coal pressured the Ministry of Environment to exempt coal project expansion under a certain production thresholds from public hearings in order to hasten clearance (Government of India. Ministry of Environment and Forests, 2014).

30 From a study of EIA in Sub-Saharan Africa, the authors noted "Project documents are often drafted in technical language, preventing proper understanding except for the well-educated few. Such lack of understanding may be to the advantage of government authorities who wish to ensure that project implementation is not unduly delayed" (Kakonge, 2012, p.311).

31 Good participatory EIA consultations should "allow directly affected communities to influence decisions about whether a project should go ahead in their area; to negotiate social and economic benefits to compensate for environmental degradation and loss of land; to increase the accountability of companies to communities; and to guide a company/government in managing the conflict and tensions that often arise in response to large-scale extractive projects" (McCullough, 2016, p.2).

32 Wells-Dang et al. (2016), p. 43.

In short, although there are examples of better performance, the reality of public participation in the EIA process can deviate considerably from good practice in almost every way (Udofia, Noble and Poelzer 2017, p. 172).[33] Indeed, in some contexts public participation in EIA consultations has been described as "a sham process intended to legitimize development projects rather than give communities the power to reshape or veto projects" (Barandiaran and Rubiano-Galvis 2019, p. 1). In other contexts, formal participatory tools have been described as "empty bureaucratic procedures" and circumscribed spaces to merely formalize "irreversible decisions" (Merino 2018, p. 75 and p. 77). As Merino notes, one of the risks of such weak participatory mechanisms in EIA processes is the possibility of precipitating conflict as communities and civil society feel that their rights, concerns and frustrations are not being meaningfully addressed through existing formal channels.[34]

3.2.3 EIA use

A good EIA process does not end with the production of a report and a consultation deliberating on some of its findings. Rather, these should serve as inputs into subsequent decisions around whether or not to proceed with a project and, if so, how to address anticipated social and environmental challenges (as noted in the introduction to this volume).[35] However, even when solid assessments are completed and feedback is collected through participatory mechanisms and integrated into decision-making processes EIA impact can be undermined by subsequent inaction. As Wells-Dang *et al*. (2016, p. 36) note, "impact assessment frequently has become a bureaucratic and technical exercise emphasizing the writing and approval of a scientific document, rather than part of a holistic planning process to inform decision-making."

33 Interviews of EIA experts from a variety of stakeholder groups and working on a range of geographies, conducted by CCSI, underscored this point across the board.

34 For instance, conflict erupted at the Conga Mine in Peru, when the Ministry of Energy and Mines approved an EIA over the objections of communities both to key provisions of the EIA EMPs and to the limited consultations on it. The conflict escalated, with 5 casualties and 10 of protestors injured in 2011, followed by protracted struggles that ultimately ended in the project being abandoned in 2016 (Merino, 2018, pp.76-78).

35 As Formby (1990, p.193) notes, "the ultimate purpose of EIA is not just to assess impacts: it is to improve the quality of decisions (...) EIA in its most useful sense is not just a quasi-scientific exercise in predicting the impacts of proposals on the natural environment. It should be an effective part of the decision-making process which integrates elements of social and natural scientific research, public participation, administrative review and political decision-making."

Table 3.3 Best practice vs Actual practice in Environmental Impact Assessment use

	Best practice	Actual practice
Impact on decisions on fate and terms of project	Environmental impact assessment (EIA) report and consultations would inform decisions about whether or not to proceed with a project and terms for doing so.	Key project decisions often already made even before EIA report is completed and report "sits on a shelf" without further action being taken.[36]
Development of environmental management plans	Design of an overarching environmental management plan (EMP) containing layers of action plans to effectively manage key anticipated environmental and social impacts; these would include assignment of responsibility for different aspects of these plans to specific actors with the capacity to undertake such responsibility effectively; and the above would be undertaken prior to start of operations.[37]	Under-developed, ill-specified or non-existent EMPs[38] incomplete plans that address, at best, natural environmental, but not social impacts; in those cases, where plans are developed, they can often be weak (e.g. covering little beyond compensation for damage)and/or inactionable, not adequately specifying requirements, steps to be taken and parties to be responsible for these (this last point is a particular problem for social impacts as appropriate responsible parties are not always obvious), nor ensuring capacity for responsibilities to be effectively undertaken.
Implementation, monitoring and enforcement of implementation plans	Efforts to put action plan commitments in practice, with mechanisms and requisite capacities among relevant agencies to monitor progress, update EIA report as project unfolds, monitor compliance of conditions of approval, and enforce commitments.	Uneven implementation of EMPs, with little effective oversight and few consequences for non-implementation.

36 See Zhang et al. (2012) on the importance of EIA use (or lack thereof) in decision-making processes and factors that influence this based on an extensive literature review through 2011. Locating the crux of EIA impact in EIA use, they argue that "to achieve the substantive effectiveness of EIA, the linkage between EIA and decision-making plays a crucial role in the extent to which EIA can make a difference" (Zhang et al., 2012, p. 153). Jay et al. (2017) also underscores the limited impact of EIA on decision-making.

37 These principles are derived from the World Bank's (2018) analysis of responsible agricultural investment.

38 See, for instance, a case study from India. Rathi (2018, p.421) refers to environmental management plans as "the most important output of the EIA process especially for the developing countries where priority is on the economic development by way of development projects and the EIA process has inherent weaknesses." However, the study of over 80 EIA reports for environmentally approved projects found that environmental management programs were generally weak and not taken seriously by either EIA professionals or decision-makers.

3.3 Political realities and EIA performance

When it comes to the question of why EIA practice frequently diverges from principles of good environmental governance, the technical reasons have been widely explored, and in some cases addressed.[39] There can be no doubt that capacity limitations (institutional deficits) can undermine EIA performance, particularly in developing countries. However, EIA performance, including the capacity considerations above,[40] can also be compromised by the political contexts within which EIA processes unfold as the "implementation of EIA is highly constrained by extensive politicization and bureaucratic intervention" (Zhang, Kørnøv and Christensen 2013, p. 153). This reality is regularly confronted by EIA professionals who can find the impact of their best efforts at technically strong assessments, capacity development, and theoretically sound processes being significantly undermined by the decisions and actions of actors powerful enough to manipulate or flout national policies, regulations and guidelines around EIA without major repercussions. No amount of technical knowledge or capacity transfer will address such impediments to better EIA performance. As Formby notes:

The disadvantage of the technocratic view of EIA is that it can blind those concerned to the political realities of the EIA process and the need to take account of these. This hinders research into the political and social aspects of EIA. Worse, it hinders adaptation of the EIA process towards a closer integration with political decision-making processes. The danger of the technocratic approach to EIA is that while EIA continues to be carried out, it becomes decreasingly related to actual decisions. While the EIA is being conducted, political or commercial decisions are made which preempt its conclusions. (Formby 1990, p.193)

Thus, alongside work on advancing 'best practice' laws, regulations, and procedures, as well as the capacity to implement these, improving EIA performance will also require tackling political determinants of performance head-on.[41]

Politics is ultimately a story of power and interests and whether/how these align with the intended goals – in this case – of EIA processes.[42] The integrity and quality of EIA production, consultations, use and impact can be profoundly compromised by the competing interests and incentives driving the decisions and actions of powerful political and economic elites.[43] They may also be potentially propelled under the right set of power and incentive dynamics (Zhang, Kørnøv and Christensen 2013, p. 154). Until such political considerations are more clearly understood and actively

39 A range of analyses have focused on the capacity gaps and legal or procedural factors contributing to problematic EIA performance. For a sample and overview of these, see, for instance, Wood (2003), Clausen et al., (2011), Zhang et al. (2012).

40 Boesen and Therkildsen (2005) discuss the relationship between relative capacity of different organizations or agencies and political dynamics.

41 A very recent analysis of EIA practice in Uganda illustrates how apparently technically sound processes ("EIA is well legislated and institutionalized in Uganda") can be distorted "on the ground" by a number of factors, political influence and interference identified among the key most important (George et al., 2020). Cashmore and Richardson (2013) highlight how the very enterprise of doing environmental assessments in and of itself is a mechanism to overcome or shift the interests of powerful decision-makers in historically side-lining environmental and social considerations. They note that environmental assessment "and the actors who implement it, can thus be interpreted as constitutive of an explicit attempt to affect power dynamics within society by reforming the values and practices of decision making" (Cashmore and Richardson, 2013, pp. 2-3).

42 We are intentionally departing from the tradition of relying on the vague and unhelpful concept of "political will," choosing instead to unpack this concept and analyze political realities in a way that is more conducive to action. For more discussion and critiques of the concept of "political will" see Green (2009), Hudson et al. (2018) and Marquette (2020).

43 In the name of stimulating economic growth and creating employment opportunities, many governments want to encourage resource development projects and therefore push to speed up decision-making through EIAs. England and Wales for instance, wanted to change the National Planning Policy Framework to speed development decisions (Morgan, 2012, pp.11-12). These dynamics are being exacerbated in some countries during the COVID-19 pandemic, as a combination of rising budgetary pressures and the desire to hasten economic recovery have been leading some governments to try to minimize or circumvent a variety of social and environmental regulations to get deals and infrastructure projects through quickly. See, for instance, Fields (2020); Bancroft (2020), Gillespie (2020); Bracken (2020); Spring (2020) and Boyd and Munoz (2020).

addressed, the risk of EIA processes and practical progress toward their intended goals being derailed in these ways will continue.[44]

This analysis complements more technocratic approaches to EIA performance by highlighting illustrative examples of how power and interest misalignments can undermine the effectiveness of EIA processes oriented around the following questions:

- **Who are the key actors involved?**
- **Who has power over whom and what realm of activity?**
- **What interests and incentives drive the key players? And**
- **How do all of these factors shape outcomes?**

3.3.1 Key players, power and interest dynamics

The fate of EIA processes is significantly shaped by the power and interest dynamics across the various actors involved from government, private sector and society. It appears, fairly consistently, that environmental and social protection are not the highest priorities for those with the most power over how different aspects of EIA processes unfold. Indeed, these might even be seen by powerful political and economic elites as competing with their primary professional and personal interests. At worst, when the key actors involved in conducting EIAs – project proponents, government authorities and the individuals who actually carry out EIAs ('experts') – have incentives to undermine EIA processes for personal and company gain, EIA processes run significant corruption risks (Dougherty 2015; Williams and Dupuy 2016, p. 5). The result of all this is that these actors can use direct control and indirect influence to weaken performance throughout EIA processes.

Because their financial and technical resources are in high demand, private sector proponents of corridor projects tend to be in a very powerful position when it comes to EIA processes. Sometimes, this power can be wielded to influence legislation and decision-making to reduce the number or demands of EIAs (Kohloff, Driessen, and Runhaar 2009, p. 279). They can also have a significant amount of direct influence over EIA production and indirect influence over the other aspects of the process through government ties and leverage; the latter of which can potentially involve bribery and threats of violence (Dougherty 2015). Some argue that whether or not projects will proceed, and the quality of EIAs conducted, "depends mainly on investors' commitments, not on government policies or regional institutions" (Wells-Dang *et al.* 2016, p. 44). A former high-level government official interviewed for this project argued that government regulations and activities were not what ultimately determined the fate of EIA processes in his mineral and liqud natural gas-rich country. Rather, good EIA outcomes would only come about when the company developing the project was driving this; that is, when that company was a 'major', listed on international stock exchanges, with extensive reputational exposure and the internal capacity to develop and sustain relatively high environmental and social standards. Such companies, he argued, hope to attract more licenses and contracts in the future and avoid costly community conflicts or delays. Therefore, they want to avoid the risks of being associated with very socially or environmentally damaging projects and show their commitment to good EIA practices.[45]

44 This analysis draws on some of the insights of Cashmore and Richardson (2013), introducing a special issue of Environmental Impact Assessment Review on "Power and environmental assessment" (EA) in which the authors underscore the importance of power to understanding EA performance and the different ways in which this relationship might be framed.

45 This interview was carried out on 13 October 2020 with a former high-level official who had worked in an extractives ministry for six years.

At a general level, within governments, typically, it is pro-investment actors – for example, finance and economy ministries; ministries of oil, gas, mining and energy; the president/prime minister – rather than social and environmental ministries and agencies that tend to have the greatest actual influence over the direction and outcomes of EIA processes (Wells-Dang *et al*. 2016).[46] Indeed, despite their nominal authority over EIA processes, environmental ministries can be considered by other ministries as "barriers to economic growth" and, therefore, their strength and autonomy are often discouraged (Kohloff, Driessen and Runhaar 2009). Because the priority of the most powerful government actors is typically the imperative to attract and retain investment, their decisions and actions tend to be driven by the interests of those of the companies and investors they are hoping to attract. As such, they generally favour and put in place EIA processes that prioritize cost- and time-savings, reduce administrative burdens, cede little or no power to other stakeholders who might compromise any of these through participatory mechanisms, and do not tie their hands on major decisions about the fate of projects, regardless of EIA findings.

Finally, "when it comes to EIAs, most communities are the politically and economically weak party seeking to counter the proposals of powerful multinational corporations and their allies in government. Scholars have found that public participation procedures often fail to level the power asymmetries that characterize the relationships between developers, state agents and communities" (Barandiaran and Rubiano-Galvis 2019, p. 2).[47] As such, communities, as well as civil society groups, can do relatively little to shape EIA processes, other than through protest about inadequate application of procedures and weak outcomes that they oppose, which might delay the project, but will rarely change the final outcomes.

3.3.2 When politics meet EIA processes

Consider a sampling of specific examples from the overview of suboptimal outcomes emerging during EIA production in Tables 3.1, 3.2 and 3.3. Screening to determine whether or not an EIA is undertaken at times has "been decided not so much by objective review of the likely impacts, as by the realities of inter-departmental or inter-governmental politics" (Formby 1990, p. 191), or by the ability of companies to design projects in such a way as to fall just below the EIA requirement threshold (Wells-Dang *et al*. 2016). Company influence can also profoundly shape EIA reports themselves. On occasion, examples have been exposed of this influence being exerted directly through company staff interfering with the content of EIA reports. For example, in Peru it was reported that "mining company employees routinely sneaked in to [the mining ministry] to help edit environmental impact

46 In interviews conducted by CCSI, the same perspective was shared by EIA experts from a variety of stakeholder groups and working on a range of geographies.

47 While there may be exceptions to this - e.g. in the presence of wealthy communities that can deflect projects away from their properties and land - in general, communities are not made up of well-connected elites.

studies" (Bajak 2014). Indirect company influence and pressure can also be used to skew reports in favour of corporate interests over environmental and social concerns (Williams and Dupuy 2016). For instance, as many have noted, the underlying conflict of interest inherent in companies financing and hiring the consultants who perform EIA can bias the contents in favour of company interests, prioritizing speed, favourable reports and consultant relationships with government officials.[48] The result can be reports that, even based on the available information and technology, are imbalanced, incomplete (limited in scope) or inaccurate, under-reporting negative impacts that might jeopardize or increase the costs of projects.[49] While there is some evidence that public or community pressure can potentially drive consultants to produce better reports,[50] in many low- and middle-income countries limited capacity, limited coordination and constrained civic space undermine the power of these groups and the prospect of their driving better performance.

Powerful government and corporate actors can also impede the deployment of EIA consultations as regular and meaningful mechanisms for public participation. The fact that "too often, participation is designed to convey information rather than integrate the community's input into the final decision". That is, consultation processes that do not allow adequate time for participant review and preparation, exclude key stakeholders, use reports that are not transmitted in culturally appropriate and technically accessible ways, and constrain the scope of discussions to favour passive listening by participants over active engagement reflect the relative weakness of these communities vis-á-vis the other major stakeholders (Barandiaran and Rubiano-Galvis 2019, p. 2). These social actors have very little influence over the rules of the game. That is, decisions regarding who will be consulted, and when, where, how and to what end. As a result, "public participation is used as an opportunity for the developers to exercise power and to persuade the public to do what they would like to do, without real consideration of needs and inputs from the public side, which distorts the original expectation for implementing public participation" (Zhang, Kørnøv and Christensen 2012, p. 151).

Finally, whether or not EIA reports and consultations ultimately inform policy decisions, their implementation, monitoring and enforcement are all, again, in the hands of key actors who often face competing incentives or perceive competing interests that drive actual practice away from notions of best practice. A common concern among EIA professionals is that their reports are unused if their content is viewed as politically or economically inconvenient. That is, "if the conclusions of the EIA are not politically acceptable, they are circumvented or ignored" (Formby 1990, p. 193). In other cases of reports being intentionally ignored, a leader can simply declare that projects be approved, regardless of what is in the EIA (Dougherty 2015, p. 12). Similarly, political pressure to expedite project approval can fundamentally undermine the use of EIA in decision-making.[51] Consider the critical issue of whether or not a corridor project should proceed. In theory, for environmental practitioners, this should be a decision that would be significantly informed by the findings of an EIA (and framed by an SEA of the policy, programme or plan choices if undertaken). That is, the question of whether the social and environmental risks merit proceeding with a corridor programme or a specific project, and whether the risks can be managed, should be influencing the decisions about the fate of a project. Yet, as numerous experts point out,

48 See for instance: Dougherty, M. L. (2019) or Wells-Dang et al. (2016).

49 See for instance: Sonter et al. (2017); Laurence and Salt (2019) and Garrard (2015), Alamgir et al. (2018), and Tenney et al. (2006).

50 Morrison-Saunders et al. (2001) looked at the determinants of EIA quality (including emphasis on science) in Western Australia and found public or community pressure (alongside the expectations of regulators) to be most prominent among those surveyed.

51 Zuhair and Kurian's study of EIA processes in Maldives found that "political influence was identified as the biggest barrier for an effective EIA promoting deliberative decision-making. Politically influenced decisions mean the capacity of EIA to address social and environmental concerns through the decision-making process is greatly reduced and, hence, the potential of the process to lead to sustainable development is jeopardized"(Zuhair and Kurian, 2016, p.138).

these decisions are often made on the basis of vested interests and not science. Indeed, as noted before and in other chapters in the publication, at times construction is already under way before an EIA is completed (Chen 2014, p. 77). Through such sequencing, companies and governments determined to proceed with their project basically take the no go option off the table and significantly constrain the possibilities for EIA use.[52]

In sum, all of this tends to boil down to a troubling paradox, underscored by Wells-Dang *et al.* (2016, p. 52). That is, those who are most supportive of strong EIA processes tend to be those who have the least power to act on this, while those most directly responsible for the current weak implementation of EIA processes are the most powerful and least likely to support reform of the current system.[53] They note that "as long as power rests in the hands of project approval agencies without public accountability, Environmental Impact Assessments will remain a technical exercise that can be manipulated by investors, consultants, and government agencies to fit a predetermined development agenda" if they so desire (Wells-Dang *et al.* 2016, p. 52).

3.4 Towards more impactful EIA processes: dealing with political context head-on

While the importance of political factors in shaping EIA processes is widely, if not always systematically, appreciated by EIA professionals at an anecdotal level, work in this field continues to focus on technocratic interventions to improve performance. The underlying logic is that change will come from enhancing information, systems, procedures, resources, skills, technologies and institutional practices.[54] However, as noted above, even the most technically sound and capacitated EIA processes can still be derailed by political factors.

Moving beyond the standard static and immutable treatment of these factors as a "lack of political will," and unpacking them, as is done here, practitioners can engage with these issues more productively and proactively. To complement the technical work being done to improve EIA processes and better integrate political considerations into EIA practice, more attention must be paid to addressing the most relevant incentives, interests and power dynamics that shape the outcomes of EIA processes in a given context. The specifics will vary from one context (i.e. country, region, project, sector etc.) to the next, and no single solution will apply across them all. The following sections, however, provide some insights to begin to grapple with politics more deliberately, practically and hopefully more effectively, in practice.

So, what does this mean in practice for global actors hoping to support EIA processes that better contribute to sustainable development? What does addressing political realities look

52 Case in point, the Central Taiwan Science Park Phase 3 developmental project. The project was divided in two parts and each was submitted for EIA separately. The EPA approved one of the projects but one day later, nine of the 21 EIA review commission members called a press conference, criticizing political interference with the EIA review and questioning the division of the project into its two parts. The Taipei High Administrative Court revoked EPA's decision, but meanwhile AU Optronics Co. Ltd., a leading TFT-LCD manufacturer, began and continued construction at the science park regardless (Chen, 2014, p.72).

53 "Those with the greatest influence on EIA policy and implementation also possess the strongest incentives to keep the system as it is, as they have themselves been invested in creating the policies and practices that are currently applied. Those with more distance from the EIA process, whether in government, civil society, or academia, are more in favour of reform but have less influence over policy outcomes" (Wells-Dang et al. 2016, p.52).

54 Boesen and Therkildsen (2005) provide a useful discussion of functional versus political approaches to understanding organizations and organizational change. Another formulation could understand the technocratic focus of external actors with regard to EIA processes to be itself politically motivated -- a strategic calculation to avoid upsetting local political and economic elites by focusing on anodyne technical approaches.

like at a practical level? A basic starting point would be some sort of political economy analysis (PEA) for a particular context. This maps the key actors, but goes beyond a mere institutional stakeholder mapping to cover their relative power and realms of formal and informal influence, the interests or incentives that drive their actions, and relevant qualities of the political system (e.g. key institutional and historical factors) within which they operate.[55] A PEA helps illuminate who might be allies for and opponents to specific EIA reforms, the opportunities and constraints around specific reforms within a given system, and the interests and incentives that need to be addressed in order to bring about meaningful improvements in EIA performance.[56] This kind of analysis can prove a valuable complement to stakeholder assessments focused on formal institutional responsibilities and capacities.

With the insights of a PEA in hand, one can then turn to the matter of acting on this information. Since systemic and historic factors are beyond the reach of most interventions (but provide important contextual information, nonetheless), the focus is on addressing power and interest dynamics. We provide some illustrations of what this might entail, based on three types of responses – that is, change, navigate and circumvent – to inauspicious political conditions.

3.4.1 Changing power and incentive dynamics

One approach to addressing challenging power and interest alignments is to try to change one part of the equation. While changing power dynamics across the key players may appear daunting in the short term, over the longer term, it will likely be critical to improving performance.[57] This could involve focusing efforts on bolstering the power of actors who support EIA processes that prioritize environmental and social protection. One way that this can be pursued is through mechanisms to identify and connect these actors – within government, civil society, companies, society, media and so on – into strategic coalitions. Working together, members can amplify their influence and have greater prospects of advancing their shared interests than they would in isolation.[58] In doing so, they might find the power to be able to amplify community roles in defining the terms of EIA production and subsequent monitoring, thereby potentially increasing the impact of existing efforts to support communities through technical capacity support.

Another pathway to better outcomes may be by changing the incentives and reframing interests that drive current unproductive choices and behaviours. Within government or among consultants, this might entail "changing sanctions and rewards, enforcing hiring and promotions based on merit, building internal coalitions for change, introducing performance-based payments, actively discouraging rent-seeking" (Boesen and Therkildsen 2005, p. 14). A study of interventions around environmental audits may hold some lessons for changing incentives in EIA processes (Duflo *et al*. 2013). Targeting a financial relationship between

55 CCSI has aggregated a number of PEA resources on our website, read for instance CCSI (2019).

56 On the difference between PEA and stakeholder analysis, see Poole (2011). "Analytic tools that Bank staff are already familiar with—stakeholder analysis, analysis of winners and losers, institutional and governance analysis, historical analysis, analysis of rents, risk assessments—all can play a valuable role in PE assessments. However, none of these in itself is a PE assessment; in fact, using any of these tools in isolation risks missing important elements. For example, stakeholder analysis rarely explains the historical legacies that constrain policy choices today, or indicates the institutional and organizational context in which stakeholders act; while an institutional and governance analysis misses the incentives of players in and around the institutions. PE assessment is more systematic and comprehensive. A problem-driven approach to PE assessment includes not only looking at the problem and its institutional underpinnings, but also drilling into the drivers that explain why the problem is there and then examining what can be done. Such an approach may include using elements of multiple tools—perhaps elements of an institutional review, rent analysis, historical analysis, and stakeholder analysis" (Poole, 2011, p.2).

57 As Wells-Dang et al. (2016, p.53) note, "The missing factor, public accountability, will not come about through reform of procedural documents, but only through longer-term changes in power relations in each country. For potential reform actors to challenge entrenched interests, they first need to work together, and then build a domestic constituency that backs their demands."

58 For some examples of how such coalitions have been effectively mobilized around an array of development reforms in the Philippines, see Sidel and Faustino (2019).

companies and environmental consultants that was resulting in inaccurate environmental audits, a research experiment in Gujarat, India, attempted to change the incentives of the consultants by breaking their dependence on, and bias towards, the firms they were auditing. To do so, consultants were: paid out of a central pool of funds; given fixed-rate salaries at a higher rate than companies were willing to pay directly, which matters when hiring local consultants in poor settings; subject to backchecks to monitor (in)accuracy of reports to influence their prospects for future contracts; and informed that their future remuneration would be made contingent on the results of this monitoring. Collectively, these interventions seemed to shift incentives to under-report, and led to audits that were noticeably more accurate than those produced under the prior model and, in turn, led to meaningful remediation activities. Another approach to separating auditor selection from the companies whose projects are affected is being implemented around environmental audits in Ghana and Cote D'Ivoire by the Rainforest Alliance.[59] Similar interventions might be developed to break similar conflict of interests common in EIA production. More stringent, merit- and performance-based qualification and certification schemes for consultants,[60] ideally overseen by third parties,[61] could also help address the perverse incentives driving some of the under-performance of EIAs and might be supported by independent monitoring mechanisms.[62]

Supporting mass mobilization by communities, civil society and/or the media can also potentially serve as a disincentive to companies, investors and government officials when it draws attention to their contribution to poor EIA processes (or bad outcomes of these). This approach has been frequently pursued, with mixed results. On the other side of the coin, efforts to spotlight and celebrate examples of good practice in government or company EIA practices when they do occur and to attach names or agencies to this practice, may incentivize more of this in the future.[63] Bolstering their existing Performance Standard requirements,[64] development banks and International Financial Institutions may also be able to create deeper incentives for good EIA performance. For instance, they may require EIA action or mitigation plans prior to project commencement and make continued financing contingent on showing meaningful progress on implementing these. Lastly, in certain contexts, citizen-initiated administrative appeals or judicial review may be (or already are) an avenue to challenge shortcomings in an EIA process, and a potentially valuable option for increasing disincentives for under-performing EIA processes. Such an approach would work best when courts are free of political or corporate capture such as, for instance, in Chile's environmental courts.[65]

59 See Rainforest Alliance's report "Audit Allocation System Implementation in Ivory Coast and Ghana" for a detailed description of the audit system (2020).

60 In Chile, a public registry for environmental consultants is managed by the Environmental Evaluation Service (SEA) within the Ministry of the Environment. Consultants apply for government certification through an online portal where they are required to provide information about potential conflicts of interest as well as meet technical and experiential qualifications . Chilean scholars have however published an extensive report examining EIA effectiveness, in which they call for even more rigorous certification processes to ensure impartiality of consultants in hopes of improving the integrity of EIAs they produce. To the current criteria for certification, it suggests adding education, minimum experience, good track records with few disputes, and regular performance assessment. For more see Servicio de Evaluación Ambiental (2020) and Instituto de Sociología Universidad Católica (2018).

61 Williams and Dupuy (2016, p.7) discuss the potential risks for certification schemes run by governments.

62 Kumacaya is an example of how to undertake independent, locally-driven monitoring and verification, funded indirectly by companies, that might be transplanted to the EIA field. The work was piloted in Riau, Indonesia and is now expanding to East Kalimantan and Aceh provinces in Indonesia, with further expansion to Liberia, Ivory Coast and Ghana, https://www.kumacaya.org/kumacaya.php#why

63 This approach to highlighting integrity or "naming and faming" is already being implemented beyond EIA by Accountability Lab in their Integrity Icon project: https://integrityicon.org/.

64 See, for example, IFC Performance Standard 1, Assessment and Management of Environmental and Social Risks and Impacts.

65 For more on this read Bary (2020), Rani (2020) and Tribunal Ambiental (2014).

3.4.2 Navigating the status quo

Sometimes referred to as working with the grain[66], this approach to addressing political obstacles takes power and incentive dynamics and alignments as reasonably fixed in the short- to medium-term and focuses on trying to navigate these most effectively in a given context. In essence, this approach is focused on pragmatically trying to make progress wherever possible within a given set of dynamic political realities. That is, taking a best fit approach, rather than pursuing a more comprehensive slate of best practices (Ramalingam, Laric and Primrose 2014). Here, knowledge of a particular political landscape from PEAs would be used to work opportunistically, to help identify the issues, policies, individuals or moments that are most conducive to real-world incremental progress, and to focus on these.

There is no model or top-down template for EIA reform in this approach. In one case, the best chance for real progress might be pursued through capitalizing on informal relationships. For example, support for an environmental minister who has the ear of the president. In another case, more extensive use of the courts might be the most promising path for trying to improve EIA use/the implementation of EIA action plans when other parts of government are not committed to these outcomes (Chen 2014). In yet another case, streamlining with participatory mechanisms for navigating other issues (e.g. prior consultation and consent processes) might provide a strategic opening for improving EIA consultations. In all situations, where possible, collaboration with large, reputation-sensitive companies on a project-by-project basis could help achieve some increment of progress. Elections or environmental or social crises may provide moments of opportunity to try to redouble efforts to reform EIA processes. While specific openings or opportunities are difficult to anticipate, this approach prioritizes flexible and adaptive programming driven by local actors with the expertise to identify opportunities and constraints on an ongoing basis and develop appropriate strategies in response.

3.4.3 Circumventing political obstacles

A final option to address political obstacles is to try to work around challenging power and interest dynamics by seeking alternative mechanisms through which to advance a particular goal. This might mean developing alternative pathways for identifying and addressing anticipated social and environmental risks, relying on different actors to those currently leading under-performing EIA efforts. In practice, this could entail greater focus on citizens' involvement in data collection, impact assessment and monitoring efforts. For example, this could be

66 https://workingwiththegrain.com/

through community-led impact assessments, or through genuinely collaborative multi-stakeholder impact assessments.[67] All of these approaches should be designed in a way that is mindful of their potential political implications. In the case of community-led approaches, for instance, this means ensuring that community engagement is actively inclusive of a range of voices, not just the most powerful, and also that communities have the ability to keep their independence and act free from coercion or co-optation by more powerful actors. The latter would involve taking steps to ensure that individuals or groups would not fear retaliation or loss of benefits for reporting negative impacts (e.g. that community-led monitoring is not financed by the company, the community's right to monitor is protected by authorities, the bulk of those community members performing these functions do not rely on the mine for their livelihood).[68]

Another way of trying to circumvent existing political roadblocks would be to try to relocate authority or resources to work around conflicts of interest that undermine current EIA models. For instance, rather than allowing companies to select, finance and guide consultants directly, an alternative would be to delegate these roles to third parties in the hope of neutralizing conflicts of interest that may be contributing to EIAs. This might entail a combined mechanism in which third parties oversee the hiring of consultants, their ongoing management and the allocation of disbursements from a glass box or basket fund (into which companies would be required to make certain predetermined payments, but would then play no role in assigning disbursements; Szoke-Burke and Cordes 2019). Doing so might entail mandating a multi-stakeholder body – comprising subnational government agencies and environmental and social NGOs, among other stakeholders – to manage a mandatory roster of independent and accredited consultants,[69] preventing companies from selecting consultants whose interests and performance they can readily influence. For example, the Environmental Service of Salzburg (ESS) is a joint initiative of the City of Salzburg, the Chamber of Commerce of Salzburg, the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management, and the Salzburg AG utility provider. ESS maintains a mandatory roster of independent consultants with high-level qualifications to perform environmental consultancies. ESS serves as an intermediary and assigns consultants based on expertise to projects with which they have no professional or financial ties. Moreover, selected consultants must meet certain education and neutrality criteria and be registered with the Austrian Energy Agency, which continuously checks their status. Additionally, ESS shares the cost of consultants with companies with funding pooled from different member agencies.[70]

3.5 Conclusion

When it comes to EIA processes, too often notions of good practice on paper fail to translate into reality. Yet, the demand for effectively identifying and addressing the environmental and social impacts of investment projects has perhaps never been more urgent among a wide array of actors. The COVID-19 pandemic and, particularly, the drive within many developing countries to try to fill budget shortfalls through quick deals and rapid

67 The modalities of collaborative approaches to impact assessment have been considered in the context of human rights impact assessments. For more, see Cordes et al. (2017).

68 See, for instance, Pareja et al. (2018), Boakye et al. (2018), and Pareja, Xavier and Daitch (2019).

69 This note explains how to get right technically and politically to contribute to the improvement of the EIA process (Netherlands Commision for Environmental Assessment, 2014).

70 For more on this, see the Environmental Service of Salzburg initiative: https://www.umweltservicesalzburg.at/de/ueberuns/index.asp

development project mobilization, seem to be leading some to try to further streamline or even sideline EIA processes. While buttressing the effectiveness and impact of EIA processes would be important under any circumstances, these developments make the case for doing so even more urgent. With growing attention to climate change and to environmental, social and governance issues more broadly, there may well be some opportunities to advance this agenda.

Technical capacity limitations are often held to blame, and are the focus of interventions to improve EIA performance. These are indeed important given the nature of the issues and activities at stake. However, there is another set of factors that are often profoundly determinative of outcomes which, while widely acknowledged in informal discussions, are rarely systematically addressed in practice: political realities. As illustrated above, the relative power and preferences of key actors within a given political context can shape everything, from the timing and substance of an assessment, to the ultimate actions it does or does not eventually precipitate. Looking ahead, if they are to be impactful, any attempts to improve the performance of EIA processes in practice will have to tackle the very real ways in which outcomes are shaped by the realities of political context. Approaches to working on EIA processes moving forward should integrate political economy analyses from the outset and on an ongoing basis. The insights from these should inform the design and implementation of interventions intended to improve EIA practices. This will mean, alongside generating ideas for best practice and identifying and filling various capacity gaps, that those seeking to see more effective EIA processes will actively identify and address power and incentive (mis)alignments, in order to see best practice become actual practice.

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04

The Role of Lender Safeguards in Addressing Biodiversity Risks Associated with Large-scale Infrastructure Projects

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ABSTRACT

International finance institutions have developed safeguards to mitigate environmental and social risks associated with the developments they are financing. The International Finance Corporation's Performance Standard 6 (PS6) is widely recognised and adopted as an international good practice benchmark. Other lenders' safeguards are increasingly convergent on PS6 in requiring application of the Mitigation Hierarchy, identification of high-value biodiversity features based on clear criteria, measurable outcomes such as 'no net loss' or 'net gain', and robust action planning and monitoring. These provisions go well beyond the regulatory Environmental Impact Assessment (EIA) requirements in most countries.

These good practice approaches provide a rigorous framework for reducing biodiversity risk and impacts but are often not well applied to infrastructure corridor development. This is owing to technical challenges related to corridors' scale, perceived extra costs that can disadvantage lenders with high standards, a piece-meal approach to mitigation and use of unproven mitigation measures.

By incorporating international good-practice approaches in regulatory frameworks, governments can address the gaps in current EIA processes, improve biodiversity outcomes and support the achievement of conservation goals. Standardising mitigation requirements across countries will also enable a more coordinated and effective mitigation strategy to be applied along corridors that cross international borders. At the scale of development corridors, a proactive and strategic approach is also needed through early 'upstream' planning with input from a broad range of stakeholders. Landscape-level planning, through Strategic Environmental Assessment or other means, can effectively reduce risks of future developments, enable effective avoidance, better address cumulative impacts and improve the outcomes of biodiversity offsets.

4.1 Lender safeguards for biodiversity

Biodiversity loss is now recognized as one of the major threats to global economic activity, alongside climate action failure, and presents material risks to individual companies (World Economic Forum 2021). In response to this, international finance institutions have developed safeguards to facilitate sustainable development, while mitigating risk associated with the developments they are financing. Biodiversity risks to lenders include:[71]

- **Systemic risks related to the destruction of nature, societies' response, and the associated disruption of society and businesses;**
- **Transition risk associated with more stringent regulations or social norms that penalize harm to nature, resulting in litigation, reputational damage and market risks; and**
- **Physical risk due to the depletion of natural resources disrupting delivery of ecosystem services, production processes and supply chains.**

Lender safeguards were first introduced in the late 1970s and by the 1990s, most multilateral development banks had adopted some type of formal environmental policy and procedures (Horberry 2015). Since then, these policies and standards have evolved to include biodiversity features, becoming more comprehensive and systematic. A key development was the International Finance Corporation's (IFC's) Sustainability Framework, including the Policy and Performance Standards on Environmental and Social Sustainability, adopted in 2006 and significantly updated in 2012 (International Finance Corporation 2012). This included Performance Standard 6 (PS6) on Biodiversity and Living Natural Resources and the associated guidance note, which was updated in 2019 based on implementation experience (International Finance Corporation 2019).

71 Also see TBC 2015; Global Canopy & Vivid Economics 2020

IFC PS6 has become an international benchmark for identifying and managing biodiversity risk. PS6 is applied by many lenders, including over 100 major commercial financial institutions that have adopted the Equator Principles and are responsible for the bulk of project financing in developing countries (World Wide Fund for Nature [WWF] and The Biodiversity Consultancy [TBC] in prep.). While Multilateral Development Banks (MDBs) each have their own safeguard framework, there is extensive consensus across biodiversity standards, with many converging on IFC PS6 (Horberry 2015; WWF and TBC) and key biodiversity areas.[72] Measurable outcomes for priority biodiversity features, such as no net loss or net gain, are generally required for priority biodiversity features.

A key component of all safeguard frameworks is the application of the mitigation hierarchy (see Box 4.1). This is a central concept in biodiversity risk management and emphasizes early planning for avoidance, then minimization, restoration and (as a last resort) offsetting of potential impacts (Cross Sector Biodiversity Institute and TBC 2015). Requirements for planning, implementing and monitoring mitigation actions are stipulated in order to verify compliance and measure progress towards biodiversity goals (Fig. 4.2).

BOX 4.1 THE MITIGATION HIERARCHY

The mitigation hierarchy is a tool to help users limit, as far as possible, the negative impacts of development projects on biodiversity. It is used by developers when planning and implementing projects, to provide a logical and effective approach to protecting and conserving biodiversity, and maintaining important ecosystem services. It involves a sequence of four key actions: avoid, minimize, restore and offset (Fig. 4.1).

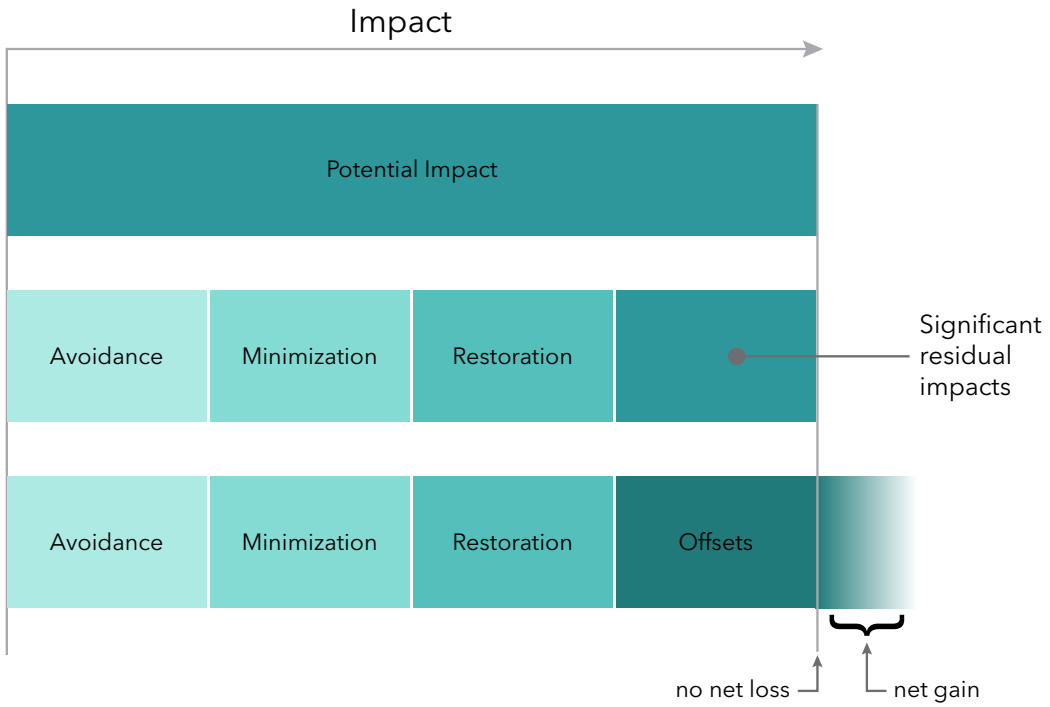
Rigorous application of the mitigation hierarchy can aid in the sustainable management of living, natural resources by establishing a mechanism to balance conservation needs with development priorities. Applying the mitigation hierarchy is an iterative process. It may often be necessary to review infrastructure routing and design to ensure that key risks are avoided and residual impacts are driven down to as low a level as acceptable. Offsets should only be considered after all options to avoid, minimize and restore biodiversity have been exhausted.

The mitigation hierarchy can be applied throughout a project's life cycle, from early planning and design, through to construction and operations. Effective application includes routing to avoid sensitive areas, design modifications such as installing under- and overpasses, and continual evaluation and improvement, with the aim of driving early avoidance and minimization, and reducing or even completely avoiding the need for remedial actions.

For more information on applying the mitigation hierarchy, see Cross Sector Biodiversity Institute and TBC (2015).

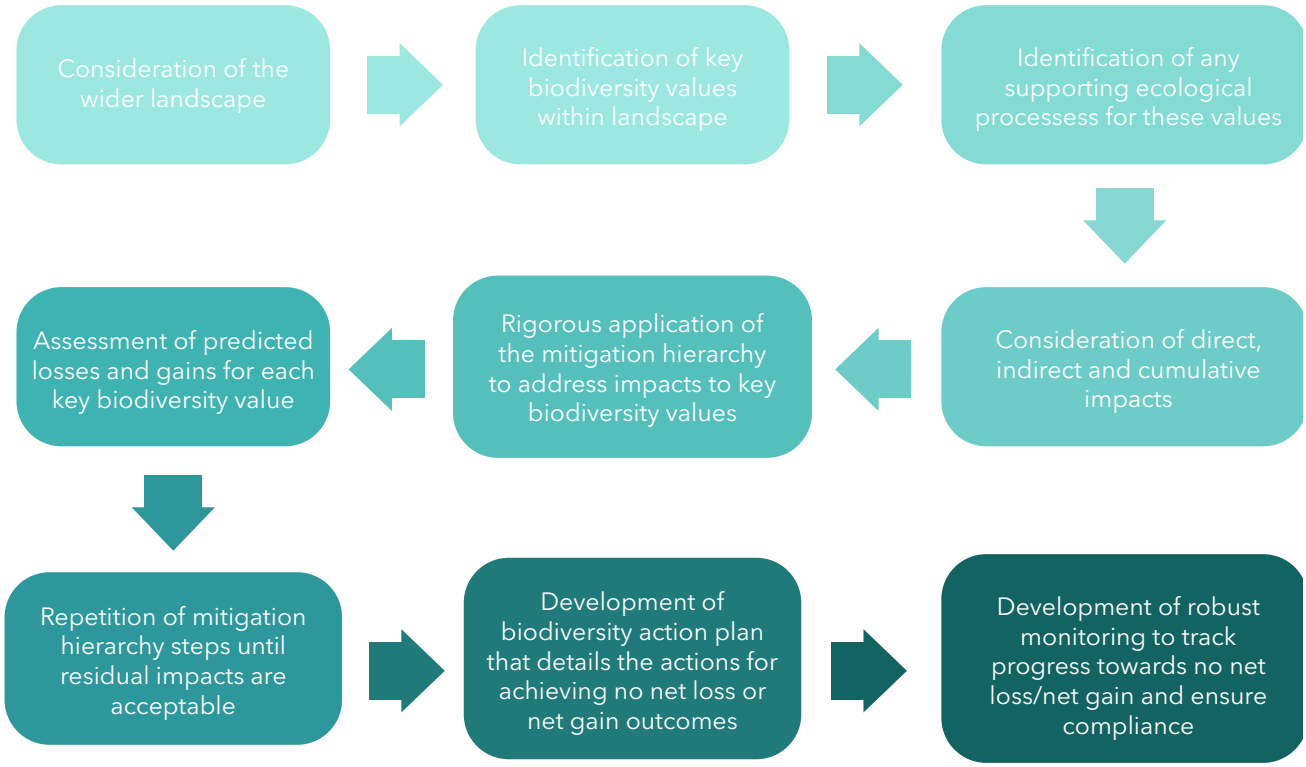
72 http://www.keybiodiversityareas.org/

Figure 4.1 Application of the mitigation hierarchy to achieve no net loss or net gain for biodiversity



Source: Cross Sector Biodiversity Initiative and TBC (2015).

Figure 4.2 Good practice safeguards go beyond traditional Environmental Impact Assessment (EIA) requirements to ensure rigorous assessment of biodiversity values and impacts, and drive mitigation to reduce these to within acceptable levels; ongoing monitoring and adaptive management go beyond the EIA process and are critical to stay on track to deliver no net loss or net gain outcomes



4.2 Challenges in applying lender safeguards

When applied as intended, lender safeguards provide a rigorous framework for addressing biodiversity risk and reducing biodiversity impacts. Although lender safeguards are widely adopted, they are not always well applied to infrastructure corridor development. Challenges of effective and consistent application include:

Technical challenges related to assessing and mitigating risks at appropriate scale;

- **An uneven playing field due to the perceived stringency and costs of rigorous mitigation, potentially putting lenders with high standards at a disadvantage to lenders who do not have such robust requirements;**
- **Piecemeal mitigation rather than strategic, landscape-level planning to avoid the most sensitive areas;**
- **Implementation of ineffective or unproven mitigation measures, leading to avoidable impacts.**

These issues are briefly covered in more detail in the following sections, including a subsection on recommendations to address the issue.

4.2.1. Technical issues

Identification of biodiversity risks during the early stages of infrastructure planning can enable avoidance of high conservation value areas and identification of cost-effective mitigation options at appropriate ecological and management scales.

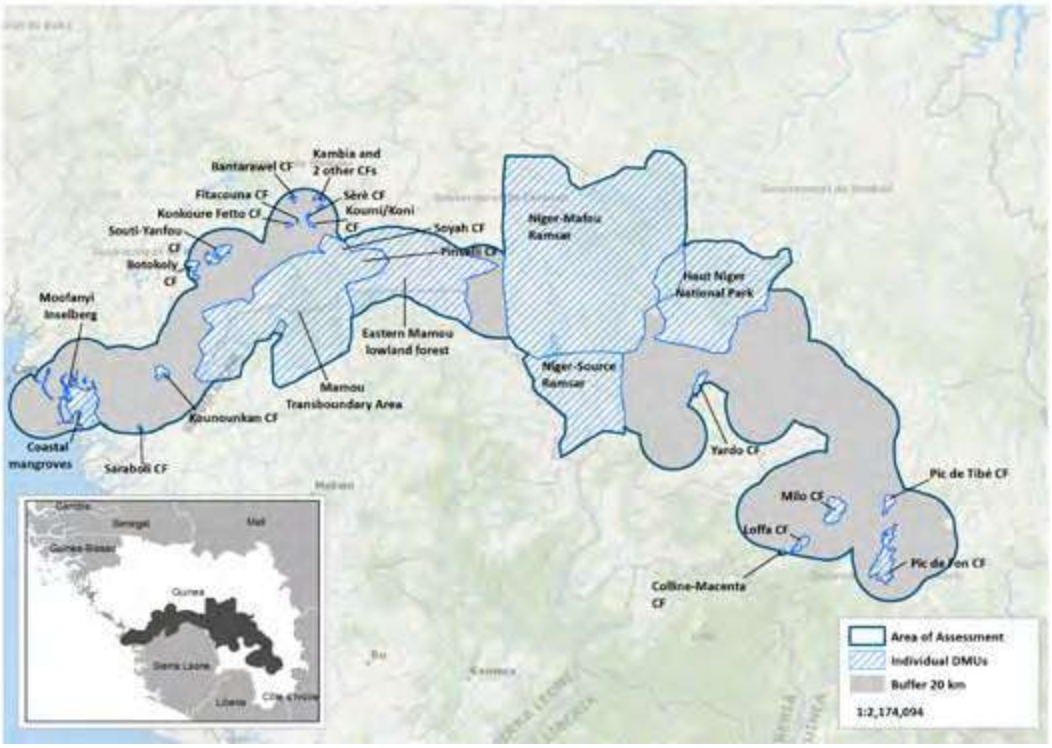
Recommendations

IFC's PS6 requires definition of an ecologically appropriate area of analysis for identification of priority biodiversity features. This area is used as a basis for applying quantitative criteria to assess the presence of critical habitats for species or ecosystems within the project's area of influence. For linear infrastructure, identifying both the area of influence and area of analysis can be particularly challenging. Infrastructure corridors often have a relatively narrow direct footprint that extends over long distances, potentially cutting across varied habitats and ecological zones with a wide variety of flora and fauna associated with changing altitude, soils and climatic regimes. An ecological, landscape-level approach to defining areas of analysis may capture a very large area for consideration. On the other hand, arbitrarily constraining the area of analysis (e.g. to a fixed buffer distance around the corridor) may miss risks and fail to identify the importance of an area for certain biodiversity.

The area of influence of an infrastructure corridor may also be challenging to define. This is likely to extend well beyond the direct footprint, but may vary along the length of the corridor depending on the type of infrastructure (e.g. roads versus transmission lines), ecological, geographic and social context. Potential impacts beyond the footprint could result from, for example, habitat fragmentation, barriers to animal movement, introduction of invasive alien species, downstream impacts on aquatic systems, or increased habitat loss and degradation resulting from induced access into previously little-disturbed habitats.

Ensure the area of analysis is sufficiently broad to include species and ecosystems in the full project area of influence, considering potential indirect impacts associated with infrastructure construction, operation and closure. For example, a buffer width of 20 km to each side of the linear infrastructure was used for the 700 km railway line for the proposed Simandou iron ore project in Guinea, West Africa (Fig. 4.3). This buffer was further expanded where it intersected with distinct areas of ecological significance or administrative coherence (e.g. various protected areas), to ensure an effective landscape-scale assessment.

Figure 4.3 Area of assessment used to assess biodiversity for the Simandou project, Guinea. A 20 km buffer was applied around the project infrastructure corridor. Separate Discrete Management Units (DMUs) were defined where the buffer intersected with distinct areas of ecological significance or administrative coherence. These are presented the overall broad area of influence covered c. 26,800 km²



Source: TBC (2015).

4.2.2 Uneven lender requirements

Despite the convergence of standards across major development banks, many other lenders have weak or no specific safeguard provisions for biodiversity, relying on the Environmental Impact Assessment (EIA) permitting processes established in national regulation (WWF and TBC in prep.). In many developing countries where infrastructure corridors are planned, regulations are less stringent than lenders' safeguards, while national environmental agencies have weak capacity for enforcement.

Governments and private developers may view rigorous safeguards as overly bureaucratic, onerous and unpragmatic, requiring unnecessary extra costs and time. While good-practice safeguards in fact deal effectively with environmental and social risks and liabilities that can cause delay, increase the costs of and/or derail projects, these risks are not always recognized by decision makers, or may be overridden by short-term political considerations. This can drive infrastructure finance towards lenders with less rigorous requirements and potentially lead to significant unmitigated biodiversity impacts.

As the case studies in this volume show, much finance of large-scale infrastructure corridors is not tied to good-practice biodiversity safeguards. For example, of the 65 financiers involved in China's Belt and Road Initiative (BRI), only 17 have biodiversity safeguards, and only 12 of these were aligned with best practice, such as IFC PS6 (Narain *et al*. 2020). As a result, significant impacts are likely to remain unmitigated, despite close to 370,000 km² of the wider corridor overlapping with critical and natural habitat.

Recommendations

Lender safeguards such as IFC's PS6 provide a framework that governments can adapt and adopt to enshrine biodiversity safeguard concepts into regulation, ensuring better consideration of biodiversity issues and providing a clear and consistent mitigation framework for developers to operate in. This process is envisaged in the World Bank's (International Bank for Reconstruction and Development [IBRD]'s) Environmental and Social Framework (where Environmental and Social Standard 6 is aligned with IFC PS6), which devolves safeguard implementation to national level, where standards are sufficiently convergent and capacity is adequate.

Standardizing mitigation policies across countries overlapping with linear infrastructure will also enable a more coordinated and therefore effective mitigation strategy to be applied across the corridor.

Many governments have, as yet, failed to mainstream their commitments under the Convention on Biological Diversity and other multilateral environmental agreements into economic decision-making (Whitehorn *et al.* 2019). Further, many existing or planned government—offset policies are deficient in robust design and effective implementation. The Global Inventory of Biodiversity Offset Policies[5] database suggests that less than a quarter of countries that enable or require compensation allow offsets only as a last resort, and only 10 per cent apply international best practice principles for offsets (zu Ermgassen *et al.* 2019). Strengthening these provisions would provide an opportunity to support more effective and consistent mitigation practice through strict application of the mitigation hierarchy (Milner-Gulland *et al.* 2020). No net loss or net gain policies that are set in line with defined conservation targets can help governments to achieve national conservation goals under their international biodiversity commitments (Maron *et al.* 2020).

4.2.3 Non-strategic mitigation

When well implemented, lender safeguards are a valuable and effective means for assessing and mitigating biodiversity risks. However, in practice, they are essentially used as a reactive mechanism that addresses risk in a piecemeal, project-by-project way. This has many drawbacks. Opportunities for avoidance may be missed and landscape-scale issues such as ecological connectivity overlooked. Cumulative impacts are not taken into account. Offsets may also be less effective and face higher risks of failure where they are implemented individually and without accounting for wider conservation priorities.

While this can be an issue for many large projects, infrastructure corridors in particular are at a scale where a more strategic and integrated approach to biodiversity management is required.

Recommendations

To effectively account for and mitigate the wide range of social and environmental sensitivities within the wider landscape, large infrastructure projects need to be developed within a framework of wider landscape-level planning that identifies and, as far as possible, avoids areas of high biodiversity sensitivity, considering other social and economic constraints and trade-offs.

Strategic environmental assessment (SEA) is a procedure for this that is increasingly established in some regulatory frameworks.

SEAs consider the environmental and socioeconomic implications of policies, programmes or plans, at a broader level than project-specific EIAs.

To be effective, SEAs need to be enshrined into national legislation, with clear requirements for their implementation. Conducting an SEA is an important first step, but is of limited value if its findings are not implemented. In practice, SEA recommendations may often be disregarded or overridden, especially

when perceived as counter to political and economic priorities. For example, although a SEA was undertaken for Kenya's segment of the Lamu Port -South Sudan-Ethiopia corridor, implementation of impact-mitigation measures was inadequate, and resulted in a number of biodiversity issues, including fragmentation of conservation areas and blockage of large mammal migratory corridors, including for elephants (Nyumba *et al*. 2019).

It is important that SEAs or similar landscape-scale assessments are undertaken collaboratively, with a broad range of biodiversity specialists, conservation non-governmental organizations and other stakeholders, so as to explore trade offs and develop effective mitigation measures that are integrated into early project planning, with rigorous review and monitoring processes in place to help ensure effective implementation. In the absence of existing spatial plans or a regulatory SEA process, investors in infrastructure corridors arguably have a responsibility to support governments with spatial planning (including capacity development where necessary) to ensure that biodiversity risks are appropriately assessed and managed. Where infrastructure corridors cross borders, coordinated efforts are needed between governments to develop landscape-level mitigation strategies.

Offsets should only be used as a last resort, after all other options to avoid, minimize and restore have been exhausted, and residual impacts are reduced to acceptable levels. Where offsets are required, they should be considered within the context of national strategic planning and prioritization frameworks including, for example, national biodiversity strategies and action plans. Strategic landscape-scale planning can help identify priority areas for offsets and enable an aggregated approach, whereby resources from multiple projects are pooled into a single offset to address residual impacts from multiple developments. Aggregated offsets have the benefit of increasing the likelihood of success, while spreading risks and costs across several developers. This can also enable a move beyond project-specific no net loss/net gain goals to contribute explicitly to jurisdictional targets such as those under the post-2020 strategic framework of the Convention on Biological Diversity (Simmonds et al. 2019). Through this approach, offset requirements would be determined based on the current state of biodiversity being impacted by the development italicise '*et al*'.. Biodiversity targets can be set through SEA processes, providing a clear and transparent basis for compensation from development.

Even when an SEA or other spatial planning process has identified areas prioritized for development, risk screening will be needed to identify site-specific sensitivities. For developers, early risk screening provides an important tool to inform infrastructure planning and inform early mitigation and EIA scoping as part of project design (TBC 2017). Screening enables avoidance of impacts to sensitive features and helps identify cost-effective mitigation options and methods to minimize impacts (e.g. routing options, technological alternatives, placement and design of over- and underpasses to maintain habitat connectivity, etc.).

4.2.4 Limited evidence base for mitigation measures

The investment of tens of trillions of dollars into linear infrastructure projects in Africa and Asia will penetrate into previously remote and intact areas and create significant additional risks to threatened biodiversity. Effective mitigation approaches to address some of the most significant impacts are urgently needed, but they must account for the local ecological and social context. Where impacts cannot be fully avoided, there are a number of approaches to minimize the biodiversity impacts of the components of infrastructure corridors, such as roads, railways, pipelines and electrical transmission lines. Good international practice, aligned with lender safeguards, requires specification and monitoring of avoidance and minimization measures within a biodiversity action plan (International Finance Corporation 2019).

Most minimization measures for linear infrastructure have so far been used and tested in a North American or European context, where the species and ecological context may be very different from other parts of the world. The transfer of technology to a different setting can have unexpected and unintended consequences. For example, the Standard Gauge Railway project in Kenya created underpasses to maintain connectivity between Tsavo East and West National Parks in Kenya. However, a proliferation of illegal settlements blocked many of the underpasses, restricting movement of animals and increasing risk of conflict between humans and wildlife (Nyumba *et al*. 2021).

Testing and adaptation of mitigation strategies are needed to understand which measures are effective and cost-effective to apply (see e.g. Collinson *et al*. 2019 for a review of research on road impacts and mitigation in Africa and Rajvanshi and Mathur (Chapter 17) on Indian experiences).

Recommendations

There is an urgent need for testing mitigation approaches in the field through wide application, improved monitoring and sharing of data. Lenders have an important role to play in developing capacity of government agencies and national practitioners to document the effectiveness of mitigation measures. Research findings need to be freely accessible to developers and practitioners through central depositories and engagement platforms. Conservation Evidence (https//www.conservationevidence.com/) provides a valuable platform that brings together assessments of the effectiveness of conservation and mitigation actions, but evidence from the developing world is still largely lacking.

Engagement and lesson-sharing between international and local wildlife specialists can also offer insights into local contexts and help identify practical solutions that account for site-specific factors. The African Linear Infrastructure and Ecology Conference, (https://endangeredwildlifetrust.wordpress.com/2019/03/15/inaugural-african-linear-infrastructure-and-ecology-conference/), International Conference On Ecology and Transportation (ICOET) (https://icoet.net/about) and Transport Ecology (https://transportecology.info/about) provide examples of effective solutions for such interdisciplinary engagement and sharing of findings.

4.3 Conclusions

Lender safeguards can play a key role in addressing biodiversity risks associated with infrastructure corridors. IFC's PS6 provides the benchmark for good practice, and has seen wide adoption or convergence by international lenders. Rigorous application of the mitigation hierarchy, to achieve no net loss and net gain outcomes where appropriate, is central to PS6 and similar safeguards.

There are technical challenges in applying some aspects of PS6 to infrastructure corridors, owing to their linear spatial configuration. The overall approach to assessing, mitigating and monitoring biodiversity risk and impact remains entirely valid, however. By incorporating these concepts and approaches in regulatory frameworks, governments can address the gaps in current EIA processes, provide a level playing field for financers and developers, improve biodiversity outcomes and support the achievement of conservation goals.

Like EIA, biodiversity safeguards are a largely reactive and project-specific mechanism. The scale of infrastructure corridors requires a more proactive and strategic approach through early upstream planning at the regional or national level, with input from a broad range of stakeholders. Landscape-level planning, through SEA or other means, can effectively reduce risks of future developments, enable effective avoidance, better address cumulative impacts and improve the outcomes of biodiversity offsets.

Impacts that cannot be fully avoided can often be minimized substantially. The evidence base for minimization approaches is growing, but still largely confined to the developed world. Field testing of mitigation approaches, data transparency and lesson-sharing between actors can all help build an information base for mitigation that works, and avoid the repeated (and sometimes costly) use of ineffective techniques.

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05

Environmental Sensitivity Mapping for Corridor Planning

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ABSTRACT

Spatial environmental data enable planning of infrastructure to avoid and minimize the impacts of development in ecologically valuable areas, and are an important aspect of impact assessments. In the age of advancing geographical information systems, the concept of environmental sensitivity mapping (ESM) has evolved as a versatile method to bring environmental spatial data together with an assessment of sensitivity to understand interactions and inform planning processes. However, there is a lack of standardization of ESM approaches and a lack of application beyond emergency response planning. Here, we suggest that a wider uptake of ESM approaches in the context of infrastructure corridors can support integrated area-based planning and the avoidance of sensitive assets, hence reducing the corridors' impact on the environment. Impact assessments of infrastructure corridors may list sensitive assets within project documentation, but a spatial analysis is rarely carried out, and often these assessments do not consider relative susceptibility of different assets to the proposed development. ESM enables a shift from a restricted, binary vision of environmental sensitivity to a spectrum of high to low sensitivity to any given development type and its associated pressures. Identifying areas that are highly sensitive to particular pressures may indicate potential no go areas based on the development type, where impacts would be considered unacceptable. Establishing quantitative sensitivity values through a standardised methodology that relies on stakeholder engagement helps impact assessments to be more transparent and objective. ESM can also align understanding of sensitivity, with standardization at a national or regional level, and hence build common recognition of areas of high environmental sensitivity to particular forms of development. This is particularly relevant for infrastructure corridors crossing multiple regions, or even multiple countries. Strategic Environmental Assessments (SEAs) and Environmental Impact Assessments (EIAs) of infrastructure corridors can therefore be strengthened through the use of ESM approaches by providing quantitative assessments of environmental sensitivities considering both importance and susceptibility to pressures. By providing a common understanding and approach to assessing environmental sensitivities for both the public and private sectors, ESM can support efforts to shift from an infrastructure corridors perspective to establishing development corridors that balance conservation and sustainable development.

5.1 Introduction

Balancing conservation and development objectives to meet the Sustainable Development Goals (SDGs) by 2030 has been a primary concern of the conservation community (Hickel 2019; Spaiser *et al.* 2017; zu Ermgassen *et al.* 2019). The impacts associated with the global infrastructural network required under SDG 8: Decent Work and Economic Growth and SDG 9: Industry, Innovation and Infrastructure, seem at odds with efforts to protect nature as mandated by SDG 14: Life Below Water and SDG 15: Life on Land (zu Ermgassen *et al.* 2019). Infrastructure corridors have primarily been designed to maximize economic growth and development in key regions, but consideration of their impacts on nature has been largely absent.

Effective planning and impact mitigation of large linear infrastructure projects can ensure development corridors do not deliver development benefits at the expense of biodiversity and its associated ecosystem services (Sonter, Ali and Watson 2018). Spatial environmental data enable planning to avoid and minimize the impact of development in ecologically valuable areas (World Wide Fund for Nature and the International Institute for Sustainable Development 2017). Spatial data are an important aspect of impact assessments including those as part of many SEAs and all EIAs (Atkinson and Canter 2011; González Del Campo 2012; Marull *et al.* 2007). The process of overlaying different spatial data into a single view was formalized in the 1960s by McHarg (1969) to support land-use decision-making. Overlays provide information on where assets are located in relation to each other, but not on how they may interact. In the age of advancing geographical information systems, the concept of ESM has evolved as a versatile method to bring environmental spatial data together with an assessment of sensitivity to understand interactions and inform planning processes. ESM was first developed in the context of oil spills, to inform emergency response plans and define priorities for protection and clean-up (Jensen *et al.* 1990), as shown in Fig. 5.1. A range of ESM approaches have been developed for different geographies and sectors – such as the National Oceanic and Atmospheric Administration (2016a); National Environment Management Authority (2010); and Schallier, Van Roy and Van Cappellen (2013) and the Mapping Environmentally Sensitive Assets (MESA) methodology can be applied for both oil spill response, as shown in Fig. 5.2, and other contexts, as detailed in Section 5.2 (Norwegian Environment Agency and UN Environment Programme World Conservation Monitoring Centre 2020). However, an overwhelming majority focuses on oil spills and coastal/marine realms (Norwegian Environment Agency and UN Environment Programme World Conservation Monitoring Centre 2019).

Figure 5.1 Excerpts from the 2016 south-west peninsular of Florida and 2013 South Florida Environmental Sensitivity Index (ESI) shoreline classifications by the National Oceanic and Atmospheric Administration (National Oceanic and Atmospheric Administration 2013; National Oceanic and Atmospheric Administration 2016b). The ESI displays the complex sensitivities of shoreline habitats to oil spills, with a ranking scale of 1 to 10. A rank of 1 corresponds to shorelines with the least susceptibility to damage by oiling (e.g. steep, exposed rocky cliffs and banks), and a rank of 10 corresponds to shorelines most likely to be damaged by oiling (e.g. mangrove swamps and saltwater marshes)

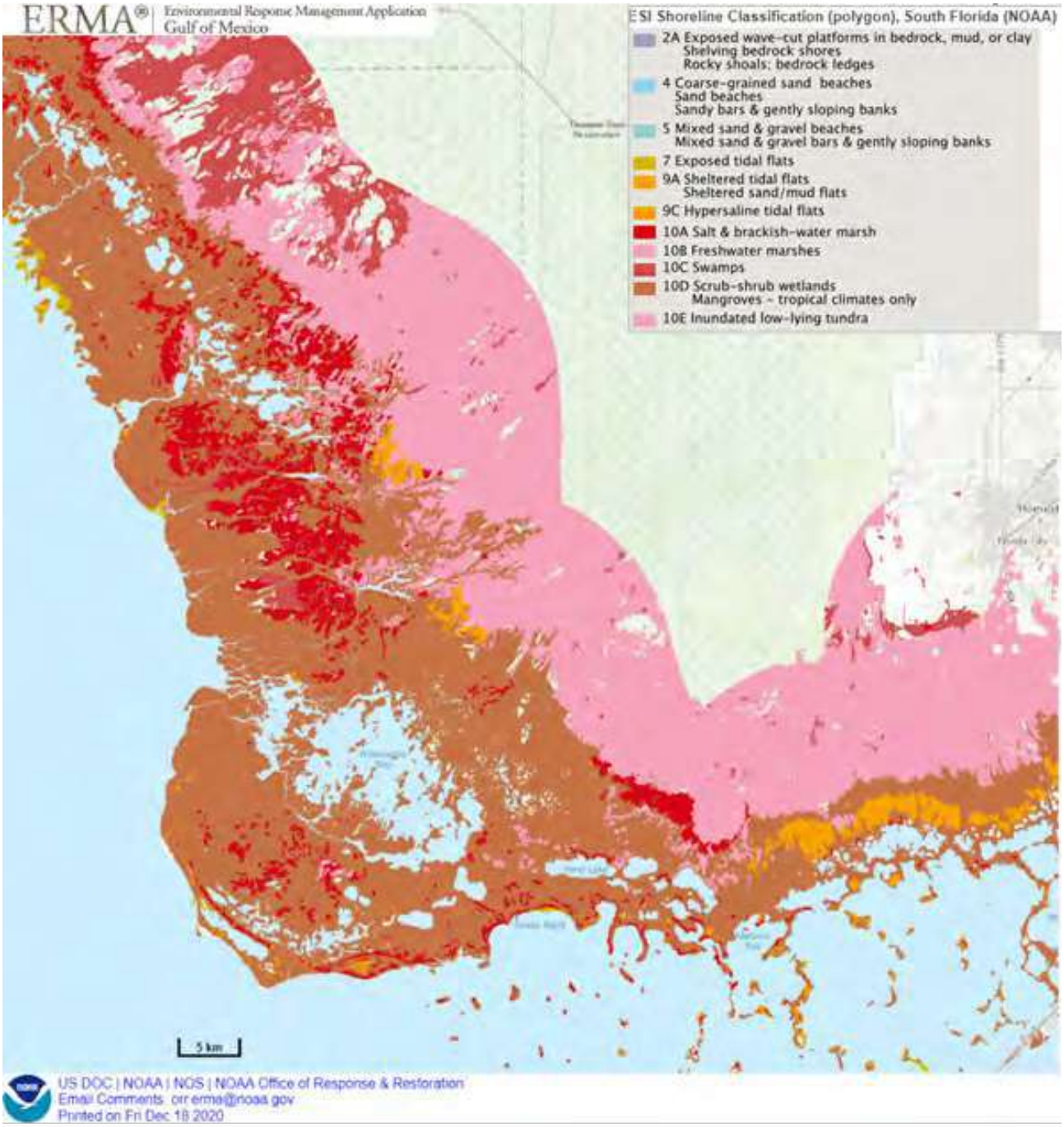
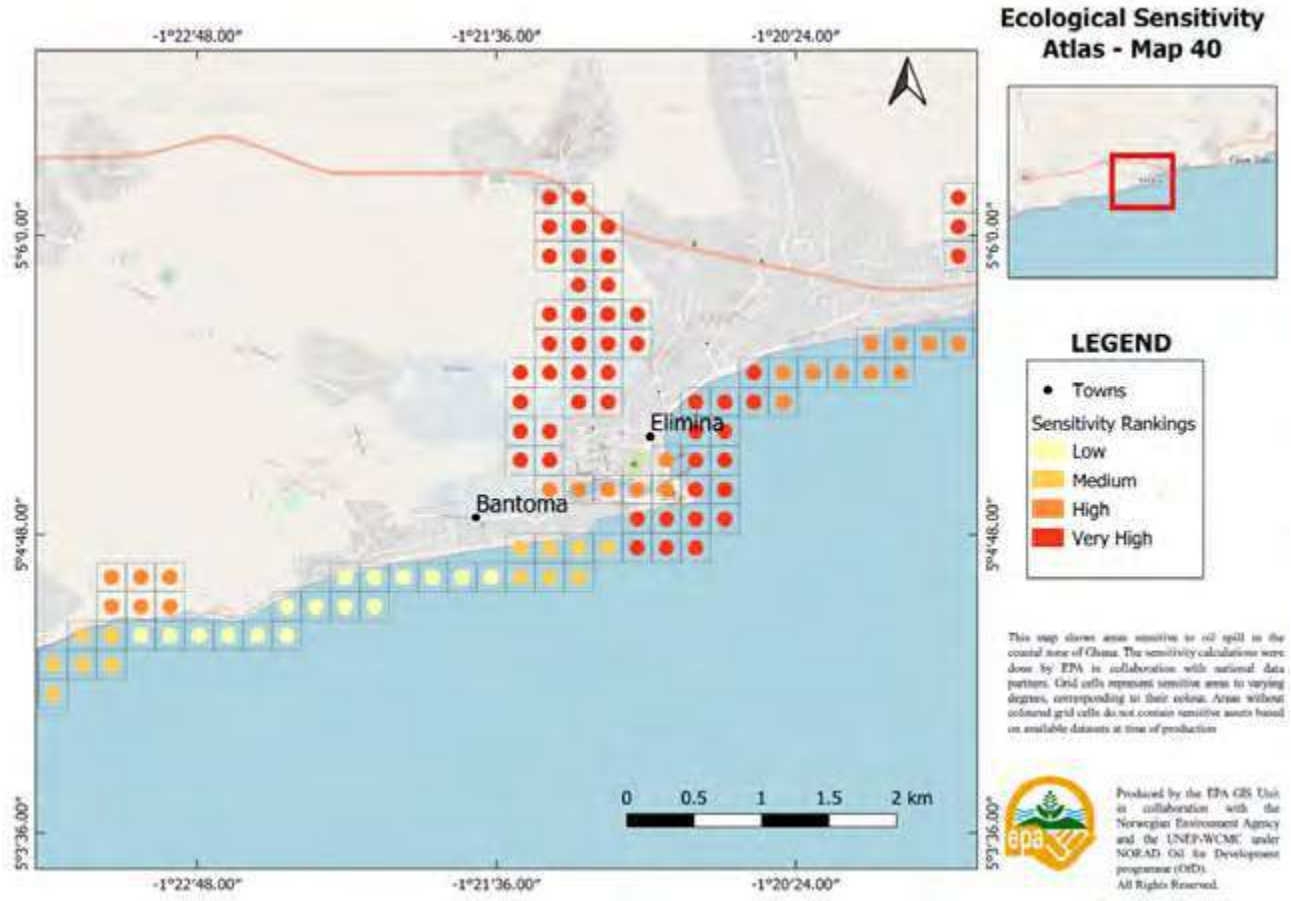


Figure 5.2 Draft excerpt from the 2021 Environmental Sensitivity Atlas for the Coastal Zone of Ghana (Environmental Protection Agency 2021). Sensitivity of ecological assets to oil spills was ranked from low to very high using the MESA methodology



ESM assesses the environmental priority and potential sensitivity of ecological and socioeconomic assets within a landscape, feeding into planning efforts to mitigate the impacts of human activities. However, there is a lack of standardization of ESM approaches and a lack of application beyond emergency response planning. Here, we suggest that a wider uptake of ESM approaches in the context of infrastructure corridors can support integrated area-based planning and the avoidance of sensitive assets, hence reducing the corridors' impact on the environment. This can support efforts to shift from an infrastructure corridors perspective to establishing development corridors that balance conservation and sustainable development.

5.2 Defining and differentiating sensitivity

Sensitivity of biodiversity features such as habitats, areas or species is commonly referred to in impact assessments (United Nations Environment Programme 2018). For example, the 2018 EIA regulations for Tanzania include a list of environmentally sensitive areas as part of its project screening criteria (The United Republic of Tanzania 2018), and Kenya's 2015 Environmental Management Act refers to projects impacting environmentally sensitive areas as requiring an EIA (Republic of Kenya 2015). Similarly, the scope of an EIA is highlighted as dependent on the sensitivities of biodiversity features and ecosystem services in the International

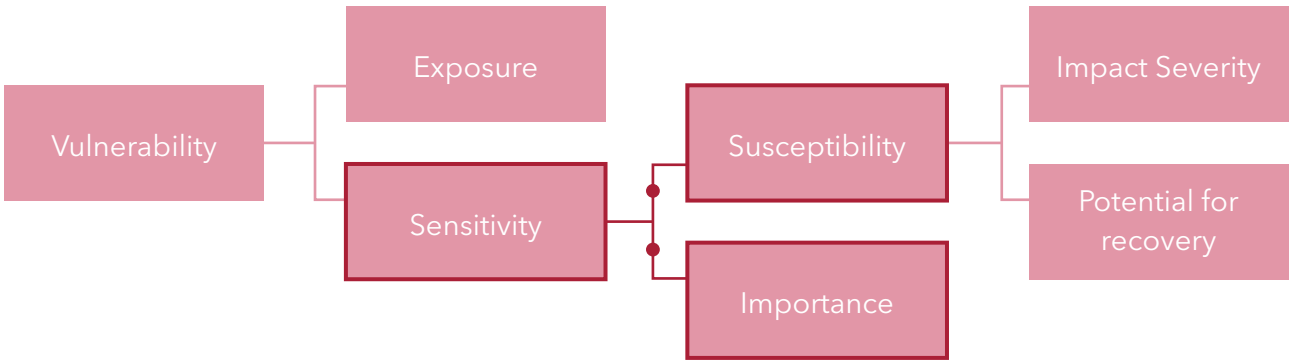
Finance Corporation Performance Standard 6's guidance note (International Finance Corporation 2019), and sensitivity is referred to throughout the Cross Sector Biodiversity Initiative (2015) mitigation hierarchy guidance (see Chapter 4). Sensitivity of a biodiversity feature is often presented independently to the type of pressure and impacts stemming from a project, focusing instead on threat status and irreplaceability of the features as determining factors.

There is no widely accepted definition of the term sensitivity and this lack of standardization has led to a variety of interpretations (Füssel 2007; Gallopín 2006). Even within the ESM community, sensitivity is not universally applied, with several overlapping concepts being differentially used, including vulnerability, importance, exposure, severity and potential for recovery (Norwegian Environment Agency and UN Environment Programme World Conservation Monitoring Centre 2019). This poses a potential barrier to widespread integration of ESM into the planning of infrastructure corridors, as these often span multiple countries, which may have adopted differing national interpretations of sensitivity.

To provide clarity, the Norwegian Environment Agency (NEA) and the UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) have proposed a standardized set of definitions for elements of ESM (Norwegian Environment Agency and the UN Environment Programme World Conservation Monitoring Centre 2020). Sensitivity is defined as a combination of susceptibility (itself a measure of impact severity and potential for recovery) and importance of the affected asset. Susceptibility can be assessed for direct impacts, as well indirect and cumulative impacts, provided that the information is available regarding how an asset will be affected and how it may recover. The vulnerability of an asset (both ecological or socioeconomic) is defined as a function of its sensitivity and likelihood of exposure to a given pressure (see Fig. 5.3). Exposure would, for example, correspond to the proposed route of an infrastructure corridor, with overlapping sensitive assets identified as vulnerable. It should be noted that assets could be susceptible and exposed to more than one source of pressure, which would increase their vulnerability. Those definitions form the basis of the MESA methodology, which is based on a review of other ESM approaches with a step-by-step protocol for evaluating relative sensitivity of assets.

be used for more consistent assessments of biodiversity features and ecosystem services of importance and at risk of impact as part of EIAs and SEAs for infrastructure corridors.

Figure 5.3 Sensitivity can be defined as a combination of an asset's susceptibility and importance. Sensitivity combined with exposure to a given pressure gives an indication of an asset's vulnerability



Source: [Adapted from] Norwegian Environment Agency and the UN Environment Programme World Conservation Monitoring Centre (2020)

5.3 Moving beyond a binary vision of sensitivity

Impact assessments of infrastructure corridors may list sensitive assets within project documentation, but a spatial analysis is rarely carried out, and often these assessments do not consider the relative susceptibility of different assets to the proposed development. For example, the impact assessment documentation of the Chad–Cameroon pipeline project compares habitat sensitivities through a summary table (Cameroon Oil Transportation Company 2011). There is no visual representation of the location of the different sensitivities referred to in the table, preventing a spatial understanding of impacts related to possible project configurations. In addition, no information is provided within that sensitivity assessment on the susceptibility of assets to the potential impacts associated with a pipeline development. Certain habitats listed may be more or less impacted by its construction or operation, which would inform the least impactful project configuration from an environmental perspective. The SEA of the Lamu-South Sudan-Ethiopia Transport Corridor project references the mapping of sensitive areas, but ultimately only displays maps of protected or conservation areas combined with the corridor route (Lamu-South Sudan-Ethiopia Transport Corridor Development Authority 2017). This approach fails to capture the differential impacts from the project on individual habitats and species of those sensitive areas, based on their underlying characteristics. It also disregards the potential sensitivity of habitats and species found outside of those designated areas, and which may be equally impacted by the project. It is estimated that 17 per cent of vertebrates listed as threatened on the International Union for the Conservation of Nature Red List live outside of one of the areas under the global network of protected areas (Venter *et al.* 2014). Looking at specific taxa, approximately 60 per cent of rare amphibian, 50 per cent of rare bird, and 44 per cent of rare mammal species have under 10 per cent of their range within a protected area (Cantú-Salazar *et al.* 2013). Within the East Africa region, only 26 per cent of endemic species had at least half their range covered

by protected areas (Riggio *et al.* 2019). Sensitivity assessments therefore need to go beyond designated protected areas if they are to account for biodiversity more broadly.

The planning of infrastructure corridors presents a number of trade-offs, with impacts on communities and the environment weighted against development benefits. An analysis of 33 planned or existing corridors in Africa found that six of them fell into a category of 'inadvisable', with high environmental costs and low or modest agricultural benefits (Laurance *et al.* 2015). Decision makers must therefore be provided with enough information to understand the specificities of a landscape and identify alternatives that have the fewest negative impacts relative to their benefits, ensuring an integrated area-based planning approach. ESM enables a shift from a restricted, binary vision of environmental sensitivity to a spectrum of high to low sensitivity to any given development type and its associated pressures. Identifying areas that are highly sensitive to particular pressures may indicate potential no go areas based on the development type, where impacts would be considered unacceptable. By capturing sensitivity to the specific pressures associated with infrastructure development, ESM can inform planning and avoid highly sensitive areas. ESM can also support other steps of the mitigation hierarchy, by identifying assets where mitigation measures would be required to minimize impacts and restore biodiversity, as well as important assets in the landscape where protection or restoration measures could be deployed to offset residual biodiversity impacts.

5.4 Strengthening impact assessments

A variety of stakeholders are called upon in EIAs and relevant SEAs to identify all biodiversity features within the area of interest (e.g. key habitats, threatened species, areas important for the provision of ecosystem services and protected areas). Similarly, stakeholder driven assessments of the importance of assets is a fundamental step of ESM. ESM draws on multiple sources of information and active engagement with stakeholders, across both governmental and non-governmental organizations (Norwegian Environment Agency and the UN Environment Programme World Conservation Monitoring Centre 2020). Establishing quantitative sensitivity values through a standardized methodology that relies on stakeholder engagement would enable impact assessments to be more transparent and objective. ESM would therefore allow a comparative assessment of the sensitivities associated with different infrastructure corridor options for more informed decisions. One of the shortcomings of the environmental and social impact assessment for the East Africa Crude Oil Pipeline, as reviewed by Netherlands Commission on Environmental Assessment (2020), is the lack of smart maps highlighting the sensitivities of valued ecological components and the assessment of potential impacts, which would enable the reader to understand how those impacts could be mitigated.

Existing ESM approaches have varying information and technical capacity needs for producing ESM (Norwegian Environment Agency and the UN Environment Programme World Conservation Monitoring Centre 2019). A sensitivity atlas ultimately consists of a collection of maps and supporting narrative text to reflect the basis for the sensitivity value, which will provide users of the atlas with a decision-support tool for planning and operational purposes. Methodologies relying on significant data and expertise in geographical information systems can be prohibitive for decision makers, especially in low- and middle-income countries (Edwards *et al.* 2014; Heeks 2002), but attempts have been made to develop user-friendly approaches. Enabling a variety of non-technical stakeholders to access and feed into a sensitivity atlas increases

its transparency and its uptake by relevant institutions. For example, the a sensitivity atlas webtool (AIRO 2016) provides plan- or programme-specific sensitivity maps for the Republic of Ireland, based on centralized SEA-relevant data. A test-group of the webtool found that the maps produced highlighted potential sensitivities meaningfully and improved the user's understanding of suitable or exclusion areas for development (González Del Campo 2017). The MESA approach is particularly versatile, with users deciding which spatial data to include and minimal technical capacity required to run the tool itself (Norwegian Environment Agency and the UN Environment Programme World Conservation Monitoring Centre 2020). It allows for both global and local importance values to be integrated within calculations of sensitivity, hence reflecting conservation priorities at a global scale, but also capturing local specificities.

5.5 Connecting impact assessments with other policies at the landscape level

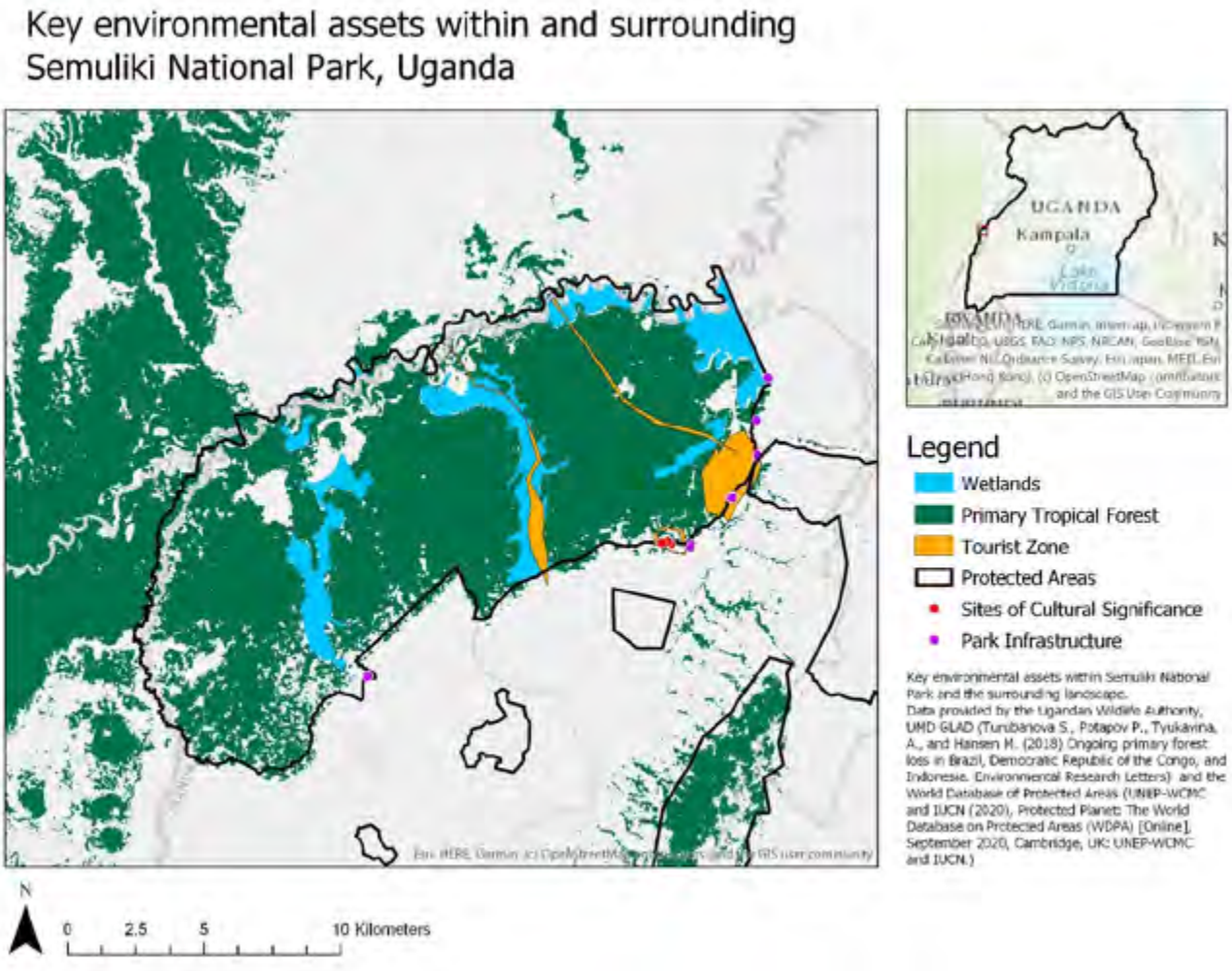
ESM can be used by both governmental authorities and project proponents. However, a publicly available and government-endorsed sensitivity atlas provides an opportunity to bridge any potential gaps in knowledge between the public and private sectors. It can also align understanding of sensitivity with standardization at a national or regional level, and hence build common recognition of areas of high environmental sensitivity to particular forms of development. This is particularly relevant for infrastructure corridors crossing multiple regions, or even multiple countries.

By endorsing a sensitivity atlas as part of a regional or sectoral SEA, governmental institutions can facilitate the integration of the associated plan or programme into the EIA approval process, by guiding the review and monitoring of EIA reports to ensure they align with recommendations from the SEA. ESM can help the standardization of EIA review processes by ensuring similar information is used systematically (González Del Campo 2017). It should be noted that some underlying data from a sensitivity atlas may need to remain confidential, such as the location of turtle nesting sites, to prevent misuse of that information (e.g. for illegal poaching).

ESM also provides an opportunity to connect impact assessments with other planning policies, plans and programmes at the landscape level, including the National Biodiversity Strategy and Action Plans (NBSAPs) that parties to the Convention on Biological Diversity are required to develop. Information collected for NBSAPs will also be relevant for the development of a sensitivity atlas, including in helping to determine the importance of environmental assets. By linking conservation planning and infrastructure development, ESM can facilitate the implementation of the NBSAP; for example, through EIA review process, which is otherwise often lacking. South Africa's NBSAP uses ESM to identify no go areas within the national protected area network for certain types of development, such as mining exploration (Government of South Africa 2015). Similarly, the sensitivity to energy developments of the Albertine Graben region in Uganda has long been identified by governmental and non-governmental institutions, with a region-wide environmental sensitivity atlas published in 2010 (National Environment Management Authority 2010). The maintenance and update of this atlas was understood as a priority for conservation planning and integrated as an action point within the 2013 SEA for the Albertine Graben region, where significant oil and gas resources lie, and the 2015-2025 NBSAP (Ministry of Energy and Mineral Development 2013; National Environment Management Authority, 2016). Ongoing work under the Oil for Development programme (see Acknowledge-

ments for further information) and in collaboration with the Uganda Wildlife Authority, the National Environment Management Authority and the Wildlife Conservation Society, aims to understand the role and resilience of a specific protected area (Semuliki National Park) within the Albertine Graben region. The impact of four different pressures on Semuliki National Park (development, flooding, demand for resources by local communities, and poaching and illegal incursions) and the sensitivity of its environmental assets (see Fig. 5.4) are evaluated to allow the identification of priority areas for conservation management. This information could feed into future development planning within the region, to ensure that connectivity is retained within the wider network of protected areas in Uganda.

Figure 5.4 Key environmental assets within Semuliki National Park (Uganda) and its surrounding landscape, showcasing the role and importance of the park, including for primary tropical forest. The environmental assets will be included in the sensitivity atlas under development for Semuliki National Park, helping to understand the potential impacts from pressures in the Albertine Graben, and the park's resilience



5.6 Conclusion

Integrated area-based planning is fundamental to the successful delivery of development corridors, contributing positively to the economic development of a region, while helping to better manage impacts on biodiversity and ecosystem services. SEAs and EIAs of infrastructure corridors can be strengthened through the use of ESM approaches by providing quantitative assessments of environmental sensitivities considering both importance and susceptibility to pressures. Aligning the ESM process with national policy settings, in particular, NBSAPS, can help ensure development is in line with national conservation priorities. Work underway as part of the Oil for Development programme aims to facilitate wider uptake of ESM by providing an easy-to-use approach and tool, MESA, and supporting governmental institutions in partner countries to develop sensitivity atlases. By providing a common understanding and approach to assessing environmental sensitivities for both the public and private sectors, ESM can help identify more sustainable pathways for development corridors.

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Through the Oil for Development programme, Norway shares its experience from more than four decades of managing oil and gas resources. UNEP-WCMC collaborates with the Norwegian Environment Agency to build the capacity of governmental institutions in developing countries, to manage the biodiversity impacts of the oil and gas sector. In particular, the programme aims to strengthen the analysis, use and management of environmental data, including spatial, and it generates bespoke guidance to address the needs of in-country governmental partners.

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06

Putting Social Issues on the Infrastructure Agenda: Getting to a Rights-based Approach to Corridor Development

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ABSTRACT

Corridors are ultimately about people. People build them, use them, live alongside them and, ultimately, benefit and/or suffer from them. Recent messaging around the role of infrastructure corridors in the delivery of multiple Sustainable Development Goals (SDGs) provides a solid foundation in principle for considering and balancing all three dimensions of corridor development: economic, environmental and social. Despite the recent, welcomed emphasis on the sustainable development dimensions of infrastructure corridors, turning those messages into practice so that shared access and benefits become a reality for communities and workers along corridors will require far greater emphasis on the social dimension of corridors than has been seen to date. Social and human rights issues are still considered the next frontier in infrastructure investments. This chapter briefly addresses key challenges in putting social and human rights issues higher up the agenda in infrastructure corridors and why it is important to do so. It explores the multiple reasons why social and human rights issues are not likely to be addressed – or addressed sufficiently – without explicit requirements as part of corridor approval, implementation and monitoring processes. This chapter also addresses what is different about social impacts with a corridor, rather than a limited footprint infrastructure project, as corridors present a number of important additional challenges brought on by different corridor characteristics (i.e. their linear, dispersed, connected and complex nature). Finally, recommendations are made for improving the incorporation of, and attention to, social and human rights issues within impact assessment policies and practice for corridors.

6.1 Introduction

Corridors are ultimately about people. They are established with important objectives to facilitate trade and commerce, thus stimulating economic development. It is people who build them, however, and use them, live alongside them and, ultimately benefit and/or suffer from them. Goods and services move along corridors, but so do people. Yet people are often seen as bystanders in establishing and managing corridors.

Infrastructure corridors are considered crucial for development, putting infrastructure at "the very heart of efforts to meet the Sustainable Development Goals (SDGs)" (Economist Intelligence Limited 2019). The strong messaging around the role of infrastructure corridors in the delivery of multiple SDGs provides a solid foundation in principle for considering and balancing all three dimensions of corridor development: economic, environmental and social. Recent developments, such as the *G20 Principles for Quality Infrastructure* reinforce important messages about integrating not only environmental, but also social and human rights considerations into the full life cycle of infrastructure planning (G20 2019).

The concept of development corridors, where corridors are purposefully planned to deliver shared benefits to communities all along the route – rather than these issues being treated as a mere afterthought – provides the justification and opportunity to apply these concepts to and along an entire corridor.

Despite the recent, welcomed emphasis on the sustainable development dimensions of infrastructure corridors, a recent review of research on corridors highlighted that development corridors "can have enormous social consequences, produce a range of large-scale social, political, economic and environmental trade-offs, generate very uneven impacts and exclude vulnerable populations" (Gannon K.E. et al., 2020; see Chapter 2).

Image credits: Diego Juffe Bignol

There are often long histories, entrenched political interests, and significant financial stakes underpinning large-scale infrastructure corridors that stand between ideals and reality, and that can have enormous consequences. The SDGs and the G20 Principles convey many of the right messages. Turning those principles into practice so that shared access and benefits become a reality for communities and workers along corridors, will require far greater emphasis on the social dimension of corridors than has been seen to date (Office of the United Nations High Commissioner for Human Rights and the Heinrich Boll Foundation 2018). Social and human rights issues are rising to the top of the agenda, but are still considered the next frontier in infrastructure investments (Economist Intelligence Limited 2019).

6.2 Key challenges in putting social issues on the infrastructure corridor agenda

This section briefly addresses the key challenges in putting social and human rights issues higher up the agenda in infrastructure corridors. First, it situates social issues in the context of continually evolving Environmental Impact Assessment (EIA) practice. Second, it turns to identifying several reasons why social issues should be specifically addressed within the context of infrastructure projects. Third and finally, it addresses what is different about social issues in corridors, compared with other types of infrastructure projects.

6.2.1 Social and human rights issues within EIA history

As this publication highlights, EIAs have a long and rich history of being used (or not) in infrastructure corridors, in some cases, far more successfully than others. Captured in the Rio Declaration (United Nations Conference on Environment and Development 2006), in two international conventions (United Nations Economic Commission for Europe 1998), (United Nations Economic Commission for Latin America and the Caribbean 2018) and in the national legislation of many countries, (United Nations Environmental Programme 2018), EIAs have become an accepted part of the project-planning landscape, even if implementation faces the many challenges highlighted in this publication (see Chapters 3, 11, 13 and 18). EIAs provide an important process standard, with a systematic procedural requirement to consider and address potential impacts and to involve, as a core part of the process, those potentially affected. The diversity of impacts that a project – or in this case a corridor – may have should in turn dictate the necessary disciplinary diversity needed to address those impacts appropriately within the EIA process. That diversity should mean, not only that the full range of issues are specifically and separately addressed but, importantly, the interplay among the impacts are specifically considered and addressed. That maturity of addressing and appropriately synthesizing the management of integrated impacts remains a work in progress.

Effective EIAs should always include a social dimension, even without the addition of the 'S' in the abbreviation. However, as social issues were often relegated to a secondary consideration, unsurprisingly, social impact assessments (SIAs) developed alongside EIAs in the 1970s and were done as part of EIAs, "usually badly" (Vanclay *et al.* 2015). For SIAs, there has not been the same clearly defined moment for social issues such as the Rio Declaration, which marked the coming of age of environmental rights and EIAs. The social bucket has often been seen as a disparate

collection of issues. Instead, they are about the issues that affect or concern people and affect their lives, directly or indirectly. The environmental and social safeguard policies (safeguards) of development finance institutions (DFIs) that projects must address to secure financing from institutions such as the World Bank, the International Finance Corporation (IFC) and the African Development Bank, include several specific social safeguard policies that address common social challenges in larger footprint projects in developing countries. They have played a role in shaping practice on addressing social issues covered in environmental and social impact assessments. Alongside the growing suite of DFI social safeguards, SIA practices matured, defining principles, developing approaches and advancing practices in the way social issues are assessed and managed throughout the project cycle (Vanclay 2003).

Human rights impact assessments (HRIA) are a newer variant of impact assessments, building on the impact assessment approach, but more explicitly grounded in the international human rights normative framework (Gotzmann 2019). Whereas SIAs are sometimes viewed, unfairly,[1] as addressing an amorphous set of issues, human rights standards add to impact assessment practice a comparable international treaty architecture, similar to the multilateral environmental agreements architecture that underpins EIAs. Human rights standards define the framework for the impact assessment and provide guidance on both the substance and process to address a project's negative impacts on people. The international human rights framework also reinforces that the issues to be addressed in a HRIA are underpinned by legal obligations on States to respect, protect and fulfil human rights, and clear expectations set by the United Nations Guiding Principles on Business and Human Rights (UNGPs) on private sector actors (Ruggie 2011). The UNGPs are a normative framework that clarifies that the standard of responsibility for business regarding human rights is to respect human rights, whether domestic law sufficiently protects those rights or not. They elaborate on the steps that companies must take to know and show that they do so, including by carrying out human rights due diligence to identify, prevent, mitigate and account for how they address adverse human rights impacts (Office of the United Nations High Commissioner for Human Rights 2014). HRIAs are one tool for businesses to do so, and they are being increasingly used as a stand-alone assessment (NomoGaia 2018) or integrated (Danish Institute for Human Rights and International Petroleum Industry Environmental Conservation Association 2016) with other types of impact assessments. Each option has its drawbacks and benefits. HRIAs can have more normative, legal and reputational bite than an SIA might be perceived to have, in part because they address issues and impacts from the perspective of people's rights, and the accountability of both states and businesses to respect those rights, rather than treating these impacts and the people affected as issues to be assessed and treated like any other issue.

Both SIAs and HRIAs seek to cover and bring into the regulatory and project planning process issues that can be fundamental to peoples' lives. That is, where they live or can no longer live, whether their livelihoods will be eliminated entirely or so negatively impacted that they can no longer feed their families, whether the social capital that knits communities together will be disrupted and devalued, whether cultural sites of worship and celebration at the core of cultural traditions will be bulldozed, whether communities and their representatives can, when necessary, peacefully protest the construction of the corridor without fearing for their lives. SIA and HRIA processes seek to identify, assess and develop prevention and mitigation measures that can be used to address these impacts throughout the project cycle and give them greater visibility and a place in decision-making that does not always exist in typical EIA practice. They put the participation of those potentially affected at the centre of the process in identifying, assessing and developing responsive preventive and mitigation measures, rather than treating consultation simply as a process step that must be taken to complete regulatory approval (see Chapter 13).

6.2.2 The importance of explicit recognition of social and human rights issues in corridor projects

Without explicit recognition that social and human rights issues must be addressed as a condition of corridor approval, implementation and monitoring, they are not likely to be addressed – or addressed sufficiently – for reasons briefly explored below.

Firstly, the social bucket, particularly when explicitly overlain with the human rights framework, is often profoundly integrated with politics at many different levels (these are touched on in selected chapters in the volume [3, 13]). Corridors are complex projects to manage from a policy, legal and administrative point of view. But even before addressing the institutional capacity to manage such complex projects (Organisation for Economic Co-operation and Development and

International Monetary Fund 2019), a government's approach to governance and rule of law plays a defining role in whether a corridor will become a development corridor (see Chapter 1). A development corridor requires a complex balancing of different rights and interests that elevates consideration of social and environmental impacts to the same level as consideration of economic benefits. The tone from the top – that is, government attitudes and the signals governments send about the role that different stakeholders play or do not play in authoritarian and repressive regimes – in deciding government policy and projects matters in such large-scale projects. Good governance – issues such as whether communities and individuals even have rights under a constitution or subsidiary legal framework that should in theory be taken into account in corridor planning, whether communities and journalists can voice opinions without fear of retribution, whether a country's judicial system is well established and disposed to hear disputes about land acquisition and resolve them in a fair and equitable manner, and whether corruption is endemic – are all indicative of the attention that may be given to the social dimensions of corridor planning.

Whether a government has the institutional capacity to manage projects as complex as corridors is another layer of overall analysis that requires heightened attention (Chapter 20) and, at times, a needed dose or realism (World Bank 2014). The countries most in need of such corridors are often those that are least able to manage the complexity. Who benefits and who does not from large-scale projects should be a matter of rights of many different kinds, including human rights, but the process is often far more complex, depending who exercises power and how they exercise it. As the Organisation for Economic Co-operation and Development (OECD) has noted, the nature of public investment in infrastructure makes it particularly prone to corruption (Organisation for Economic Co-operation and Development 2016).

Secondly, the political economy of decision-making around large-scale projects, even in higher-functioning states, plays a key role in decision-making, as highlighted in Chapter 3. Local communities that are potentially affected are not the power brokers. Without explicit attention, these are the easiest groups to ignore in complex projects. They have neither political relevance nor the kind of political power that is needed to sway vested interests. It is often the poorest, most deprived, vulnerable and socially excluded communities that experience the greatest environmental inequalities, with infrastructure planned for their lands rather than more affluent or politically well-connected areas (see Chapters 11 and 13). SIA and HRIA seek to foreground the impacts on and rights and interests of the most vulnerable and marginalized in corridor decision-making, building as they do on principles of inclusivity (Aizawa 2020). The power of the human rights narrative is in giving their interests equal weight in decision-making, and in prevention and mitigation plans. A human rights approach insists that, where marginalized groups may experience impacts disproportionality, additional, specialized preventive and mitigation measures are necessary to redress the impacts. The increasing role of DFIs, the private sector and investors concerned about environmental, social, governance (ESG) impacts in

infrastructure corridors provides, at least in theory, new leverage for strengthening this critical dimension of the impact assessment process, even where governments are willing to ignore or even seek to repress any kind of active inclusion of those affected.

Thirdly, as a regulatory matter, although in most countries across the world EIAs are required by law as part of a project approval process, regulatory requirements for conducting SIA remain limited (Vanclay 2014). In some cases, social dimensions are specifically included within the scope of EIA laws, but even where they are, they may be given only secondary attention, as a subset of environmental issues.

Fourthly, there are many issues around the interplay between local communities and corridors, but there is one in particular that is at the core of a web of related impacts that can have significant implications for people's lives and, therefore, deserves attention through dedicated SIA and HRIA processes: land. Many countries around the world still have incomplete or dysfunctional legal frameworks governing land tenure, which include unresolved objectives about whether land is to be governed as a commercial asset to be harnessed for economic development, or as a basis for livelihood activities and social identity for the, often majority, rural populations (African Development Bank 2020). Land tenure is deeply political, reflecting cultural values and the collective sense of justice about distribution in a country. As a result, it is a profoundly challenging area of reform. In the many countries where governments retain the constitutional right to land ownership, those on the land potentially hold some form of tenure rights that may range from formal legal title to customary tenure rights holders, to those who hold the land through short or long-term occupation (Committee on World Food Security 2012). In many developing countries, particularly in rural areas, communities themselves recognize and manage tenure through customary land tenure practices, which the government may or may not recognize (Land Portal 2021). When the time comes for the government to exercise the typical governmental function of eminent domain to secure land for corridors, some governments find it convenient that their patchy land regulatory framework does not recognize customary or other forms of tenure. Those living on the land – sometimes for generations – under these rules may not be recognized as land owners, and therefore not entitled to compensation or to a voice in consultation processes to establish the corridor (Land Portal and International Institute for Environment and Development 2020). Referring to those on the land as "illegal squatters", even though there may have been no possible legal avenue under national law to pursue claims to legalize their title, becomes a convenient excuse for eviction without due process or compensation, as required under human rights law (United Nations 2007a).

Corridors often involve resettling communities along the route – potentially many different communities. Resettlement can trigger profound social transformation that is often a source of constant conflict, anxieties, concerns and human rights violations. In addition, too few governments have laws governing resettlement to define the rights of those physically and economically displaced by public sector projects, the process for actually establishing new resettlement sites, the objectives of replacing livelihood activities (Kamakia, Guoqing and Zaman 2017), for appropriately assessing fair compensation (Tagliarino 2017) or generally to manage the complex process of resettlement. Countries that do have such laws in place lack the more detailed procedures and capacity to capture the full range of assets, including the natural assets communities rely on, which need to be covered as part resettlement arrangements (see Chapter 18). Further, countries typically do not have plans or principles, much less laws, to manage what is often predictable in-migration, as people move to the area of potential land acquisition and construction around corridors, seeking new livelihood opportunities but overstretching local capacity to provide services (International Finance Corporation 2009).

Around the world, in many countries with indigenous peoples, there is a patchwork of recognition of their rights to their land, territory and resources as set out in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) (UN Permanent Forum on Indigenous Issues 2021). While there are encouraging signs that indigenous land and resource rights are becoming more secure in some places through both legislation and litigation, there are many countries where these rights remain weak. UNDRIP provides that indigenous people have the right to determine their own economic, social and cultural development and to manage, for their own benefit, their own natural resources. The duties to consult with indigenous peoples and to obtain their free, prior and informed consent (FPIC) are crucial elements of the right to self-determination. FPIC is more than consultation and states are obliged to have consent as the objective of consultation before undertaking projects that affect indigenous peoples' rights to land, territory and resources, and to explicitly obtain the consent of indigenous peoples in cases of relocation from their lands or territories (Office of the United Nations High Commissioner for Human Rights 2013). Normative instruments, such as the Voluntary Guidelines on the Responsible Governance of Tenure and the UNGPs, reinforce the expectation that private sector actors respect those indigenous peoples' rights as well during project planning and implementation, whether or not they are protected under national law (United Nations 2018). Corridors that plan to go near or even through indigenous peoples' lands, or that may impact the natural resources they rely on, require long-term planning and engagement with indigenous peoples, to secure their consent and any conditions attached. Otherwise, re-routing or modification must be planned for where and when necessary.

All of this makes for potent, and in many cases, justified complaints and conflicts around infrastructure projects as people's assets are expropriated without any, limited or very delayed compensation (see Chapter 13). Where livelihoods are tied to the land or place, project-induced displacement can have even more severe impoverishment impacts, imposing long-term, potentially intergenerational trauma, especially where vulnerable groups are displaced. These land issues are interlinked with a number of human rights, including in particular the right to housing and the right to an adequate standard of living, but also to the enjoyment of many rights that are bound up with everyday community life – that is, the rights to health, education, and cultural life (Equator Principles 2020). The expediency of pushing through expropriation of land for corridors according to national laws that provide weak or absent protection for these rights can be alluring to governments seeking investors for large-scale infrastructure corridor projects. However, this creates new sets of impacts that are contrary to the objectives of the SDGs that are so often the purported reason for developing the corridor in the first place (Office of the United Nations High Commissioner for Human Rights and the Heinrich Boll Foundation 2018).

An SIA/HRIA process cannot address underlying land reforms – that is a typically a multi-decade process. What they can do is to ensure that these complex issues of the social and human rights impacts of land acquisition are identified, evaluated and addressed though appropriate assessment and management processes, such as a separate and dedicated resettlement assessments and action plans where necessary (European Bank for Reconstruction and Development 2017). SIA/HRIA can overlay the land acquisition and resettlement process with international standards to highlight relevant gaps in national law (Vanclay and van der Ploeg 2017). Where DFIs are involved, the application of DFI safeguards on involuntary land acquisition and resettlement is mandatory, although even the application of DFI safeguards is not a guarantee of outcomes that protect the rights of local communities and, importantly, better living standards after resettlement (Picciotto 2013; Cotula 2019).

Fifthly, meaningful stakeholder consultation has become an accepted, integral part of impact assessment theory, if not practice, that plays a crucial role in providing space and

a process for the voices and views of those potentially affected (International Institute for Sustainable Development 2018). The divergence between good practice and actual practice have been highlighted in Chapters 3 and 13. These processes can also undermine, rather than elevate, attention to social and human rights impacts if care is not taken. There are several points of concern, which are addressed below.

Consultation should not be treated as a substitute for specific attention to social issues through a dedicated SIA/HRIA process. Just because there is a consultation process, it does not mean that there is no need for dedicated SIA/HRIA, nor does it mean there are no specific social issues to address if stakeholders do not raise them as part of a consultation process. There may a whole host of reasons why people do not raise issues in consultations, nor are all social issues suitable to be addressed solely through consultations. Consultation with people is a core value of SIA and HRIA, but consultation is not the sole measure of the methodology; both SIA and HRIA are a whole branch of impact assessment that is based on a range of methodologies and approaches to assess and manage social and human rights issues.

The consultation process can take on an exclusionary function when treated as a technocratic step; if it is not in the consultation record, it is not taken into account. Even if it is in the consultation record, consultation responses can end up in annexes that by their placement signal the lack of importance attached to the views conveyed. Because the consultation process can be very determinative of whose interests get considered and whose do not, how the process is run becomes very important, as does who is consulted and how their concerns are recorded (Bradlow and Chapman 2011). Even in processes with detailed consultation requirements, as in corridors funded with DFI funding, where safeguards on consultation are applied, stakeholder engagement is consistently one of the issues that is most often raised in complaints about DFI-funded projects (Daniel *et al*. 2016).

There is a risk that all stakeholders are thrown into the same grouping, creating a muddle – and at times a purposeful muddle – lumping together everyone and anyone with any kind of interest in a corridor and treating them all equally. Yet not all stakeholders are equal (Hobbs 2020). Those who are potentially negatively impacted by the corridor, whose rights (to housing, an adequate standard of living, water etc.) are differently situated to those who may have broader interests in corridors. These are rightsholders rather than just stakeholders and, as such, they should be treated differently in the consultation process and, importantly, in the prevention, mitigation and remediation steps set out in the action plan to avoid violations of their rights. Where they are not counted as landowners through a formal expropriation process, they will typically not have access to legal avenues to make claims, or if they do, this may be a fraught, lengthy process. A human rights framing provides a basis for the potentially affected rightsholders to argue for recognition of security of tenure and other human rights at a minimum (Vanclay and van der Ploeg 2017).

The stakeholder consultation process can become disempowering if treated as the only legitimate interface for stakeholders to raise concerns about a project, to the exclusion of all other avenues. Addressing concerns outside of that narrow window of a consultation meeting can be considered a challenge to development itself. In an era when civil space is closing, and those who object to projects are branded enemies of development and criminalized, harassed or even killed, this is a serious concern (Antoine 2018; Hossain *et al*. 2018). In authoritarian regimes, stakeholder consultation can be manipulated to undermine, rather than exercise rights, by treating the impact assessment process as a checkbox, rather than an informative exercise.

6.3 What is different about a corridor?

It is important to consider what is different about social issues when it is a corridor being considered, rather than a limited footprint infrastructure project. Given how many corridors there are in existence and planned under the heading of delivering on the SDG (Economist Intelligence Limited 2019), there is less literature than might be expected on the environmental impacts of corridors (Gannon *et al.* 2020), but even less so on the social dimensions. In addition, the assessment of some major corridors that have been linked to anchor projects, often resource extraction projects, with a few notable exceptions, tend to be lost in the assessment of the overall anchor project, thus limiting further the available evidence. Nonetheless, a few issues stand out.

The first is the large scale/small voice problem. Corridor projects, by their nature require long-term planning that is typically complex, high-level and political. Trying to influence the early upfront decisions about corridors in favour of approaches that balance out impacts on communities requires a level of expertise and organization that is typically well beyond the knowledge and capacity of any local, rural civil society organizations. Being able to raise issues of the potential social impact of a large-scale corridor requires a level of scenario analysis that draws on experiences from other corridors – something local communities will not have access to. Even for organizations concerned with and able to address the environmental and social impacts of corridors at the policy and programme level, finding an entry point into the discussions, coupled with the political economy considerations in large-scale, multi-billion dollar corridors, highlights the challenges. The limited number of civil society organizations that are able to raise social and human rights concerns are very small voices in very large-scale projects.

The second issue relates to the linear nature of a corridor, as a corridor affects a wide range of communities on either side of the corridor. The dispersion of these groups is likely to mean they lack any perceived sense of cohesion. From the point of view of politicians and regulators who are interested in pushing through corridor decisions as quickly as possible, the dispersed nature of stakeholders along long corridors may be seen as an advantage. They may have little chance of co-organization or of seeing sufficient similarities that give such disparate groups sufficient cause to overcome the significant organizational challenges of bringing together groups along the corridor. They thus represent a more limited impediment than may be possible around one static, localized infrastructure project where community cohesion is strong, grounded in shared roots and interests. The divide and rule approach to consultations may be even more easily manipulated in corridor impact assessments, as may be the tactic of bringing in outsiders to speak for local communities, who in fact have no legitimacy in representing local concerns. Methodologies to engage these communities and better connect their shared impacts and interests need to be better adapted to corridor realities.

The third issue relates to the connected nature of the infrastructure. Corridors are purposefully designed to bring new goods and people to areas where they were not connected before. Those connections are seen and designed to contribute to national development, but those same connections can also have profoundly deleterious consequences for those populations and places that do not exist for other localized projects. The most obvious examples involve the devastating impacts of transport infrastructure projects in opening access to pristine areas that are also home to indigenous peoples – and in some cases, formerly uncontacted indigenous peoples (Ferrante, Gomes and Fearnside 2020). Corridors that open up areas for development bring a whole range of induced impacts – from loss of land and loss of access to resources, to negative impacts on health through disease transmission, to undermining cultural unity – that are often irreversible and irremediable, and that cannot, in applying a mitigation hierarchy, be either offset or

compensated. And yet, lessons learned from previous projects, some with disastrous consequences, are consistently repeated (International Finance Corporation and Fundação Getulio Vargas 2018).

A fourth issue that deserves further consideration is related to the large-scale nature of corridors. This means that they traverse large areas of a country, or several countries. Given the number of countries classified as fragile and affected by conflict (World Bank 2020; Organisation for Economic Co-operation and Development 2020), some part of a corridor may traverse areas that are affected by conflict, or at least by heightened tension. This impacts on project planning, but it can also have profound social and human rights and political consequences. There is often a two-way dynamic, with conflicts affecting corridor development and corridor development affecting conflicts, with the contextual risks materializing in unexpected ways. Corridors can open access to areas in conflict, they can facilitate the movement of government security forces, as well as insurgent forces along routes opened, they can be accompanied by heightened security forces to protect corridors, which in turn exacerbates existing tensions, to name just a few of the interacting dynamics. In other words, there may be a range of conflict dynamics that a corridor may exacerbate, or potentially mitigate. HRIAs and SIAs should draw out these links, especially when corridors are planned for conflict-affected and fragile areas (Orsini and Roper 2018). Conflict assessments are yet another area that require specific expertise and methodologies and they could be integrated into corridor impact assessments (Geneva Centre for the Democratic Control of Armed Forces and the International Committee of the Red Cross 2015).

Finally, the most significant issue relates to dispersal that is also an inherent characteristic of corridors: the dispersal of accountability. This is a significant issue, given the large number of actors that are typically involved in corridor projects. In some cases, there is a corridor authority or there may be a centralized ministry that has thematic authority but no authority over local planning. Where the corridor involves public-private partnerships (PPPs) through a PPP structure, there may be a complex layering of responsibilities with separate enforcement authorities supervising the private sector operators. Given the size and scale of corridors, there may be multiple financial institutions involved, both public and private. Financiers add another layer of possible accountability avenues and complexity to the structure of corridor transactions. The regulatory framework and number of actors are likely to be far more complex than for localized infrastructure projects. If the corridor crosses borders, that adds a whole new dimension to the complexity, much less if the corridor crosses several borders. With so many actors, the risk is that everyone and no one is accountable for environmental and social impacts. Unless the corridor has a centralized authority that manages the project, including taking responsibility for addressing grievances and non-compliance, it may be impossible for communities to untangle the identity of the project proponent or funder that is responsible for harms.

Access to justice, including remedy, is one of the three Principle 10 environmental rights set out in the Rio Declaration (United Nations Conference on Environment and Development 2006) and subsequent regional treaties and legislation. The UNGPs (highlighted above) also reinforce a focus on accountability and remedy where there have been violations of human rights. One of the three pillars of the UNGP framework is devoted to ensuring that victims of human rights abuses have access to remedy, starting with operational-level grievance mechanisms. The DFI safeguards have long-since required that projects they fund set up operational-level grievance mechanisms at the level of the project. DFIs also typically have their own grievance mechanisms, independent accountability mechanism (IAMs), which address complaints about DFI-funded projects. Infrastructure projects are one of the sectors with the most complaints to IAMs, which could be indicative of the level of concerns in other corridor projects (Daniel *et al*. 2016).

While, in theory, those harmed as part of corridor development or implementation have access to national courts or other non-judicial mechanisms in a country, that may indeed be only a very theoretical prospect, and something that an HRIA can flesh out as part of the assessment. Establishing a grievance mechanism that covers the whole corridor may provide a far more immediately accessible avenue, and if structured well, can create important lessons for the whole corridor. This would likely require new approaches to project structuring to ensure that there is one centralized and accessible grievance mechanism, with financial resources to address adverse impacts covering the entire project and the entire life cycle of the corridor project (World Bank 2016). Given the increasing rhetoric around connecting corridors to the delivery of the SDGs, it is important that SDG 16 becomes an integral part of the SDG-corridor development framework.

6.4 Conclusion

This chapter has focused on why it is important to provide a far stronger place for social and human rights considerations within impact assessment practice for corridors – starting with integration into the strategic level and Strategic Environmental Assessments (SEAs). Whether an integrated or a stand-alone process is preferable is a matter of both professional debate and, to a certain extent, the specific circumstances. There are drivers that should further elevate the social issues in corridor planning and projects. The key issue will be to test how these drivers push real change in the politics and practice on the ground, so that the impact assessment process becomes a more meaningful approach to, not only highlighting and foregrounding social and human rights risks and impacts, but also contributing to the ongoing management of these issues throughout the whole project development cycle, from strategic conception to post-closure (Vanclay *et al.* 2015).

Given the size and scale of corridor infrastructure projects, there is likely to be a mix of financial institutions involved, and one or more are likely to be a DFI. As noted above, DFIs have had environmental and social safeguard policies in place to guide consideration and management of environmental and social impacts as a condition of financing for decades (see Chapters 4 and 5). These safeguards are periodically updated. There is variation among DFI safeguards, but at least some DFIs are increasingly strengthening the social dimension, including by incorporating human rights into their safeguard policies and strengthening the breadth and depth of human rights issues covered. These safeguards are applied by a range of other financial institutions through voluntary adoption, such as the Equator Banks, by OECD Export Credit Agencies, by financial institutions financed by DFIs, via syndication agreements around particular transactions, and more informally as other financial institutions use them as a model for their own policies, thus spreading the practice and influence of the safeguards to a far wider set of financial institutions that may be involved in corridor financing. There are gaps in safeguard frameworks, particularly with respect to human rights, so involvement of DFIs do not represent a panacea for impact assessments across corridors (Office of the United Nations High Commissioner for Human Rights 2019). Private sector 'equator' banks updated their Equator Principles in 2020 to include a specific focus on human rights, in part because they were under pressure to provide a greater profile to the issue than in the IFC Performance Standards (on which the Equator Principles are based) did (Equator Principles 2020). The numerous complaints about DFI-funded corridor projects attest to the challenges of addressing social impacts, even in projects with experienced financial and development oversight from DFIs.

The counterfactual raises the spectre of the management of complex social challenges in projects where there are no mature multilateral DFIs involved. A lack of experience

may prevail among project proponents in international operations, where social issues are considered a matter purely for national governments (who may be uninterested or worse repressive), or where funders policies are antithetical to the human rights values that underpin SIA/HRIAs (Myers *et al*. 2019). There is a far wider range of financial institutions increasingly looking to infrastructure investments. These include pension funds and institutional investors looking for long-term investments, matched to their pension time horizons. In addition, regional and national financial institutions are also being drawn into financing corridors and they may have far less expertise and experience, and in some cases expectations, that environmental and social issues are an integral part of project requirements. Though environmental, social, governance (ESG) or 'impact' investing signals a sea-change, there is a long way to go in developing and applying the standards that would turn ESG into the consistent requirements that would prompt project sponsors to address the kinds of challenges highlighted in this publication. In particular, most investors currently consider ESG issues only when they may have a material impact on their own financial returns, and not what impacts their investments may have on people and the environment. However, that is slowly changing, and could become another important driver as investors and banks demand further accountability from infrastructure operators about the management of environmental and social issues.

The G20's recent Principles on Quality Infrastructure reinforce important messages about integrating, not only environmental, but also social and human rights considerations into the full life cycle of infrastructure planning, as noted above (G20 2019), and provide important signals from governments. However, while these principles, like the push on connecting the SDG and infrastructure agenda, and the focus on ESG, all push in the right direction, raising the profile of addressing environmental and social issues as an integral part of corridor planning and implementation, the challenge remains in translating high-level commitments into binding requirements that are applied to projects. Strong leadership and clear guidance are needed to value the issues drawn out through SIA/HRIAs, even in the face of the many challenging circumstances that face corridor projects, from stiff national political resistance to providing space and voice to the population, to changing the hardwiring of corridor project financing and legal documentation (financial conditions, legal agreements etc.) (Brauch 2017), to managing the complexity of making full use of the suite of impact assessment tools that can help inform better corridor planning and implementation.

A sobering recent study highlights the challenges of addressing these issues, even where the costs of ignoring social impacts is translated into hard, cold financial losses, repeatedly. An Inter-American Development Bank (Inter American Development Bank) study in 2017 looked at 200 infrastructure projects across six sectors in the IDB portfolio, where there was some level of social conflict about the project. The study found that "firms that fail to consider conflicts proactively or choose to remain unresponsive to conflicts when they arise usually face substantial consequences and are more likely to see their projects cancelled or abandoned. In most cases, risk and conflict management systems are ignored while community engagement is regarded as a secondary requirement which needs to be fulfilled in order to comply with regulations. Their crucial function for preventing conflicts is often not seen" (Watkins *et al*. 2017).

6.5 Recommendations

Firstly, the basic point is that there should be a consistent requirement for specific attention to social and human rights issues in corridor impact assessments. Corridors can have significant impacts on a substantial number of communities and people along their route, profoundly affecting their lives, potentially for generations. These impacts extend far beyond other localized infrastructure investments, justifying equally significant attention to these issues.

Secondly, given the potential for profound social disruptions, attention to social impacts should be routinely incorporated into SEAs for corridor projects; that is, strategic environmental and social assessments (SESA). Better yet, developing or maturing an approach to strategic social impact assessments (SSAs) that give equal focus to social dimensions at the level of programme planning could be considered.

Thirdly, the impacts of corridors on people are mostly covered by international human rights frameworks, adding a weight and urgency to giving priority to these issues. This is an obligation for governments, but also an expectation for the private sector actors involved in corridor projects, such as financial institutions, project operators and contractors. The increasing focus on the role of the private sector – in impacting human rights, in land grabbing, on indigenous peoples' rights and during resettlement – will lead to closer scrutiny of these issues and the private sector actors involved in corridor projects in the years to come. Structured HRIA processes can help corridor proponents better plan for, prevent and mitigate the many negative impacts that corridor projects can have on human rights, while also taking the opportunity of the detailed assessments to augment the positive impacts, thus contributing to the SDGs.

Fourthly, a remedy for negative impacts is a core tenant of human rights as well as of environmental rights under Principle 10 of the Rio Declaration. It is also part of the typical mitigation hierarchy that has gone largely unnoticed (but see efforts to address social impacts in the context of biodiversity offsets in Griffiths et al. 2019 and Jones et al. 2019). Many mitigation hierarchies include compensation or offsetting where impacts cannot be prevented or mitigated. Offsetting is not appropriate when harms to people are concerned, as distinct from many environmental issues. While compensation can be appropriate for some social impacts, in some circumstances, it is not the only, or the most appropriate remediation step. The impact assessment community needs to revise its thinking about mitigation hierarchies for social and human rights impacts (and potentially also for a range of environmental impacts that cannot be addressed through compensation or offsetting). With projects as extensive and long-lasting as corridors, starting the process from an appropriate approach to mitigation hierarchies that reflect accountability for remedy would signal a significant shift in conceptualization and practice.

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07

Accounting for Sustainable Development Co-benefits: Insights from Local Experiences with Climate Resilience Interventions

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ABSTRACT

Every investment decision shapes outcomes in the real world, and can have numerous non-intentional, positive or negative wider economic, social and environmental impacts. Particularly during the current COVID-19 pandemic, it is essential that investments are made responsibly, without harming the economy, the environment or our communities. Recovery from this crisis should mark the beginning of a global transformation to strong, sustainable, inclusive and resilient economic development and growth.

If we are to overcome poverty, make progress on the Sustainable Development Goals (SDGs) and manage the immense risks of climate change, it is wise to choose a path out of the depression by focusing on investment in sustainable economies and activities of the future, not only in man-made physical capital (traditional tangible assets and infrastructure), but also in natural, human and social capital. There is convincing evidence that a recovery which embodies the principles of sustainability can be stronger and faster than alternatives, as also shown by recent assessments underpinning the 'building back better' and green recovery arguments for a post-COVID-19 stimulus programmes (Hepburn, *et al.* 2020).

At the core of the SDG concept is the recognition that an intervention – be that an investment, policy, plan, programme or project – can have a wide range of co-benefits (and co-costs) that often fail to be recognized when undertaking ex ante appraisals or evaluation. This can be in the form of public health co-benefits of green spaces, or education and employment co-benefits arising from better transport routes. The terms co-benefits and co-costs emphasize the idea of additional, sometimes overlooked or unintended, benefits and costs of a particular project in any sector. As such, some investments might be undervalued because the potential indirect benefits to the community were not included in the appraisal, while in other cases wider environmental or social costs may be ignored or not identified.

From an SDG perspective the recognition of co-benefits and co-costs helps embed a holistic perspective across social, environmental and economy dimensions. Indeed, this is the underpinning principle of sustainable development, including for large-scale infrastructure investments, such as through China's Belt and Road Initiative, or as part of the African development corridors, which offer significant opportunities to support SDG strategies across different countries (Adshead et al. 2019).

However, recognizing and accounting for these during the appraisal-planning and evaluation stage of investments or projects is often challenging (Tanner et al. 2015; Vorhies and Wilkinson 2016; Fung and Hellgeson 2017). This underpins the importance of interdisciplinary and holistic planning for projects such as the development corridors that have emerged across many parts of the developing world. Research from the Development Corridors Partnership, led by the UN Environment Programme World Conservation Monitoring Centre, shows that development corridors can produce a range of large-scale social, political, economic and environmental benefits, as well as trade-offs, generating very uneven impacts and often excluding vulnerable populations, threatening the SDG pledge to "leave no one behind" (Lesutis 2019; Gannon et al. 2020). This raises questions for those investing in these development corridors, as well as for those who are responsible for implementation and delivery at national and local level (Schindler and Kanai 2019).

7.1 The concept of co-benefits

Conceptual overviews and taxonomies of co-benefits (see, for example, Ürge-Vorsatz *et al*. 2014; Mayrhofer and Gupta 2016) show that there are widespread definitions of the concept of co-benefits and quantification is often lacking.

Multiple approaches have existed to determine the magnitude and sources of co-benefits within appraisal methods such as cost–benefit analysis (CBA) or Multi Criteria Analysis (MCA). Some examples are computable general equilibrium modelling, such as a simulation method focused on the macro-economy, econometrics, economic modelling or science-based models, among others. These can be data- and computing-intense, and not all are feasible for applications by practitioners. Indeed, the failure of CBA to successfully quantify all impacts has given rise to the development of further appraisal tools such as Environmental Impact Assessment.

Particularly for large-scale projects – such as corridors – that span across geographic boundaries and involve international funders, implementing agencies, national governments and private sector, the recognition of co-benefits and co-costs is often lacking. As analysis of the Lamu Port South Sudan and Ethiopia transport corridor (LAPSSET) in Kenya shows (Dexter 2018), there was little formal integration of the environmental, social and economic co-benefits and co-costs in the official CBA, which only captured the conventional costs and benefits associated with the projects. Instead, wider economic, environmental and social aspects were considered in separate impact assessments, but not integrated into the formal appraisal. Thus, concerns such as local resistance to mandatory land rights changes, the environmental implications of the corridor for fishers' (Enns 2017), and the economy-wide implications of oil price fluctuations (Browne 2015) were not considered at the formal project appraisal.

Overall, the utilisation of any co-benefit assessment depends on data availability and on agreed metrics. Over the last few years, a range of alternative approaches to identifying environmental and socioeconomic co-benefits have emerged to supplement the conventional impact assessments (Olsen *et al*. 2015). In an effort to formalize this, the United Nations Framework Convention on Climate Change Clean Development Mechanism (CDM) Sustainable Development Co-benefits metric was devised, to highlight the co-benefits of CDM projects (United Nations Framework Convention on Climate Change 2018), offering a qualitative assessment that loosely captures these co-benefits and provides an approximate magnitude. This may be efficient and particularly sensible for local-level and small-scale projects, but is likely to face acceptability challenges in the context of large-scale investments, including major infrastructure. Lack of data and clear accounting standards is an issue. There are, however, also tools and methods that can help overcome this, as the case of climate resilience shows.

The ability to collect primary data in case of field work, especially in behavioural economics, where data is not necessarily taken at face value, but instead different pathways for co-benefits can be uncovered by non-market contributors to co-benefits. Examples include the Co-benefits Evaluation Tool for Municipal Solid Waste by the United Nations University, which uses a life cycle assessment approach to consider the environmental impacts associated with climate change, air pollution and wastewater. The Nationally Appropriate Mitigation Action (NAMA) Sustainable Development Evaluation tool allows users to evaluate the sustainable development performance indicators and sustainable development results achieved over the lifetime of the NAMA.

7.2 Insights from climate resilience: integrating co-benefit appraisal into planning and decision-making processes

In the context of climate mitigation and adaptation, the concept of co-benefits has been playing an important role for strengthening the case for investment and action. Many benefits of emission reduction projects are long-term and global in nature (Hamilton, Brahmbatt and Liu 2017). However, there are also more immediate and locally felt benefits, such as improved air quality, which is the co-benefit most often referred to in the literature, as per a review by Karlsson, Alfredsson and Westling (2020) of 239 peer-reviewed articles covering co-benefits. Likewise, within the resilience literature, many benefits of resilience projects that protect against uncertain shocks will only materialize if a disaster happens (Surminski and Tanner 2016). However, in both cases, recognition of the wider co-benefits of these projects can make the business case for their implementation to become more palatable, as other immediately tangible benefits also occur because of their implementation.

This follows the view that climate change policies and interventions can be used to target multiple (non-climate) objectives, such as human health and energy security (Intergovernmental Panel on Climate Change 2014; Von Stechow 2015). To quantify co-benefits, Von Stechow (2015) adopts an economic model in which co-benefits are the marginal impact of a policy on an objective, where the social planner's aim is maximizing social welfare by choosing the best policies (optimization of marginal welfare). This approach of optimizing marginal welfare can be adopted in multiple objective/multiple-impact frameworks. After a revision of quantitative assessments of co-benefits in the literature, they find that potential co-benefits account for 53 per cent (e.g. from renewable wind farms) to 350 per cent (e.g. from thermal insulation) of direct benefits.

On the adaptation side, decision makers still undervalue investment in resilience due to its political unattractiveness and unclear monetization, even though evidence shows that strengthening resilience is hugely cost-effective and can generate multiple benefits. The idea of resilience has been promoted for a long time. In terms of global commitments, this is well established in the Sendai Framework for Disaster Risk Reduction 2015–2030, the SDGs and the Paris Agreement on climate change. Yet different disciplines apply different concepts when assessing resilience – from robustness to bouncing back and bouncing forward in the face of shocks. A commonly used definition is the one provided by the United Nations Office for Disaster Risk Reduction: "the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions" Importantly, resilience needs a holistic understanding of risks and risk drivers, taking into account how risks interact and what this means for the aims and ambitions of individuals, companies or countries. But, for many, particularly in the investment community and for policymakers, there is a need to assign monetary values to any co-benefits or co-costs (Surminski and Szoenyi 2019). This creates challenges, as not all impacts of policy or interventions can be assigned monetary values, but overcoming this quantification gap is widely seen as a key barrier for more investment in adaptation and resilience (Dicker et al. 2021).

Resilience can also have a transformational aspect when we consider future climate risks and how to reduce and prepare for these. In that context, we consider resilience as a holistic strategy to help communities move ahead in a sustainable way; that is, by pursuing social,

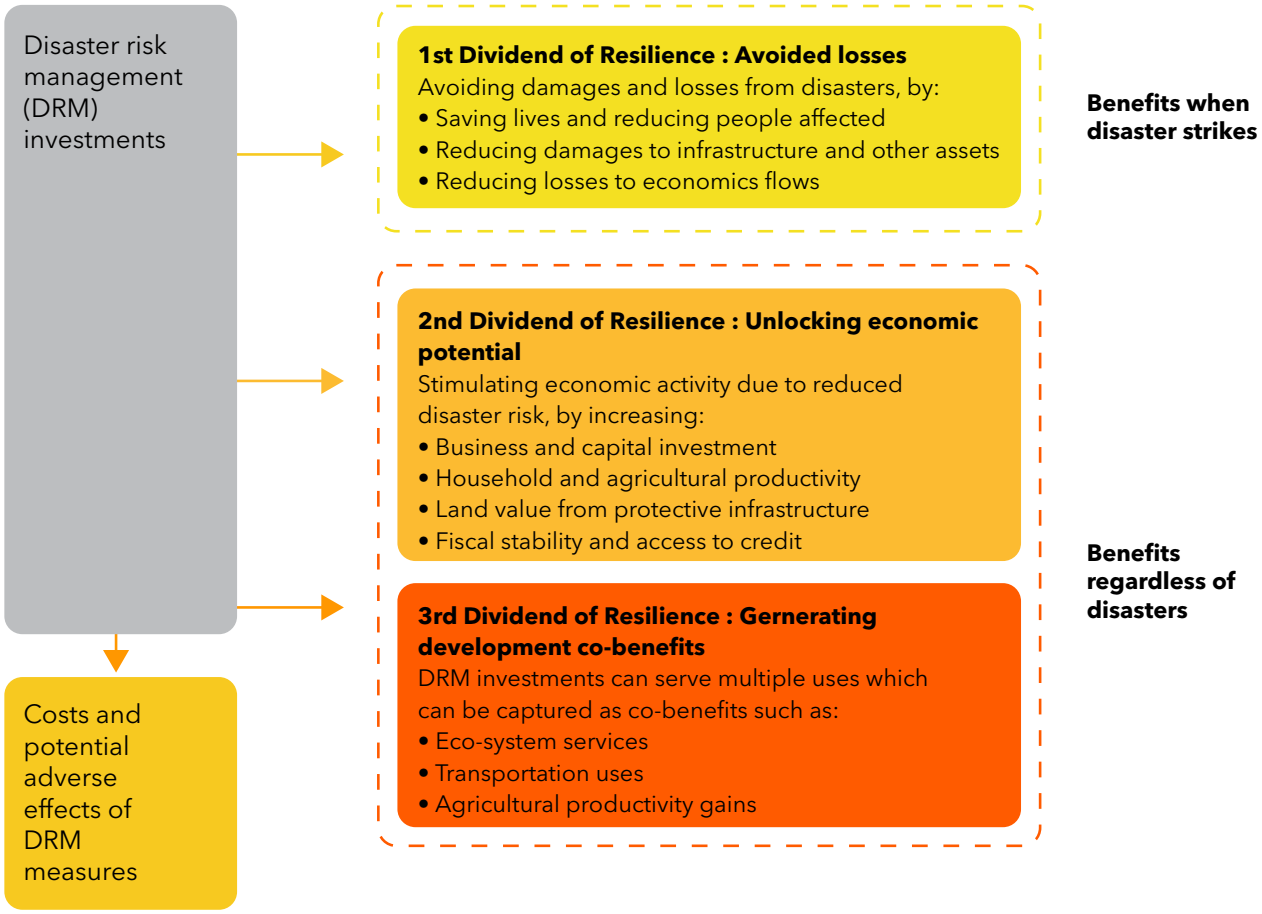
ecological and economic development goals, while managing the risk of climate change over time in a way that mutually reinforces these goals.

As such, achieving resilience is not just a matter of selecting one strategy; for example, in the context of flooding, by building a dyke. True resilience can only be achieved through a strategy that employs financial, human, natural, physical and social capitals. One example is climate change, where we know that today's decisions will determine tomorrow's risks. A lack of regard for future risk can lead to expensive lock-ins.

However, for policymakers or investors, the old adage that prevention is better than cure does not always hold water; preventative measures aimed at reducing risks or avoiding damages tend to be seen as a cost, with uncertain or distant benefits, and they often lose out to actions or interventions with more immediate and more visible results. This has caused a major imbalance in funding, with significantly more spent on recovery and repair than on climate adaptation and increasing resilience (Surminski and Tanner 2016).

As a result, the European Union's Science for Disaster Risk Management report in 2017 recommended that "presenting evidence of additional dividends to policymakers and investors could provide a narrative reconciling short- and long-term objectives. This will improve the acceptability and feasibility of DRM investments, enhancing the business case for investment in prevention and mitigation" (Poljanšek et al. 2017). Recognizing and quantifying those wider benefits in the context of policies, investments and interventions can thus help to strengthen the case for investing in adaptation, as demonstrated by the Global Commission on Adaptation's Flagship report (2019). This builds on the notion that climate resilience can generate several dividends and achieve separate objectives simultaneously. Fung and Helgeson (2017) define the resilience dividend as "the net benefit (or cost) that accrues, from investments aimed at increasing resilience, in the absence of a disruptive incident over the planning horizon". Here, the main objective is maximizing co-benefits from projects that are initially financed to achieve a certain resilience objective that tackles a problem, whether in infrastructure, energy, agriculture, water supply and many more. The end goal for measuring and exploring the resilience dividend is to make co-benefits (e.g. increased jobs and enhanced reliability of an infrastructure system) of resilience planning tangible. This idea was based on existing literature around measuring co-benefits for several types of projects in multiple sectors that yield indirect benefits, whether the main outcome was building resilience or not. The Triple Resilience Dividend concept, developed through a collaboration between Overseas Development Institute, the World Bank and the London School of Economics, and currently developed further with International Institute for Applied Systems Analysis and partners in the Flood Resilience Alliance and applied by the GCA in the context of adaptation, provides a holistic framework for assessing the direct and indirect benefits and costs of climate resilience measures. At its core are three dividends (Fig. 7.1).

Figure 7.1 Triple Disaster Resilience Dividends framework

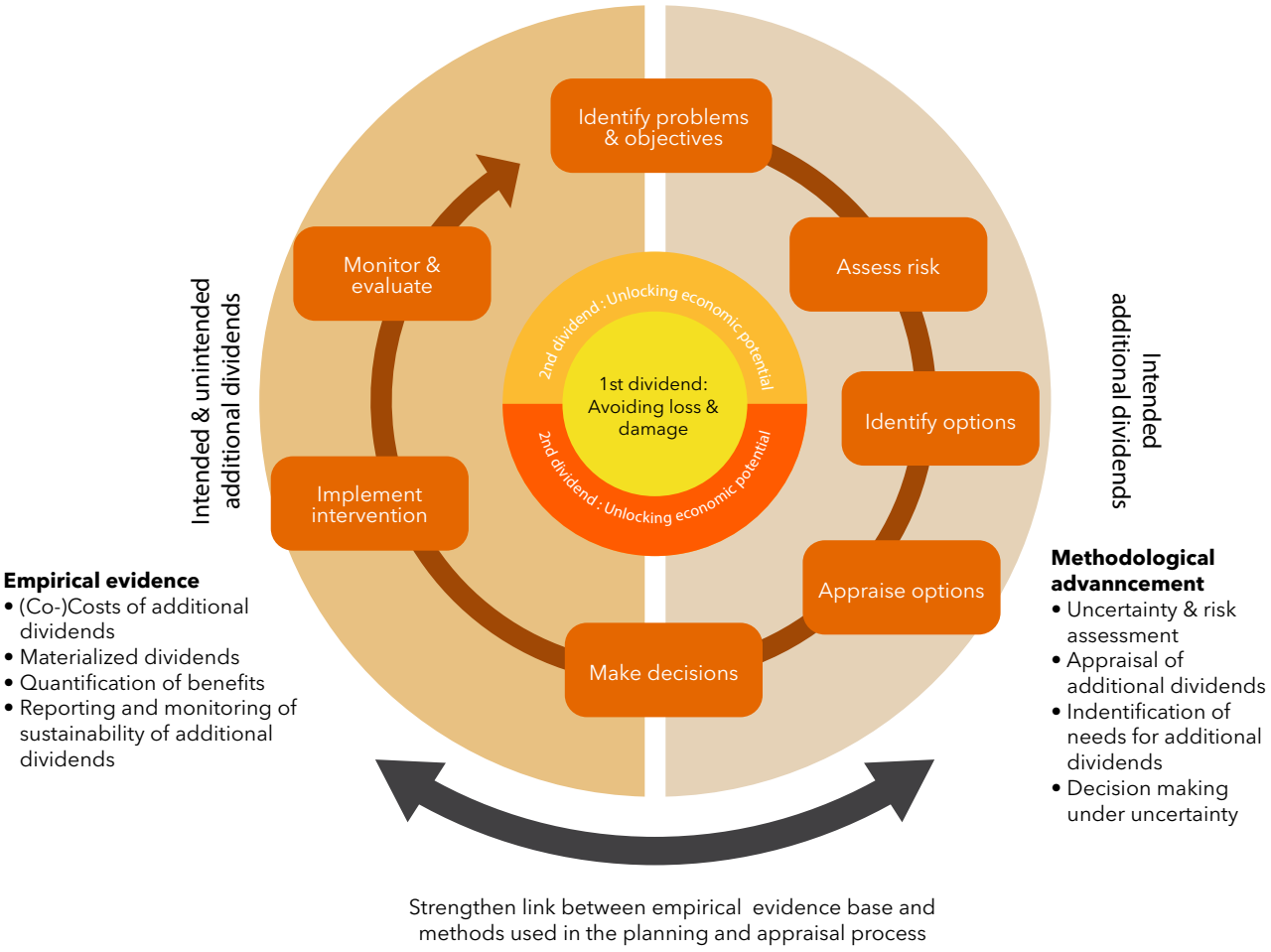


Source: Surminski and Tanner (2016).

The most common motivation and most basic rationale for disaster risk management is the first dividend: avoiding loss and saving lives. However, it is a metric that is hard to measure because of the uncertainty around predicting the timing and magnitude of a future event – this applies to both public health crises and natural disasters. The second dividend – boosting economic potential – occurs because improving resilience reduces the background risk of disaster and can increase economic potential at both the household level and, more broadly, at the macro-economic level. In addition, there can be broader sustainable development co-benefits (third dividend). Investment in resilience can yield other benefits, for example, in the form of wider environmental impacts of ecosystem restoration or reforestation, transport structures and agricultural systems. For example, flood embankments can also support road networks, and safe sea-port shelters can double as a fishery logistics service centres. Nature-based solutions in particular offer many advantages, including the fact that healthy ecosystems can regenerate; they are self-sufficient and do not need external energy supplies; they help to maintain biodiversity; they can bring tourism benefits; and they do not lose their performance capacity over time.

Applying the wider perspective on benefits and costs requires a strong tool set to help identify, quantify and monitor these for project appraisal, investment decisions and other interventions, as well as a recognition of experiences and qualitative assessments at the local level (Mechler and Hochrainer-Stigler 2019). Rözer et al. (2021) consider this in the context of decision-making processes, as shown in Fig 7.2. They argue that the need for holistic appraisals and recognition of the wide range of co-benefits and co-costs is key.

Figure 7.2 Empirical Process.



Source: Roezer et.al. 2021

7.3 Examples of co-benefit appraisals in projects relevant for the development corridor context

This section offers brief summaries of case studies where co-benefits have been appraised, to illustrate different types of applications and local experiences, as well as observed challenges. All cases have the primary aim of supporting adaptation to climate change and increasing resilience to the impacts of climate change effects. In addition, there are a range of environmental, social and economic co-benefits that have been realized, and in some cases quantified.

7.3.1 Devolved climate finance in Kenya's arid and semi-arid regions and assessment of social co-benefits

7.3.1.1 Context

The Adaptation ('Ada') Consortium (made up of the Kenya Meteorological Department, the UK Met Office, Christian Aid, International Institute for Environment and Development and in-county partners) built on pilots to develop

the County Climate Change Fund (CCCF) – a devolved climate finance mechanism. The mechanism comprises a fund to finance climate action, adaptation planning committees at county and ward levels, climate information and resilience planning tools, and a monitoring and evaluation (M&E) mechanism. It is designed to both channel climate financing to county-level governments, and to empower local communities by strengthening their participation in the use and management of those funds. Communities focused initial investments mostly on water infrastructure, such as water pans, earth and sand dams, boreholes, shallow wells and rock catchments.

Social co-benefits include the following:

- Advancing gender equality. At the community level, the CCCF mechanism has resulted in greater engagement among women and young people in planning processes. This has been supported by training and capacity-building through local committees, as well as establishing processes and procedures to ensure the views of all community groups are appropriately represented. For example, where women's views are not reflected strongly enough in plans, women-only meetings are held to address this imbalance (Bonaya and Rugano 2018). Anecdotal evidence suggests that the CCCF mechanism may be "helping change communities' attitudes towards women and supporting women and youth to become more visible and active within communities" (Crick et al. 2019) – with some women taking on leadership roles in their communities (both within local committees and more broadly) and discussing issues of community development with men where they were not previously (Bonaya and Rugano 2018; Crick et al. 2019).
- Increased community participation. It has been reported that "community consultations have become more participatory and communities have strengthened their political voice, increasingly holding county planning departments to account" (Crick et al. 2019). This is driving transparency and accountability in governance processes. This is supported by strengthened vertical links between community, ward and county levels, with greater interaction (including greater consultation of ward-level representatives), improved relations, and learning supported between different levels. Findings from household surveys suggest that standards in the way investments had been implemented had been improved as a result of increased public participation and scrutiny (Crick et al. 2019). Moreover, the CCCF mechanism has been cited by county officials to highlight the "value of participatory planning in generating effective and efficient public goods investments that represent value for money" (Crick et al. 2019).
- Education. The reduction in time spent collecting water is noted to be supporting children in their schoolwork, with anecdotal evidence of increased time at school for both girls and boys, and increased support at home – with noted educational benefits. It has been noted that girls in particular have more time to spend on their schoolwork, as a result of reduced water collection responsibilities (Bonaya and Rugano, 2018).
- Increased social cohesion/reduced conflict. Other benefits reported anecdotally include greater social cohesion and fewer conflicts within households (including reports of decreases in domestic violence) and communities, as well as between neighbouring villages.

7.3.2 Heat Action Plan in Ahmedabad, India and social co-benefits

7.3.2.1 Context

In Ahmedabad, a coalition of academic, municipal, health and environmental groups partnered to address heat-induced health impacts, led by the Indian Institute of Public Health, Gandhinagar; the Natural Resources Defence Council; and Ahmedabad Municipal Corporation (AMC). The coalition developed a Heat Action Plan (HAP), a framework for the implementation, coordination and evaluation of a strategy, the HAP outlined immediate and longer-term activities to increase preparedness, information sharing and response coordination.

Social co-benefits include the following:

- Capacity built to address other public health threats. Research to inform iterations of the HAP, and the relationships it developed, have also led to work to protect health in new areas. For example, research undertaken with traffic police in 2016 as part of the HAP highlighted the risk to workers' health of traffic pollutants (Kirbyshire and Paul 2017). The city now has an Air Information and Response Plan to fight air pollution, modelled on the HAP process. The Air Information and Response Plan promotes inter-agency coordination, public awareness and capacity-building among medical professionals. This provides a clear example of the capacity built in local government institutions through the HAP, including in planning and evaluation. One evaluation found that the HAP "built interest in the evaluation and feedback process within several government agencies" (Indian Institute of Public Health Gandhinagar, Natural Resources Defense Council, Rollins School of Public Health of Emory University, Icahn School of Medicine at Mount Sinai 2015).

- Education. The HAP has allowed schools to continue to provide uninterrupted access to education during some periods of extreme heat, with an informant noting a "remarkable reduction" in those missing school during heatwaves. However, this is limited, and the 2019 iteration of the HAP advises school closures on days where temperatures reach 45˚C or above (Ahmedabad Municipal Corporation 2019).
- Women's employment. Painting roofing on low-income housing with white reflective paint has allowed women, who are more likely than men to work from home (in roles such as sewing), to remain indoors and continue working, where they were unable to previously in comparable heat.
- Knowledge-building. The HAP has created greater awareness of the impacts of extreme heat and climate change, with acknowledgement and action from a range of actors who previously did not recognize the risk. Drawing attention to the role of climate change in the occurrence of extreme heat has also encouraged greater focus on carbon emissions and mitigation measures, by raising the profile of climate change more broadly among the population. One informant noted that solar panels have seen a significant increase in uptake over recent years, including as a revenue stream. The AMC is planning to install solar panels on AMC buildings, as well as planting 500,000 trees annually between 2020 and 2025 (Natural Resources Defense Council 2020).
- Highlighting vulnerabilities. The plan has also highlighted other existing vulnerabilities in Ahmedabad. The focus on protecting slum communities from heatwaves, for example, further highlighted the specific vulnerabilities of those in low-income housing without access to water or electricity.

7.3.3 Ecosystem-based adaptation in Thua Thien Hue province, Vietnam

7.3.3.1 Context

As part of a disaster risk reduction (DRR) and research project by the Global Resilience Partnership, ecosystem-based adaptation (EbA) measures have been planned and implemented in the Giang Lagoon, Bu Lu river delta and Hue City (Bubeck *et al*. 2019). The region suffers from flooding caused by the river, sea and from heavy rainfall, mainly during monsoon season. Between 1975 and 2005, 40 flood events were recorded in the region (Bubeck *et al*. 2012). At the same time, the province highly depends on ecosystem services of the surrounding water bodies, including 100,000 people directly relying on the lagoon as fishing grounds and for their water supply (Van Tuyen, Armitage and Marschke 2010). In the United Nations Educational, Scientific and Cultural Organization (UNESCO)-listed Hue City, the local ponds act as retention areas in case of heavy rainfall events, while at the same time are important for local tourism and recreation. Population growth and rapid urban expansion has led to a fast disappearance of natural areas, putting additional pressure on available ecosystem services, while at the same time increasing the exposure to flooding. Apart from that, a gender gap between men and women was identified as one key issue of the communities' flood resilience. As the main caregivers in the community, to both the elderly and children, women have limited mobility in case of a flood disaster and also fewer opportunities to build up savings for a fast financial recovery.

Social co-benefits include the following:

- The implemented EbA measures generated a number of social co-benefits. Restoring the ponds in Hue City improved the recreational value, offering areas for recreation improving physical and psychological well-being of the local population. Creating attractive spaces for local communities to meet it promotes neighbourhood activities

and social cohesion. As the measures were developed and planned with the active involvement of the local women's union, increased participation and engagement by local women helped to promote gender equality.

Economic co-benefits include the following:

» Both planting of mangroves and urban pond restoration come with considerable economic co-benefits. A willingness to pay for analysis of both national and international tourists resulted in a positive benefit–cost ratio of 34 from the increased attractiveness to tourists of the UNESCO World Heritage Site, Hué. Planting mangroves is expected to lead to an increase in fisheries and seafood, stimulating the vital maritime economy in the region. Based on an expected increase in seafood production, a positive benefit–cost ratio of 2.3 was estimated.

Environmental co-benefits

» By planting mangroves along the river banks of Bu Lu river and in the Giang Langoon, not only is wave energy reduced, stopping coastal erosion and reducing the risk of flooding, but planting mangroves also comes with additional environmental co-benefits. This includes new habitats and breeding grounds for many terrestrial and aquatic species and improved water quality, as mangroves act as a natural water filter by absorbing heavy metals and other toxic substances. As a global environmental co-benefit, the planted mangroves absorb carbon dioxide and reduce the greenhouse gas concentration in the atmosphere. The urban pond restoration in Hue City contributes to a regulation of the urban microclimate by absorbing excess heat during hot days and, due to healthier vegetation, local air quality has improved.

7.3.4 Bio-dykes in Bardia and Kailali districts, Nepal

7.3.4.1 Context

The Bardia and Kailali districts lie in north western Nepal, on the border with India. The two communities in Bardia and Kailali consist of 135 and 60 households, respectively. In both cases, the main livelihood of community members is agriculture, which is also the key source of their food security. The majority of the agricultural land is highly susceptible to regular flooding of tributaries of the Karnali river during the monsoon season, destroying crops, putting livestock at risk and leaving sand deposits. Both communities have a low standard of living. As part of the Nepal Flood Resilience project the non-governmental organization Practical Action has supported the construction of bio-dykes to reduce bank erosion and loss of agricultural land during flooding, as well as to save lives and properties. Faced with more frequent and intense climate-induced disasters, bio-dykes have emerged as a DRR intervention that can be well integrated into local plans and community-led programmes across the different geographic areas in Nepal. Bio-dykes are a bio-engineering solution that can control bank erosion and control flood risk by mediating the water flow through a combination of vegetation and structural measures. The vegetation controls the erosion of an embankment built from locally available material such as sand, rocks and soil. In the initial stage, sand bags are used to control erosion while the biological measures gradually become more effective when plants mature and their roots start to stabilize the soil. For the vegetation, local grass, shrub and tree species are used. Bio-dykes with a length of 220m and 1,500m were built in the two communities coordinated by the Local Disaster Management Committee.

Social co-benefits include the following:

» As a direct social co-benefit, the better protection of livelihoods through a protection of agricultural land from the bio-dykes out-migration from the community

could be stopped, as community members are not forced to find other sources of income outside the community.

» Additionally, community members reported the new knowledge and skills that they acquired during planning, building and maintaining of the bio-dykes as a positive social co-benefit.

Economic co-benefits include the following:

» The bio-dykes increased fodder production for livestock in two ways. As the agricultural land is better protected, yields are more stable as they do not get destroyed by floods during the monsoon season. In addition, the vegetation growing on the bio-dykes can use as an additional source of fodder increasing the productivity of livestock.

Environmental co-benefits include the following:

» The vegetation growing on the bio-dykes not only helps stabilize the construction of the dyke through their roots and prevent bank erosion, but it also created new wildlife habitats for local species. With sustainable use of the vegetation growing on the bio-dykes, carbon dioxide is sequestrated, reducing the greenhouse gas concentration in the atmosphere.

7.4 Conclusions

The ex-ante recognition of co-benefits and co-costs can have significant implications for the design of investments, policies and government interventions, such as corridors. This can be a significant contribution to ensuring utility corridors transition into true development corridors. As highlighted by Dexter (2018), their omission has led to a myopic view of the potential benefits of corridors, hence misrepresenting their true value, either with a positive or negative bias. Unequivocally, this can lead to suboptimal decision-making, when incomplete impact appraisals are used to allocate funding and attract investment, or comply with investor conditionality rules.

From the field of climate resilience, we learn that a holistic approach is important for avoiding silo thinking. We are facing complex challenges and will only succeed if we understand how we can cope with interconnected and compounding risks. Importantly, this also needs to move beyond the traditional view of relying on hard engineering and infrastructure solutions only. Human, social and natural capital are hugely important for building resilience, but are often overlooked when designing risk strategies. This aligns well with the holistic scope of sustainable development, where co-benefits can also strengthen the case for investments in favour of those projects and policies that deliver economic, social and environmental benefits.

Evidence of these co-benefits can be drawn from a mixture of studies, M&E documents and discussions with stakeholders. However, the case studies used in this chapter show that there are significant limitations in the evidence base for the benefits that accrue from adaptation processes, across breadth, robustness and type of evidence. Indeed, much of the evidence gathered is anecdotal, reflecting that the evidence of co-benefits is not likely to have been a key consideration when the adaptation process was initiated. This may be related to the availability (or lack thereof) of funding for holistic M&E activities, how these activities were framed, and the types of benefits that were being considered for measurement. Challenges in evidence availability appeared greater in some contexts, for instance, from adaptation processes in Least Developed Countries and Small Island Developing States.

This is also visible for many of the development corridor projects. As Gannon (2020) shows implementation and ownership of SDG achievement through development corridors remains varied and fragmented (Gannon 2020). And the analysis of LAPSSET shows that the integration of the environmental, social and economic co-impacts were omitted from the CBA, despite the theoretical necessity of their inclusion. However, even the simplistic environmental and social impacts identified in the current LAPSSET reports (LAPSSET 2021) could be converted into an aggregate performance measure to help better indicate the co-impacts of the project (DCP policy brief 2021).

The case studies shown are themselves still relatively new and emerging examples of potential adaptation successes, recognizing that the full returns from investment in adaptation will only become evident in the long term, particularly for large-scale infrastructure projects such as the development corridors. As such, it will be critical to continue to invest in ongoing M&E activities into the future for pioneering adaptation processes such as those highlighted by the paper. Nonetheless, action to increase financing for adaptation does not depend solely on further rigorous documentation of the impacts of adaptation financing and the two areas should be focused on simultaneously. Existing technical analysis, although limited, is sufficient to continue to build the profile of the benefits to be gained through a rapid scaling up of adaptation financing.

Decision-making frameworks for financing adaptation should recognize and value a diverse range of possible benefits that may result from adaptation processes. However, those tasked with appraisals and decision-making need to acknowledge that maximizing monetary co-benefits might not be the best option in case the co-benefits do not meet the community's needs and priorities, and are therefore lacking local buy-in. In the case of CBA this means that the co-benefits that are included in a CBA analysis need a careful and critical evaluation from all stakeholders to avoid solutions that might have a high BCR but low acceptance by beneficiaries.

Furthermore, there is the challenge of creating significant search costs when attempting to assess all possible co-benefits and co-costs in detail. In response, the approach recommended by the UK's Green Book (Her Majesty's Treasury 2018) is to not conduct economic analysis of benefits and costs if it is disproportionate to do so. Given that the values of some wider co-impacts may be relatively miniscule compared with the central costs and benefits of the project, it can be justifiable to exclude them from a full appraisal if their inclusion is unlikely to alter the conclusions of the CBA or MCA. In Vietnam, a survey among local decision makers showed knowledge gaps regarding the wider co-benefits of ecosystem-based adaptation and revealed a mismatch between the adaptation strategy of the national government highlighting the importance of co-benefits and the overall reluctance and scepticism of local decision makers towards considering and implementing measures with a high number of co-benefits but a lacking track record in avoiding losses and damages. Overall, the case studies show the need for robust, long-term, bottom-up and open-ended planning, as well as M&E for these adaptation interventions.

However, there are often major obstacles in terms of lack of trust and experience with co-benefits when convincing local decision makers to include additional co-benefits in appraisals. This can lead to a negative feedback loop, in which lacking the M&E of co-benefits of previous projects means that crucial evidence is missing to inform decisions on co-benefits in future projects. However, the case studies also show that the perceived usefulness of co-benefits by decision makers and their communities play a major role in securing local buy-in and acceptance of the proposed measures. Especially in cases in which the value of additional co-benefits of a measure is compared against its main goal. In the case of the bio-dykes in Nepal, buy-in by the local community could not be achieved for these measures, despite the large number of co-benefits, as concerns by the community about the lower efficacy of bio-dykes in avoiding loss and damage compared with concrete flood walls outweighed the perceived usefulness of the additional co-benefits from bio-dykes. In the Nepal case, local decision makers were not in favour of bio-dykes as a DRR measure due to concerns that their efficacy in reducing loss and damage is lower than concrete flood walls. The additional co-benefits of bio-dykes in comparison with concrete flood walls were valued as lower in comparison with the increased risk of not reaching adequate flood protection levels. Similarly to the case study in Vietnam, this revealed a contrast between national-level strategies, which encourage nature-based solutions and solutions with a high number of co-benefits, and the focus on avoiding loss and damage by local decision makers. This suggests that without significant community engagement, there is a danger of a mismatch with co-benefits suggested by funders and those that reflect actual local needs. The selection of case studies reflects the current landscape of adaptation activity, in which narratives of adaptation recognized as successful often fail to target – or hear the voices of – the communities that are poorest and most vulnerable to climate change, despite the fact that there is extensive and innovative adaptation activity taking place in these communities.

Comparing adaption case studies between developing and developed countries, it appears that in developing countries, governance and funding structures are, at least on paper, often more supportive in including co-benefits, due the immediate development needs alongside the need for disaster risk reduction and adaptation. In developed countries, institutional silos are more prevalent and considering additional co-benefits is often seen as a weak point in project proposals, as co-benefits often require co-funding from separate funding sources.

Decision-making frameworks for financing adaptation should recognize and value a diverse range of possible benefits that may result from adaptation processes. However, those tasked with appraisals and decision-making need to acknowledge that maximizing monetary co-benefits might not be the best option in case the co-benefits do not meet the community's needs, and are therefore lacking local buy-in. In the case of CBA this means that the co-benefits that are included in a CBA analysis need careful and critical evaluation by all stakeholders to avoid solutions that might have a high benefit–cost ratio but low acceptance by beneficiaries.

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African Case Studies

08

The Mtwara Development Corridor in Tanzania: Strategic Environmental Assessment of a Planned Corridor

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ABSTRACT

The Mtwara development corridor is a spatial development initiative proposed by the Southern African Development Community (SADC) and launched in 2004. The corridor includes southern Tanzania, northern Mozambique, northern and central Malawi, and eastern and northern Zambia. In Tanzania, it extends from the town of Mtwara on the western Indian Ocean coast to Mbamba Bay on the shore of Lake Nyasa/Malawi. The corridor is planned to encompass resource extraction, oil and gas exploration supported by new or improved infrastructure. Mtwara corridor is expected to unlock the development potential of a region that is rich in natural resources but has high levels of poverty. However, the same area is known for hosting globally significant species and ecosystems that also provide important benefits to local communities. We assess the current status of the Mtwara development corridor in Tanzania, document the future known plans for it, and review three Strategic Environmental Assessments (SEA) that aim to drive or influence this development and projects within it. Specifically, we assess whether these reports take full consideration of the risks associated with biodiversity and ecosystem services in the region, and we explore the role of the mitigation hierarchy framework or similar approaches to improve SEA outcomes. Then we reflect on what the SEA process has brought, and whether the products produced through it have had an influence in spatial planning in Mtwara development corridor area of influence. For the Mtwara corridor to reach its full potential, it is important to carry out an integrated and inclusive impact assessment process that can identify alternatives to manage the potential environmental and social risks of such developments.

8.1 Introduction

The Mtwara development corridor (Mtwara corridor thereafter) is a spatial development initiative first proposed by the Southern African Development Community (SADC in 1992 and launched in 2004 as an agreement between the governments of Tanzania, Mozambique Malawi and Zambia (Japan Development Institute 2009; Smith 2005). It includes portions of southern Tanzania, northern Mozambique, northern and central Malawi, and eastern and northern Zambia (Fig. 8.1).

The Mtwara corridor is often called the minerals or mineral-rich corridor in reference to its potential for large-scale resource extraction projects for coal, iron ore, uranium and nickel; a smaller artisanal mining for diamonds, gem stones and gold; as well as off-shore oil and gas exploration opportunities in the Indian ocean. In addition, planned and ongoing new or improved infrastructure would support these operations by connecting production and trade areas across countries and between borders, and most notably, the expansion of the Mtwara port as a major transoceanic trade point.

High levels of poverty characterise the territories where the Mtwara corridor is expected to develop with the majority of the population relying on subsistence agriculture and wild harvesting and hunting (Japan Development Institute 2009; Kinshella 2014; World Wide Fund for Nature Tanzania 2016). In addition, the corridor contains a wealth of well-preserved natural ecosystems, including large areas of miombo woodland that is of global importance for biodiversity conservation, such as the Selous-Niassa transboundary wildlife corridor that connects Tanzania to Mozambique (Baldus and Hahn 2009); or the Nyasa/Malawi Lake system, a global freshwater biodiversity hotspot (Sayer, Palmer-Newton and Darwall 2019). Mtwara corridor proponents are expecting that the infrastructure development and resource extraction will bring much-needed socioeconomic growth and improvements in the region. However, some of these developments are likely to cause negative impacts on biodiversity and ecosystem services that local people rely on. Consequently, in addition to impacts on nature, it could result in worse social outcomes (i.e. increased poverty of some marginalized groups) than before the development takes place.

Image credits: Diego Juffe Bignoli

Here, we assess the current status of the Mtwara development corridor in Tanzania, document the future known plans for it, and review three SEAs that aim to drive or frame this development and projects within it. Specifically, we assess whether these reports take full consideration of the risks associated with biodiversity and ecosystem services in the region. We explore the role of the mitigation hierarchy framework or similar approaches to improve SEA outcomes for biodiversity, and we reflect on what the SEA process has brought and whether the products created through it have influenced spatial planning in the Mtwara corridor area of influence. Although the focus is on the Tanzanian part of the corridor, we identify transboundary links when appropriate.

8.2 The Mtwara development corridor in Tanzania

The Mtwara development corridor concept in Tanzania has evolved since its launch in 2004. The two earliest studies involving the Mtwara corridor, a prefeasibility and environmental baseline study for the Ruvuma river interface (Smith 2005) and the Tanzania Mtwara development corridor study report led by the Japan Development Institute (2009), show this evolution.

The 2005 prefeasibility study was developed through a collaboration of three initiatives: the GTZ Wildlife Programme in Tanzania, the Mtwara Development Corridor Secretariat (hosted by the Spatial Development Initiatives Programme of the South African Department of Trade and Industry[73] but now not operative), and the Forestry and Beekeeping Division of the Ministry of Natural Resources and Tourism of Tanzania. The study focused on the Mtwara corridor as a platform to develop new tourism and community-based natural resources management (CBNRM) concepts – through community-owned wildlife management areas (WMA) and village land forest reserves – in the Selous-Niassa Transfrontier Conservation Area (see Section 8.3 for more detail on this conservation effort). It states that the Mtwara corridor's aim is "to identify and package projects aimed at attracting private sector investment" and, specifically, "potential tourism routes and associated projects, which are consistent with the National Tourism Master Plan" (Smith 2005). The study proposed an "Alternative conservation and land management concept," which aimed to integrate tourism and WMA, and outlines a series of land use designations and plans to develop the region as an anchor destination that would bring economic development (Smith 2005). However, it concludes "it is difficult to see the Ruvuma River as playing the role of anchor destination" mainly due to lack of reliable infrastructure at the time and concludes the focus on developing WMAs was the most viable option. The Japan Development Institute report (Japan Development Institute 2009), which was completed only four years after the prefeasibility study, focuses on the Mtwara corridor potential as a development corridor promoting industrial and private sector investment targeting agriculture, forestry, and mining development. The report provides an overview of the projects planned (Annex 1) and pays special attention to the Mtwara port development as an importing and exporting gateway of trade goods for the corridor.

Five years later, in 2014, the Mtwara corridor was listed in the Transport and Trade System Development Master Plan for Tanzania as one of "a number of major projects that would considerably change the spatial structure of the national economy" (Ministry of Transport and Japan International Cooperation Agency 2014) and described as "Intensive resource-based development". Tanzania's Integrated Industrial Strategy 2020–

73 This programme was created in 1995 by the South African Government.

2025 planned to develop a Mtwara Special Economic Zone (SEZ) to further stimulate investment to support industrial development in the area (Ministry of Industry and Trade of Tanzania 2011), although there is no available evidence to confirm these plans have been implemented. Linked to these reports, at least three assessments that are labelled as SEAs cover, partially or totally, the Mtwara corridor area. These which will be reviewed in Section 8.4.

Based on the existing assessment and plans in Tanzania, the geographical extent of the corridor stretches from the town of Mtwara on the western Indian Ocean coast to Mbamba Bay on the shore of Lake Nyasa/Malawi, covering the regions of Ruvuma and Mtwara in their entirety, and Lindi and Njombe partially (Fig. 8.1). The anchor projects for the Mtwara corridor are mineral resources available in southwest Tanzania and northern Malawi, and offshore oil and gas in the Indian Ocean coastal zone of southern Tanzania and northern Mozambique. The key anchor projects are the proposed Mchuchuma iron ore and Liganga coal mining activities in west Tanzania, which link to the Mtwara city and port through the recently upgraded Mamba Bay-Mtwara road, and the proposed associated railway. The Unity bridge is another key infrastructure component, and has been in place since mid-2010, connecting Tanzania and Mozambique; the Mamba Bay port and the road play a similar role in connecting with Malawi.

Figure 8.1 Proposed area of influence for The Mtwara development corridor – this proposed area of influence is based upon the known administrative boundaries of regions and districts were planned, or existing projects are located

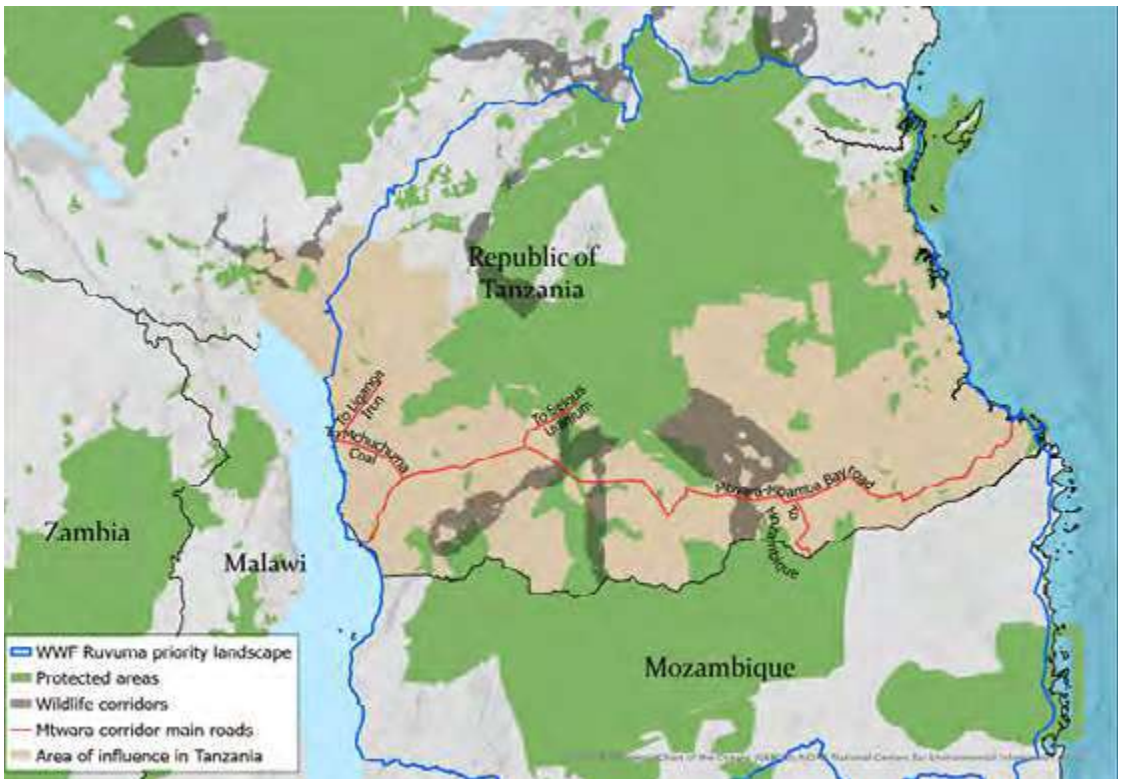
Over the decades, many projects and activities have been attributed to the Mtwara corridor in planning documents and existing SEA reports. However, with the notable exception of the upgrade of the Mtwara-Mbamba bay road and the Unity bridge, very few of these plans seem to have been implemented on the ground (Annex 1). There is a general lack of information on the actual progress of the Mtwara corridor, and the status of many projects within the corridor is unknown or they have remained in a conceptual planning phase for many years. Despite the lack of evidence of implementation, the Transport and Trade System Development Master Plan for Tanzania (Ministry of Transport and Japan International Cooperation Agency 2014) predicts an increase in demand of 402 per cent on the roads and railways in the Mtwara region. Many major offshore oil and gas exploration efforts are already underway, for example, in Mnazi Bay and the offshore Lindi region (Richmond 2016; Bofin, Pedersen and Jacob 2020), and the need to expand the port in the city of Mtwara. On the railway, the Transport and Trade System Development Master Plan of 2014 notes that "Stanbic Bank (Tanzania) and the International Commercial Bank of China (ICBC) secured syndicated financing worth USD 3 billion for Mchuchuma Iron Ore and Liganga Coal mining projects in Ludewa District", which "may accelerate the construction of the line" as an essential development to support these mining operations. Active mining licenses exist for graphite, limestone and sand in the east part of the corridor; Uranium in the southern part of the Selous UN Educational, Scientific and Cultural Organization World Heritage Site; and coal, iron ore, and gold in the west part of the corridor near lake Nyasa/Malawi (Ministry of Energy and Minerals of Tanzania 2021). Although transparency is a fundamental principle of best practice in impact assessment processes, there are no publicly available project-specific impact assessments of these projects. Nevertheless, a prefeasibility study on the Mtwara-Songea-Mbamba Bay railway and studies on Liganga and Mchuchuma are likely to have been completed.[74]

74 https://allafrica.com/stories/202010230567.html [Accessed 26/01/2021]

8.3 Biodiversity and ecosystem services within the Mtwara corridor

The Mtwara corridor covers a vast area and has a natural and cultural heritage of national and global significance, falling within what has been called the Greater Rovuma Landscape by the World Wide Fund for Nature (WWF). The Ruvuma landscape covers 280,000km^2 (an area larger than the UK) of southern Tanzania and northern Mozambique (Fig. 8.2), and has been a global priority for conservation action for WWF for the past 15 years (Harrison *et al*. 2009). Key habitats include coastal forests, mangroves, coral reefs, miombo woodlands, freshwater systems, woodlands and important wildlife corridors connecting the Selous Game Reserve World Heritage Site in Tanzania and the Nyassa National Reserve in Mozambique. This is one of the largest areas in Africa that still retains large portions of intact habitats hosting globally threatened species such as elephants, lions, cheetahs, hyenas and unique, endemic freshwater fish and plants.

Figure 8.2 Key conservation areas in the area of influence for the Mtwara development corridor in Tanzania



Sources: UN Environment Programme World Conservation Monitoring Centre and International Union for Conservation of Nature (2019) for protected areas; Riggio and Caro (2017) for wildlife corridors, World Wide Fund for Nature (WWF) Tanzania for the Mtwara development corridor's (Mtwara corridor) main roads and WWF Ruvuma priority landscape.

WWF has developed a programme of work (World Wide Fund for Nature 2021), and a climate vulnerability assessment and adaptation strategy for the Ruvuma priority landscape (World Wide Fund for Nature Tanzania 2014). This has also been accompanied by efforts to take a scenario development approach for integrated spatial planning (Murphree *et al*. 2014) and Reduce Emissions from Deforestation and Forest Degradation in developing countries (REDD+) planning (Runsten *et al*. 2013; World Wide Fund for Nature Tanzania 2015). In addition,

the southern part of the Tanzanian portion of the corridor is a key area for ecological connectivity, linking the Selous Game Reserve and other protected areas in southern Tanzania with the Niassa National Reserve in northern Mozambique (Fig. 8.2). This forms the Ruvuma's Selous-Niassa Transfrontier Conservation Area with a history spanning 20 years.[75]

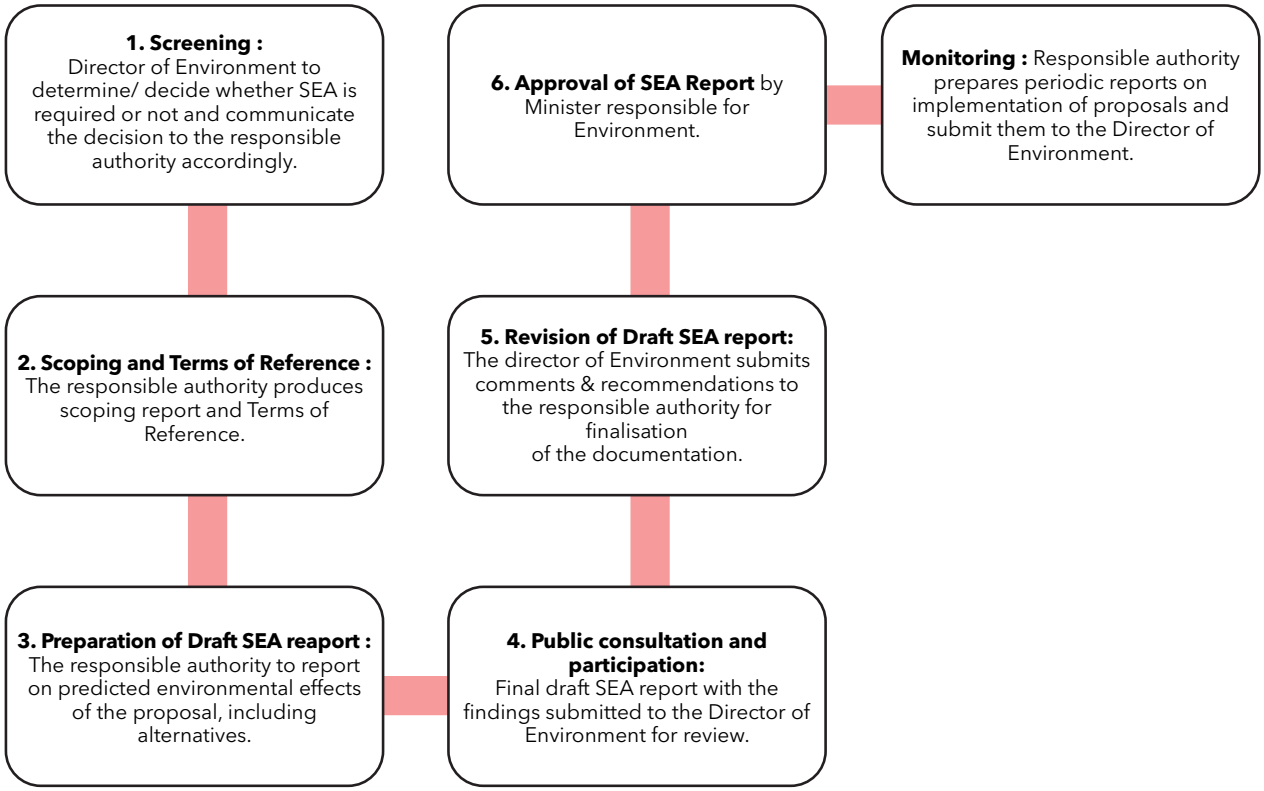
This extent of wildlife and natural resources contrasts with a relatively low population density, which has been growing, but at a slower rate than other regions of Tanzania (Inter-consult Ltd. 2013). As explained in Section 8.2, subsistence agriculture, logging and mining are prevalent activities that have increased over the past years, resulting in numerous and fragmented local threats to biodiversity, including extensive elephant poaching across the Ruvuma landscape (Zafra-Calvo *et al*. 2018). This mix has created some conflicts between conservation priorities and development priorities (Kinshella 2014; Bluwstein and Lund 2018) and recently extreme Islamic groups in northern Mozambique, attracted by potential revenues from such developments, are threatening political stability and local livelihoods in the region (Estelle and Darden 2021). In this socioeconomic context, this globally important ecological system is likely to be negatively impacted by insensitive developments. However, integrated planning and systematic assessment of impacts to identify alternatives and mitigation measures can make a difference to how this corridor progresses.

8.4 Review of existing impact assessments

In Tanzania, the legal frameworks for Environmental Impact Assessment (EIA) and SEA are provided by the 2004 Environmental Management Act . The central authority for EIA in Tanzania is the National Environment Management Council (NEMC). NEMC's main obligations include raising awareness and capacity-building in environmental management, screening for environmental risk of projects of national interest and coordinating stakeholders to assess potential impacts, approve the conditions under which projects may go ahead, propose mitigation measures and monitor performance (Netherlands Commision for Environmental Assessment 2013). Specifically, since 2007, Tanzania has produced National Guidelines for Strategic Environmental Assessment (Tanzania Vice President's Office 2017), which sets the scope for SEA, defines SEA principles, describes the key steps in SEA processes, which includes an approval stage and subsequent monitoring process (Fig. 8.3) and establishes responsibility to undertake an SEA. The latter lies with government agencies or departments when "it is found necessary at the commencement of a policy, bill, regulation, strategy, programme or plan" and "if there are important environmental effects of a policy, bill, regulation, strategy, plan or programme" (Tanzania Vice President's Office 2017). The guidelines include questions that are relevant for corridor initiatives, such as: does the proposal set the framework for future development? Are there components that are likely to have cumulative or long-term consequences for the environment (e.g. trade, industrial diversification, technology development, crop diversification)? Or is the proposal likely to have significant effects on the environment?

75 The history of this important transboundary conservation areas is well described by (Noe 2015; Baldus and Hahn 2009). Social issues are explored by (Bluwstein and Lund 2018).

Figure 8.3 Key steps in a SEA process in Tanzania according to the National Guidelines for Strategic Environmental Assessment



Source: Tanzania Vice President's Office (2017).

In the Mtwara corridor, no impact assessment (SEA) of the corridor concept per se, as an initiative for regional economic development, has been undertaken to date. However, three Strategic Environmental Assessments that are relevant to the planned corridor area of influence are available: the SEA for the Transport and Trade Systems Development Plan of Tanzania (Inter-consult Ltd. 2013), the draft SEA for the Mtwara region (Institute of Resource Assessment 2015), and the SEA Ruvuma region (Ruvuma Regional Secretariat 2016). We review these three reports from the perspective of their coverage of biodiversity and ecosystem services. It is important to note that these three SEAs were conducted before the national SEA guidelines were developed and, therefore, might not have followed the best practice outlined in such guidelines.

8.5 National sectoral SEA for the Transport and Trade Systems Development Plan of Tanzania (2013)

Tanzania's Ministry of Transport, financed by the Japan International Cooperation Agency, coordinated this national-scale sectoral SEA. It serves as a foundational document of the Transport and Trade System Development Master Plan for Tanzania (Ministry of Transport and Japan International Cooperation Agency 2014), whose purpose was to "streamline

the countrywide freight transport system; and develop necessary transport and trade systems". The objectives of this SEA were to identify: (i) likely significant environmental and social impacts associated with the implementation of the Master Plan; (ii) the appropriate mitigation measures to prevent, minimize or avoid these; and (iii) to define monitoring tools to ensure that the proposed mitigation measures are implemented and identify any unforeseen adverse (negative) impacts, so that remedial action can be taken.

Environmental protection objectives are defined according to each of the international agreements and national policies and acts identified in the report. The report states that the transport infrastructure agencies and authorities will be required to comply with environmental protection objectives outlined in the list of relevant policies, legislations, strategies, conventions and treaties, and provides objectives for each of them. For example, with regards to the Wildlife Policy of Tanzania, the objectives are to avoid the destruction of wetland ecosystems, avoid destruction of important biodiversity areas and protect wildlife. The SEA then assesses the biodiversity impacts that are likely to happen qualitatively, specifically loss of biodiversity, destruction of wildlife corridors, climate change and landscape degradation. To do this, it chooses earmarked projects. The only project relevant to the Mtwara corridor included in this SEA is the Mbinga-Mbamba Bay road.

The state of the environment study or baseline provides an overview of protected areas, key ecosystems, and ecological features of Tanzania, including appendices with a list of protected areas and number of species found and the status of water, soil and cultural assets. There is, however, no systematic identification and characterization of species and ecosystem and no determination of conservation priorities on a large scale. Nevertheless, the report estimates the proposed plan may lead to "increased exploitation of forest products and wildlife, hence loss of biodiversity".

Image credits: Rob Marchant

To assess these impacts and their significance, a stakeholder consultation for the earmarked areas was conducted. Consultation meetings took place in eight of the 31 regions (Dar es Salaam, Pwani, Tanga, Ruvuma, Mbeya, Rukwa, Mwanza and Kigoma), where over 128 people from local government authorities, regional administrative secretaries, the Tanzania Port Authority and Tanzania Roads Agency (see Appendix 4 in the SEA) took part. In relation to the Mtwara corridor, only 10 stakeholders for the Ruvuma region were consulted in these meetings; mostly government officials and consultants. Still, no non-governmental organizations (NGOs) or local communities seem to have been involved. Moreover, there is no evidence of consultation from stakeholders from the Mtwara region in this SEA report.

The SEAs provide a study of alternatives using an Analytic Hierarchy Process technique. Participants were asked whether they predicted secondary, cumulative, synergistic, short, medium and long-term permanent, temporary, positive or negative effects of a given intervention, and to assess its significance, although no justification was documented as to how the values or the scores were chosen. For the only Mtwara corridor project included, the project concludes that: (i) the increased exploitation of forest and wildlife is likely to result in negative, indirect (secondary), and cumulative impacts of permanent, and long-term, medium significance; (ii) the destruction of natural habitat of terrestrial and aquatic flora and fauna is likely to result in negative, direct, cumulative impact, of permanent, and short-term, high significance; and (iii) the destruction of wildlife corridors is likely to result in negative, indirect (secondary) impacts, with permanent and long-term medium significance. It then defines the likely consequences of these impacts and proposes specific mitigation measures to manage these (Table 8.1). To implement the mitigation measures proposed, it states that collaboration will be required from the Division of Environment in the Vice President's Office (VCPO); Ministry of Natural Resource and Tourism; and the Ministry of Water "to enforce compliance with environmental protection objectives".

Table 8.1 Types of impacts identified for the Mbinga-Mbamba Bay road in the Mtwara corridor, its potential consequences, and proposed mitigation measures, as described in the SEA

Type of impact	Description	Mitigation measures proposed
Loss of biodiversity	Exploitation of forest products and wildlife, resulting in the destruction of natural habitats for terrestrial and aquatic flora and fauna: fragmentation and loss of critical ecosystems linkages, overexploitation of some species, agricultural expansion Specific impact on Lake Nyasa swamps	» Avoid all environmentally sensitive areas, protected areas such as game reserves, national parks, forest reserves and ecologically important natural vegetation » Enforce existing legislation and the introduction of economic instruments such as charging taxes to mitigate the likely increased exploitation of forest and wildlife products
Destruction of wildlife/ ecological corridors	Loss of habitat, isolation, or reserves impact on tourism Specific impact on Mwambesi Game Controlled area and Selous Game Reserve	» Application of speed control measures, such as speed humps and rumble strips, and warning signboards within wildlife corridors to mitigate the destruction of wildlife corridors
Climate change	Changes in species ranges, migratory patterns, increase of pests and diseases	» Ensure that planning of road construction projects considers climate change impacts (e.g. the design of bridges consider extreme flood events) » Increase capacity of carbon sinks by promoting tree planting (reforestation)
Landscape degradation	Degradation of unique landscapes with scientific, ecologic and aesthetic values	» Take a precautionary approach during construction to avoid/minimize landscape degradation » Discourage opening of new areas for extraction of construction materials by prioritizing the use of existing borrow pits and quarry sites » Identify and document all vulnerable landscapes and unique landscapes with scientific, ecological and aesthetic values so that they can be avoided during construction » Restore and stabilize disturbed landscape areas immediately after construction

During implementation of the master plan, the SEA states, "infrastructure transport agency/authorities will collaborate with these institutions to identify and document environmentally sensitive and protected areas likely to be affected, and devise a mechanism for avoiding or minimizing adverse impacts on these areas".

Finally, the SEA proposes 17 years of monitoring 2013–2030 efforts, listing several variables and the responsible agencies (e.g. data on types and number of unique, rare, threatened and/or endangered species of flora and fauna and data coming from Tanzania National Parks Authority, Wildlife Conservation Society, Tanzania Wildlife Research Institute, and Local Government Authorities, among others). The SEA was submitted on 3 December 2013 and approved on 10 February 2014 by the Ministry of Transport of the VCPO, with no suggested revisions and a final note: "We hope the ministry will ensure all mitigation and enhancement measures will be adhered to during implementation of the master plan."

8.6 Regional SEA for the Mtwara and Ruvuma development plans

This section provides an overview of two SEAs conducted to support the regional plans for Mtwara (Institute of Resource Assessment 2015) and Ruvuma (Ruvuma Regional Secretariat 2016) regions, both of which fall entirely in the Mtwara corridor and form the core area to be developed under that initiative. The focus is on identifying specific mentions of the Mtwara corridor, assessing potential impacts on biodiversity and ecosystem services, and mitigation measures proposed.

WWF Tanzania funded these two SEAs. The Mtwara SEA was conducted by the Institute of Resource Assessment, University of Dar es Salaam, while the Ruvuma Regional secretariat prepared the Ruvuma SEA. Their development emerges from terms of reference that were developed to conduct the assessments (World Wide Fund for Nature 2021). Therefore, the resulting SEAs were conducted following the same frameworks, which is reflected in having a very similar report structure, SEA objectives, similar environmental goals and the same approach to impact assessment and similar mitigation measures. The SEA aimed to provide a list and rationale for the proposed projects in the region, assess the likely positive and negative environmental and socioeconomic impacts of these on an established baseline, and determine how these projects will affect the achievement of the environmental and economic objectives.

The stakeholder analysis included five main groups of actors to be consulted: local government authorities, sector ministries, government parastatal organizations, NGOs and private sector organizations, and defines their roles and responsibilities in SEA process. Stakeholder participation was ensured through key informants and stakeholders' group or individual meetings and workshops. There were three consultation phases from January to October 2015. The workshops were conducted jointly for the Ruvuma and Mtwara regions. For example, the first national workshop on SEA for the Mtwara and Ruvuma Regional Strategic Plans conducted in February 2005 brought together 44 participants from 20 institutions. The issues identified included economic potential in the Ruvuma landscape, availability of electricity, environmental pollution, scaling down of activities and water use. Others include financial constraints, land acquisition, corporate social responsibility, responsible institutions to implement projects, prioritization of activities and transboundary issues.

The report proposes alternative scenarios for development, but none of these have a biodiversity or ecosystem services focus, nor do

they clearly relate to the goals identified in the previous sections. The significance of the expected impacts of each scenario (on the achievement of the objectives of the SEA) are examined in a qualitative way (Table 8.2). It considers, for example, that there will be an *Insignificant negative change* in biodiversity from Development and Intensification of agro-industries and settlement planning and infrastructure development but *Significant negative change* from expansion and improvement of agriculture and the development of the energy and water infrastructure sectors (Table 8.2).

Regarding the Mtwara development corridor, both SEAs have the development target of "Infrastructure development along the Mtwara Development Corridor by 2025" but provide no detail on what this may entail nor of the specific impacts it may cause. Of the 39 original development targets, the SEA recommends cancelling 3, downscaling 5, and proposes five new projects, some of which are significant in scale, such as development of tourist infrastructure (e.g. hotels, ecotourism trails, roads, recreation bands), rehabilitation of antiquities (e.g., Mikindani former slave trade market and the Newala German colonial period administrative building). 25 out of the final 40 development targets (62 per cent) relate to the Mtwara corridor either as specific projects identified in Annex 1 or indirectly related projects (Annex 2).

Table 8.2 Overview of Mtwara and Ruvuma regional SEAs focusing on relevant biodiversity objectives, impact significance of proposed alternatives, and proposed mitigation measures as described in the SEA. The proposed mitigation measures reflect the level of detail found in the SEAs. Details of all proposed projects and proposed modifications in scale are in Annex 2

Regional SEA	SEA objectives	Biodiversity baseline study	Relevant biodiversity goal or objective	Impact significance of alternatives	Proposed mitigation measures
Mtwara	» **Present relevant environmental baseline information** » **Identify, describe and assess the likely significant environmental effects of the plan** » **Propose measures to avoid, reduce and/or offset any potentially significant adverse effects and, where appropriate, to enhance any potential positive effects from the plan** » **Outline and describe the measures envisaged for monitoring any significant effects identified by the SEA** » **Demonstrate that the plan has been developed in line with SEA regulations**	No specific characterization of biodiversity risks. Scant mention of biodiversity in sections on fisheries, forest resources, and tourism Map showing locations, no species lists	Objective C: protect/restore/ enhance regional biodiversity	Agricultural land expansion: slightly negative Agro-industries expansion: no impact Infrastructure development: slightly negative Tourism development: moderately positive	No specific biodiversity sections. Proposed measures focus on mitigating impacts on wetland only, follow EIA regulations and reduce the scale of some proposed projects
Ruvuma		Qualitative and superficial description of protected areas and wildlife corridors; map showing locations, no species lists	Goal 2: conserve and enhance Ruvuma Region biodiversity and geodiversity	Agricultural land expansion: significant negative change Agro-industries expansion: insignificant negative change Infrastructure development: insignificant negative change Energy and water infrastructure development: significant negative change	Specific biodiversity section; proposed measures focus on mitigating impacts on wetlands mostly, following EIA regulations, reducing scale of some proposed projects, avoiding introduction of alien, exotic, or invasive species (manually remove and destroy them wherever found), and minimizing unnecessary land use/cover change

conclusion is that although the proposed programmes will bring positive and negative environmental impacts, they will "boost economic growth, increase jobs and improve livelihoods of the people". The recommendations include taking action to improve governance issues, undertake long-term planning processes, adopt appropriate planning tools, undertake measures to implement activities aimed at enhancing economic benefits, establish measures to address environmental implications, reduce negative social effects, and incorporate uncertainty planning. The Mtwara SEAs were submitted to each of the regional authorities. Both SEAs would then be submitted to the Vice President's Office.

8.6.1 Conclusions from the SEA review

A national sectoral SEA, such as the one reviewed here, would be expected to have an influence on regional programmes and plans, especially the two regional development SEAs that aim to assess the likely positive and negative environmental and socioeconomic impacts of proposed projects and how these will affect the achievement of the environmental and economic objectives for the region. However, the national SEA report reviewed here is not cited nor mentioned in any of the two regional development SEAs. This perhaps reveals a lack of transfer of information between national and regional governmental bodies.

In all three SEAs, there was a clearly described process where stakeholder consultations and analyses of alternatives seemed appropriate, in line with the national SEA guidelines. Similarly, although the proposed Mbinga-Mbamba Bay road was the only Mtwara corridor project included in the national plan, the railway, which is likely to be built adjacent to the road, and 16 out of 23 of the projects linked to the corridor are mentioned in either of the regional SEAs (see Annex 1). However, while the processes seemed to follow best practice, some fundamental issues are found with the biodiversity baseline assessment, which then negatively influences the technical outputs of the process. Moreover, it was nor clear whether the processes had been inclusive enough, that there had been a meaningful involvement of all relevant actors, and that an appropriate range of alternatives for development had been considered in depth (see Chapters 20 and 22 to explore how a good SEA process could have avoided serious negative impacts to nature and people).

The three reports do not meaningfully assess the implications of the proposed development for biodiversity and ecosystem services. The baseline studies and the assessment of impacts carried out were not comprehensive enough to meaningfully assess whether it was possible to meet the objectives set without compromising ecological integrity. Without an adequate baseline, it is difficult to effectively assess the likely impacts of the proposed alternatives, even at a regional scale, which would be an appropriate SEA scale of assessment. Consequently, the change expected from proposed projects involved in the corridor programme remains generic and vague. There cannot be a systematic assessment of the potential impacts of each project on biodiversity and ecosystem services. As a result of a poor baseline and superficial assessment of impacts, the mitigation measures proposed do not address the potential impacts of the projects listed (Tables 8.1 and 8.2). Moreover, without an appropriate baseline, it will be difficult to monitor progress on the effectiveness of the proposed mitigation actions and do adaptive management to resolve any issues. In conclusion, although the objectives of the SEAs state the intention to avoid, minimize and offset impacts, the report does not provide sufficient detail on how that can be achieved.

8.7 Conclusions

The Mtwara development corridor has been in planning since at least 2004 and is considered a key initiative in Tanzania's national development priorities. However, although some projects have been, and are being implemented, to date, it does not seem to have been developed as a cohesive development programme coordinated by a central body such as is the case with other similar developments in East Africa (i.e. the Southern Agricultural Growth Corridor of Tanzania Centre, Chapter 9 and the Lamu Port South Sudan and Ethiopia transport corridor [LAPSSET] Authority, Chapter 11). The main constraint to fully develop the corridor as a coordinated initiative seems to have been the lack of financial resources to support some of the key anchor projects and government development priorities. Nevertheless, the main road that would act as the spine of the corridor from the east in Mtwara city to the west in the Mbamba Bay lake port has been fully upgraded, and the railway that will likely go alongside it is being planned. The bridges from Dar es Salaam to Mtwara, including the Mkapa bridge over the Rufiji River and the connection of Mtwara region with northern Mozambique via the Unity Bridge have been built and upgraded.

To date, a SEA for the Mtwara corridor has not been undertaken, and other attempts to undertake SEAs that should have had some influence on Mtawara corridor developments have been lacking in several key requirements. To understand how the potential impacts on biodiversity and ecosystem services from the Mtwara corridor have been assessed to date and what mitigation measures have been proposed, we reviewed three SEAs that the national SEA Tanzania (Inter-consult Ltd. 2013), a SEA for the Mtwara region (Institute of Resource Assessment 2015) and a SEA for the Ruvuma region (Ruvuma Regional Secretariat 2016). We conclude that the SEA does not establish a systematic biodiversity baseline and, as a result, it does not fully consider the biodiversity risks of this initiative. More importantly, the authors could not determine whether these SEAs have been implemented or have influenced any decision-making in the area of influence of the Mtwara corridor. However, the Mtwara corridor is mentioned in several government strategies before carrying out regional SEAs.

The mitigation hierarchy (see Chapter 4) should be used as a guiding framework to explore some of these issues. The mitigation hierarchy is not explicitly mentioned, but mitigation hierarchy actions such as avoid, minimize and offset are proposed. However, none of the SEAs undertake a complete application of this framework through a systematic assessment of impacts and mitigation options beyond the project scale. The mitigation hierarchy could be applied to the SEA to determine the actual biodiversity outcomes pursued by these developments transparently and coherently, considering indirect, cumulative and transboundary impacts at a scale larger than an EIA scope of assessment. As such, it could support the development of different scenarios towards a future with, for example, the achievement of no net loss or net gain for biodiversity. The explicit application of the mitigation hierarchy at a regional/corridor level has not been undertaken to date. Still, there is an extensive experience on applying it at a project level (Ekstrom, Bennun and Mitchell 2015) and some attempts to apply it at larger scales (Tulloch et al. 2019; Bigard et al. 2020).

Table 8.3 provides a first attempt towards defining how the mitigation hierarchy should be used to assess and manage impacts for biodiversity in the context of a corridor SEA. It explores the application of the steps reactively and proactively. Reactive refers to keeping the status quo and developing mitigation measures and monitoring procedures to manage predicted impacts. Proactive, as a more forward-looking practice, refers to determining the specific actions needed to achieve predefined goals for the corridor. It is important to note that

in every action, accountability and responsibility, and the financial resources available to carry out these actions need to be determined. In this sense, perhaps a biodiversity action plan that is specific for a corridor as an annex to the SEA could be appropriate.

Table 8.3 Preliminary recommendations to apply the mitigation hierarchy for a corridor-level SEA

Step	Description	Application to SEAs – from reactive to proactive
Avoid	Prevent damaging actions before they take place	**Reactive:** assess potential direct, indirect and cumulative impacts of the proposed development on the achievement of SEA objectives Re-design to avoid significant large-scale risks and potential impacts **Proactive:** in addition, define conservation goals at a local, national and global scale and align those with SEA planning and project EIA implementation Design development compatible with those goals
Minimize	Reduce the severity of impacts	**Reactive:** propose mitigation measures specific for each project. Follow on to project EIAs implementation and monitoring **Proactive**: In addition, identify mitigation measures across the area of influence to meet SEA goals. Feed into EIAs process
Restore	Actively enhance recovery to the pre-project state	**Reactive:** identify areas that need to be restored after each project has been completed **Proactive:** in addition, identify areas for restoration in the area of influence of the corridor to enhance regional ecological connectivity and recovery
Offset	Compensate measurably for impacts	**Reactive:** determine ecological compensation mechanisms Quantify likely outcomes for biodiversity at the short, medium, and long term **Proactive:** in addition, seek positive outcomes for biodiversity beyond just compensation

More importantly, while the focus on this study has been biodiversity impact mitigation, this is only one of the pieces of the impact assessment puzzle. Impact assessment should consider the whole environment, which includes the socioeconomic context and impacts on local people (see Chapter 1). What is needed at a corridor level is integrated and interdisciplinary corridor-wide planning across regions, considering the positive and negative impacts of the proposed development scenarios, plans or programmes on the region's environmental, social and economic assets.

Ad hoc developments without reference to a framework that guides those developments to a sustainable future for the region will lead to environmental degradation and social unrest. Therefore, it seems imperative that a collaborative, inclusive and comprehensive SEA is explicitly conducted for the Mtwara corridor. The national SEA guidelines already serve as a guide to

complete such an assessment, following best international practice. WWF has played a central role in developing the SEA guidelines and developing SEA capacity in the country (World Wide Fund for Nature Tanzania 2018). The Tanzanian and neighbouring Kenyan SEA

guidelines resulted from training courses supported over six years by the Swedish International Development Agency, delivered by Gothenburg University, Sweden. Specifically, WWF's Regional Sustainable Investment Programme in Tanzania, over the past several years, has raised awareness and knowledge on the use and value of the application of SEA guidelines to government officials from six zones of the country, which covered 20 out of 25 regions. A total of 180 government officials (district and regional environmental officers) gained knowledge on the application and the use of the guidelines. This is a very important step towards the institutionalization of quality SEA implementation within Tanzania. The aim was that the trained government officers foster SEA guidelines, create awareness, and assist government authorities, SEA practitioners and other stakeholders to design, conduct and implement SEA processes on policies, regulations, strategies, plans and programmes that are likely to impact the management, conservation and enhancement of the environment and sustainable management of natural resources. The network of officials trained now serve as a resource to conduct SEAs that will assess the development alternatives for the Mtwara corridor to be designed and implemented as an actual development corridor.

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Annex 1 Project list for the Mtwara development corridor 2009-2014

Project	Resource	Region	Location	Type	Status	Original Source	T&T SEA (2014)	Mtwara SEA (2015)	Ruvuma SEA (2016)
Liganga	Iron	Ruvuma	Liganga, Tanzania near Nyassa lake	New	Active licenses but status unclear (misalignment between investors and government)	JDI 2009		x	
Mchuchuma	Coal	Ruvuma	Mchuchuma, Tanzania lake Nyasa/ Malawi	New		JDI 2009		x	
Nachingwea	Nickel	Lindi	Nachingwea, Lindi	New		JDI 2009			
Potential mineral reserve	Uranium	Ruvuma	Mkuju River	New		JDI 2009			
Mnazi-Bay Gas concessions	Natural gas	Mtwra	Mnazi Bay	New	Operational	JDI 2009		x	
Methanol plant	Methanol	Unknown	Unknown	New	Unknown	JDI 2009			
Potential mineral reserve	Phosphate	Mbeya	Mbeya, between Nyasa/Malawi and Rukwa lakes	New	Unknown	JDI 2009			
Nitrogen fertilizer plant	Fertilizer	Mtwara	Mtwara industrial area	New	Unknown	JDI 2009		x	
Cement plant	Cement	Mtwara	Mikindani	New	Operational	JDI 2009		x	
Mtwara port	Transport	Mtwra	Mtwara	Expansion	Unknown	JDI 2009	x	x	

LNG plant	Gas	Mtwra	Mtwara port	New	Unknown	JDI 2009		x	
Mtwara-Songea-Mbamba Bay railway	Transport	Mtwra, Ruvuma	Mtwara-Songea-Mbamba Bay	New	Planned	JDI 2009		x	x
Road	Transport	Mtwra, Ruvuma	Mtwara to Mamba bay	Upgrade	Done	JDI 2009		x	
Lindi-Mtwara power link	Energy	Mtwara, Lindi	Lindi to Mtwara	Upgrade	Unknown	JDI 2009		x	
Road and railways upgrades	Transport	Mtwra	Mtwara, Ruvuma, Morogoro, Lindi	New/ upgrades	Ongoing	Transport & Trade SEA (2013)	x	x	x
Mtwara airport	Transport	Mtwra	Mtwara	Upgrade	Unknown	Transport and Trade SEA (2013)	x	x	
The international airport in Songea Municipality	Transport	Ruvuma		New	Ongoing	Ruvuma SEA (2016)			x
Harbour at Nyassa lake	Transport	Ruvuma	Mbamba Bay in Nyasa District	Upgrade	Unknown	Ruvuma SEA (2016)			x
Mineral exploration	Mining	Ruvuma	Not specified	Expansion	Ongoing	Ruvuma SEA (2016)			x
Energy development	Energy	Ruvuma	Not specified	Expansion	onging	Ruvuma SEA (2016)			x
Water-related infrastructure	Energy	Ruvuma	Not specified	Expansion	Unknown	Ruvuma SEA (2016)			x
Small-/medium-scale gold	Mining	Lindi	Namungo, Ruangwa	Expansion	Ongoing	Tanzania mining cadastre portal (MEM 2021)			
Small-/medium-scale gypsum	Mining	Lindi	Kilwa	Expansion	Ongoing	Tanzania mining cadastre portal (MEM 2021)			

Annex 2 Projects under Mtwara and Ruvuma regional SEAs and prposed changes to original targets

SEA	Theme	Original development target	Change proposed	The modified SEA development target
Ruvuma region	Small- and large-scale agriculture	Expansion of irrigated land from the current 10,266ha to 39,943ha by 2025, including development areas of over 2,000ha within the Ruhuhu river delta at Lituhi in Nyasa District	No significant changes	Expansion of irrigated land from 10,266ha to 25,943ha by 2025; intensification of maize farming within current development areas, including expansion of maize storage facilities, adding value to the crop, and improving crop marketing by 2025
Ruvuma region	Small and large-scale agriculture	Construction of 8 new cattle dips tanks and rehabilitation of 40 existing dip tanks in all districts.	Downscale	Improve livestock industry by the construction of 8 dip tanks and rehabilitation of 40 dip tanks in five districts
Ruvuma region	Small- and large-Scale Agriculture	Establishment of a total of 118 small livestock ranches in all districts	No significant changes	establishment of 118 small ranches in five districts by 2025
Ruvuma region	Small- and large-scale agriculture	Establishment of 26,012ha of pastureland in all districts	No significant changes	No change proposed
Ruvuma region	Small- and large-scale agriculture	Expansion of fish fingering farms from the existing 3 to 7 farms	No significant changes	improve protein intake by the expansion of fish fingering farms from existing 3 to 7, at least one in each district by 2025
Ruvuma region	Agro-processing industries	Development of two beef processing industries	Cancelation	Recommends not to do this project because it will not be viable given the little availability of animals to feed the industry
Ruvuma region	Agro-processing industries	Development of one fish processing industry through fish capture and farming	Cancelation	Recommends not to do this project because it will not be viable given the little availability of animals to feed the industry
Ruvuma region	Agro-processing industries	Revamp Songea tobacco processing industry	Cancelation	Recommends not to do this project because it is not environmentally sustainable
Ruvuma region	Agro-Processing Industries	Development of small-scale horticulture processing industries in all districts	No significant changes	development of agricultural small-scale processing industries through intensification horticulture gardens and improvement of packaging and marketing in all districts by 2025
Ruvuma region	Settlements and Infrastructure Development	Construction of 4000km tarmac roads network	No significant changes	Construction of 400 km tarmac roads network.
Ruvuma region	Settlements and Infrastructure Development	Construction of international airport in Songea Municipality	No significant changes	No change proposed
Ruvuma region	Settlements and Infrastructure Development	Construction of harbour at Mbamba Bay in Nyasa District	No significant changes	No change proposed
Ruvuma region	Settlements and Infrastructure Development	Demarcation of mining and mineral exploration areas in all districts	No significant changes	Demarcation of mining and mineral exploitation areas in all districts by 2025
Ruvuma region	Settlements and Infrastructure Development	Acquisition of 1000ha of the land bank (EPZA) for investment	No significant changes	acquiring and planning for 1000 ha of land-bank for investment (EPZA) by 2025
Ruvuma region	Settlements and Infrastructure Development	Infrastructure development along the Mtwara development corridor	No significant changes	infrastructure development along the Mtwara development corridor by 2025
Ruvuma region	Settlements and Infrastructure Development	Construction of Mtwara-Ruvuma Railway Line (1,000km)	No significant changes	No change proposed

Ruvuma region	Energy Sector Development	Power generation (200MW) from solar energy; 100MW from hydropower; and 400MW from coal by 2025	Downscale	Development of 75MW from hydropower on the Ruhuhu River and 400MW from coal by 2025; and reduction of charcoal usage from 92.67 per cent to 30 per cent using alternative energy sources (coal, hydropower and gas) by 2025.
Ruvuma region	Energy Sector Development	Rural electrification targeting 509 villages using solar, hydropower, and coal sources by 2025	No significant changes	No change proposed
Ruvuma region	Energy Sector Development	Expansion of urban electrification from 30 per cent to 90 per cent in all districts	No significant changes	Expansion of urban electricity power supply from 30-90 per cent by 2025
Ruvuma region	Energy Sector Development	Reduction of charcoal usage from 92.67 per cent to 30 per cent by the adoption of alternative sources of energy i.e. gas and electricity, by 2025	No significant changes	No change proposed
Ruvuma region	Tourism Based on natural resource Base	Construction of tourist hotels in all districts.	No significant changes	No change proposed
Ruvuma region	Tourism Based on natural resource Base	Construction of beaches and camping sites along Lake Nyasa/Malawi at Mbamba Bay in Nyasa District	No significant changes	No change proposed
Ruvuma region	Water-Related Infrastructure	Expansion of urban water supply from current 67 per cent to 100 per cent and waste water disposal in all district HQs by 2025	No significant changes	No change proposed
Ruvuma region	Water-Related Infrastructure	Expansion of rural water supply from current 59 per cent to 90 per cent by 2025	No significant changes	No change proposed
Ruvuma region	Water-Related Infrastructure	Construction of 5,000,000m^3 dam for Songea Urban water supply	Downscale	Construction of about 2,500,000 m3 dam for Songea urban water supply by 2025.
Mtwara region	Small and Large-Scale Agriculture	Construction of eight paddy irrigation schemes (2,743ha)	Downscale	Development of three (3) paddy irrigation schemes i.e. Ndanda, Kitere and Muhurunga (2,296 ha) by 2025.
Mtwara region	Small and Large-Scale Agriculture	Development of cassava plantations in Mtwara Rural and Newala districts (5,873 ha)	No significant changes	Expansion of cassava plantation (5,873 ha) in Mtwara Rural and Newala districts by 2025.
Mtwara region	Small and Large-Scale Agriculture	Expansion of Nangaramo ranch (8,000 ha) for improved cattle breeds	Downscale	Expansion of Nangaramo ranch (1,825 ha) and stocking rate (50,000 improved animal breeds), including provision of energy, storage and waste management facilities by 2025.
Mtwara region	Small and Large-Scale Agriculture	Establishment cashew plantations in all six districts (2,000,000 trees per years)	No significant changes	Expansion of cashew plantation (100,000 ha) by replacement of old trees in all six districts by 2025.
Mtwara region	Settlements and Infrastructure Development	Planning for a 7,000-acre settlement at Msijute village	No significant changes	Development of a 7,000 acre settlement at Msijute by 2025.
Mtwara region	Settlements and Infrastructure Development	Construction of Mtwara international airport (runway about 3.5km and weight of plane 160 tons) in Mtwara Municipality	No significant changes	No change proposed
Mtwara region	Settlements and Infrastructure Development	Expansion of Mtwara Port (2,694.24ha).	No significant changes	No change proposed
Mtwara region	Settlements and Infrastructure Development	Establishment of a Regional Referral Hospital at Mitengo (400 acres)	No significant changes	Upgrading/rehabilitation of 400 acre health facility (Regional referral hospital) at Mitengo.
Mtwara region	Settlements and Infrastructure Development	Rehabilitation and construction of roads connecting all districts (230km)	No significant changes	

Mtwara region	Settlements and Infrastructure Development	Infrastructural development along the Mtwara development corridor	No significant changes	Infrastructure development along the Mtwara development corridor by 2025
Mtwara region	Energy Sector Development	Oil and gas energy production and associated projects	No significant changes	
Mtwara region	Water-Related Infrastructure	Construction of water infrastructures drawing water from Ruvuma river for Mtwara municipality	No significant changes	
Mtwara region	Water-Related Infrastructure	Construction of water infrastructure for water supply (100,000,000 l) from Ruvuma river for Mtwara and Mikindani Municipality	No significant changes	Improvement of the water supply of water (100,000m^3/day) to Mtwara- Mikindani Municipality from Ruvuma river by 2025..
Mtwara region	Water-Related Infrastructure	Rehabilitation of approx 50,000m^3 dam at Nangaramo ranch	No significant changes	Rehabilitation of approximately 50,000 m^3 dam at Nangaramo ranch by 2025.
Mtwara region	Agro-processing industries	Establishment of fish processing facilities in the region to be associated with protection of fishing grounds, provision of modern fishing equipment/gear, and enforcement of fishing policy, rules and regulations by 2025	New project	New project
Mtwara region	Agro-processing industries	Construction of additional (250,000 tons) cashew nut processing facilities by 2025	New project	New project
Mtwara region	Agro-processing industries	Construction of 8 milk collection points and one processing factory in Mtwara MC	New project	New project
Mtwara region	Tourism industry	Development of tourist infrastructure (hotels, ecotourism trails, roads, recreation bandas), rehabilitation of antiquities (e.g. Mikindani late slave trade market and the Newala late Germany colonial administration building), preparation of Mtwara tourism guide map, and publicize the tourism attractions by 2025	New project	New project

09

Managing the Environmental and Social Impacts of Agricultural Transformation: Southern Agricultural Growth Corridor of Tanzania

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ABSTRACT

Managing social and environmental impacts within a development corridor focused on agriculture involves multiple levels of assessment and action. Traditional tools such as Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) are designed to deal with these impacts from the programme and policy to project levels. However, the reality of application is often hampered by governance, finance and practical challenges, particularly in a developing country context with large numbers of smallholder farmers spread across a broad investment area. In this chapter, the case of the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) is studied to evaluate application of these tools for managing environmental and social impacts for a development corridor, and to analyse the origin and application of a new corridor-level tool. SAGCOT's new Inclusive Green Growth (IGG) tool, which was born of the ongoing need to manage for impacts, complements and supplements existing traditional impact assessment tools by empowering small- and large-scale producers and processors to track their own progress and identify areas of improvement for further support and attention, while providing a pathway to consolidation and action across the development corridor. Development corridors, as neither ecological nor administrative entities, present special challenges to practical implementation of impact assessment and management. This analysis explores how these issues have unfolded in one agricultural growth corridor, with lessons learned that can be applicable to other development corridors, particularly with substantial agricultural focus.

9.1 Introduction

SAGCOT is a public-private partnership initiated in 2010 at the World Economic Forum, with the aim of agricultural transformation in Tanzania that is commercially viable, while enhancing food security, improving livelihoods and ensuring environmental sustainability (World Economic Forum 2016). SAGCOT covers a region stretching over 300,000km^2 from Dar es Salaam to the border of the Democratic Republic of Congo, Zambia and Malawi, linking key areas within Tanzania. This region encompasses the Southern Highlands, which are also of significant ecological importance for biodiversity and critical ecosystem services, including water provisioning to millions. The initial focus has been on three priority clusters of the original six identified – Ihemi, Mbarali and Kilombero – where agricultural transformation activities are either planned or ongoing.

Agriculture is the backbone of Tanzania's economy, comprising roughly 25-30 per cent of gross domestic product (GDP) (Statista 2020), employing over 75 per cent of the workforce (Food and Agriculture Organization of the United Nations 2016), and contributing 95 per cent of the nation's food requirements (Munishi *et al*. 2010; Massoy 2016). Value-added agro-processing and increases in productivity are considered important contributors to Tanzania's goal of achieving middle-income status, as laid out in its Tanzania Development Vision 2025. Much potential still remains. Of Tanzania's total 945,000 km^2 land area, 620,227km^2 (70 per cent of the total) are considered suitable for agriculture, including cultivation and livestock. While 440,000km^2 of this is considered arable, only around 100,000km^2 of land (10 per cent) is actually in cultivation. In addition, of the 500,000km^2 of potential rangeland, only approximately 240,000km^2 is used for grazing (United Republic of Tanzania, 2009; Kimaro and Hieronimo 2014). Moreover, Tanzania's current agricultural systems are largely based on small-scale farmers with relatively low productivity and poor infrastructure, minimal use of modern techniques, and lack of access to financing (Majule *et al*. 2015). Thus, there is substantial potential for increased agricultural production and increased economic contribution of agriculture, particularly in the face of greater regional and international market access.

SAGCOT is a key initiative to grasp this agricultural opportunity. Key goals and objectives by 2030 include bringing 350,000 hectares of land into profitable production, helping 100,000 small-scale farmers transition into commercial farming. This will create 420,000 jobs, lifting 2 million people out of poverty. SAGCOT expects US$ 1.2 billion of private investment to match US$ 1.3 public sector grants in agricultural development funding. These ambitious goals are key to the fact that SAGCOT is considered a government priority to help Tanzania reach its agricultural potential and roll out climate-smart agriculture. Since the beginning, there has been international attention on SAGCOT for its innovative partnerships with strong support from the Alliance for a Green Revolution in Africa and publicity at the World Economic Forum. In addition to the Tanzanian government, international donors include the UK's former Department for International Development (now known as the Foreign, Commonwealth & Development Office), the United States Agency for International Development, the World Bank, the United Nations Development Programme and the Royal Norwegian Embassy, among others.

9.2 Key players and stakeholders

SAGCOT Centre Ltd, as the main corridor authority for the initiative, was established as a non-partisan partnership broker and catalyst, engaging multiple stakeholders in the SAGCOT region and facilitating partners to achieve sustainable, inclusive commercial agricultural transformation. The 43 partners in 2014 have since grown to 102 official partners in 2020. These include key ministries of the government of Tanzania, including: the President's Office and Vice President's Office; private sector companies ranging from large multinationals like Syngenta and Unilever, to local Tanzanian companies such as the Kilombero Sugar Company and Deka Foods; organizations representing small farmers; non-governmental organizations (NGOs) and other service providers; and public financing institutions such as the Tanzania Investment Bank and the Tanzania Agricultural Development Bank.

To advance collective efforts towards inclusive green growth, each partner (e.g. public entity or private investor) commits to general SAGCOT principles for sustainable and inclusive agricultural investment (see Box 9.1). Commitment can be either informal, or with a Letter of Intent including specific investments, projects, and targets.

In addition, a multi-stakeholder SAGCOT Green Reference Group (GRG) was established at both the cluster and SAGCOT-wide level to advise the SAGCOT Centre on inclusive green growth issues, including environmental and social aspects. The GRG works as an informal advisory body, bringing together a representative group of stakeholders from government (e.g. Ministry of Agriculture, Ministry of Water Resources, Vice President's Office and local government authorities), the private sector (including farmers), the donor community, academia and civil society/ NGOs (e.g. African Wildlife Foundation, Shahidi wa Maji, WWF- Tanzania) to ensure appropriate action at both scales.

The original concept of SAGCOT included US$ 60 million in support from the World Bank, including a US$ 45 million catalytic trust fund to stimulate private investment within SAGCOT. Though the trust fund was later cancelled in December 2018 at the Government of Tanzania's request due to delays in fund disbursement, its early existence meant that the initial implementation of SAGCOT had to meet certain World Bank donor requirements, which included a strategic environmental and social assessment (SESA)[76]. Thus, a SEA was carried out in 2012-2013 by Environmental Resources Management (ERM) Consultants. Completed in August 2013, the SEA process underwent two rounds of public consultation and was finally approved in 2014.

BOX 1. SAGCOT PARTNERSHIP PRINCIPLES:

- **Engaging smallholder farmers and ensuring environmental sustainability through their activities,**
- **Partnering with others to promote a harmonized approach and improve synergies,**
- **Maintaining engagement, communication, and support for the SAGCOT Centre Ltd.**
- **Contributing to the resolution of policy and infrastructure constrains; and**
- **Considering new and innovative financing mechanisms.**

76 Strategic Environmental and Social Assessment (SESA) is a term used by the World Bank but refers to what is more widely known as Strategic Environmental Assessment (SEA)

9.3 Impact assessment in Tanzania

9.3.1 Framework/enabling law

Project-related impact assessment in Tanzania started as early as the 1980s, though without a legislative or regulatory framework. These early impact assessments were typically donor-driven EIAs, numbering roughly 40 by 1998 (Mwalyosi and Hughes 1998), to just over 300 in 2013 (Netherlands Commission for Environmental Assessment 2013). A key first step towards a more systematic impact assessment process took place when Tanzania's National Environmental Management Act (No. 19) in 1983 established the National Environmental Management Council (NEMC), the main government authority with responsibility for reviewing EIAs and conducting environmental monitoring and auditing. Another key step was in 1994, when the Ministry of Tourism and Natural Resources published the National Environmental Action Plan, which incorporated environmental concerns into national planning and development and recognized EIA as a means of ensuring good environmental management and avoidance of negative impacts (Netherlands Commission for Environmental Assessment 2013). Other sectoral policies on land, mining, energy, water, agriculture and fisheries also recognized the need for EIA procedures around this time. However, it was Tanzania National Parks that was the first government agency to adopt EIA into policy by requiring EIA preparation for all developments within and adjacent to national park boundaries since 1994 (Tanzania National Parks 1994).

Draft EIA guidelines followed, which were first presented in 1996, but later revised and updated in March 2002. They were issued as Tanzania EIA Procedures and Guidelines by NEMC, and were intended to eventually be integrated into EIA regulation. Finally, in 2004, the Tanzanian Parliament historically passed the Environmental Management Act (EMA), which provided the legal basis for both EIA and SEA. The 2005 National Environmental Impact and Auditing Regulations set out procedures for conducting EIA in Tanzania. SEA regulations were further promulgated in 2008, though SEA guidelines were not launched until 2018 (see Chapter 8).

Intersectoral coordination is supported by the establishment of an environmental section in each ministry. Their responsibilities include ensuring compliance with the Environmental Management Act and liaising with NEMC to foster shared responsibility for natural resource governance. Regarding environmental assessment procedures, they must collaborate in the drafting of project briefs and EIA Terms of Reference, contribute to scoping exercises and review processes, etc. In terms of section 87(2) of the EMA, NEMC may set up cross-sectoral technical advisory committees to help review EIA procedures and environmental impact statement (EIS) content. Within the EIA process, the proponent must submit an EIS, which contains the bulk of the analysis.

9.3.2 Challenges

Impact assessment in Tanzania has faced numerous challenges. From its earliest days, EIAs generally performed poorly, with marginal impact on decision-making (Mwalyosi and Hughes 1998). EIAs were found to take place too late in a project's decision-making process; they were under-resourced and did not meaningfully engage stakeholders (Mwalyosi and Hughes 1998). The focus seemed to be more on the output and not the process. Government departments generally exhibited a lack of environmental leadership and weak commitment to environmental management. Decentralization to local authorities was not met with allocation of resources and capacity-building, leaving local authorities with responsibilities, but without the capacity or funding to monitor compliance (Mniwasa and Shauri

2001; Booth, Chapman and Walmsley 2002). Indeed, more data needed to be collected, and national capacity needed to be built for screening, scoping and reviewing EIAs, and institutional structures needed to be developed (Spooner, Singh and Mugabe 1994; Institute of Resource Assessment and International Institute for Environment and Development 1995). EIAs have been generally seen by both private sector and some government staff as impediments to development, and a waste of time and resources (Mwalyosi and Hughes 1998), with EIA considered more a procedural tickbox exercise rather than truly a tool to mitigate adverse impacts. In fact, cultural, sociological and psychological factors related to governance, accountability and commitment of key stakeholders combined to hinder the effectiveness of EIAs even after the legislative framework was in place. Indeed awareness, capacity and data were not necessarily the key limiting factors to effectiveness of EIAs (Sosovele 2011). Additionally, because the resources to undertake EIA are normally from or are contributed by the entity that needs the EIA done (i.e. project proponent), the intent of the EIA's effectiveness is undermined to favour the entity that requires or pays for the EIA. This array of challenges to EIA effectiveness is further hindered in the agricultural context, as described in the next section (see Chapter 3 to learn more about the theory versus practice of impact assessment).

Image credits: Diego Juffe Bignoli

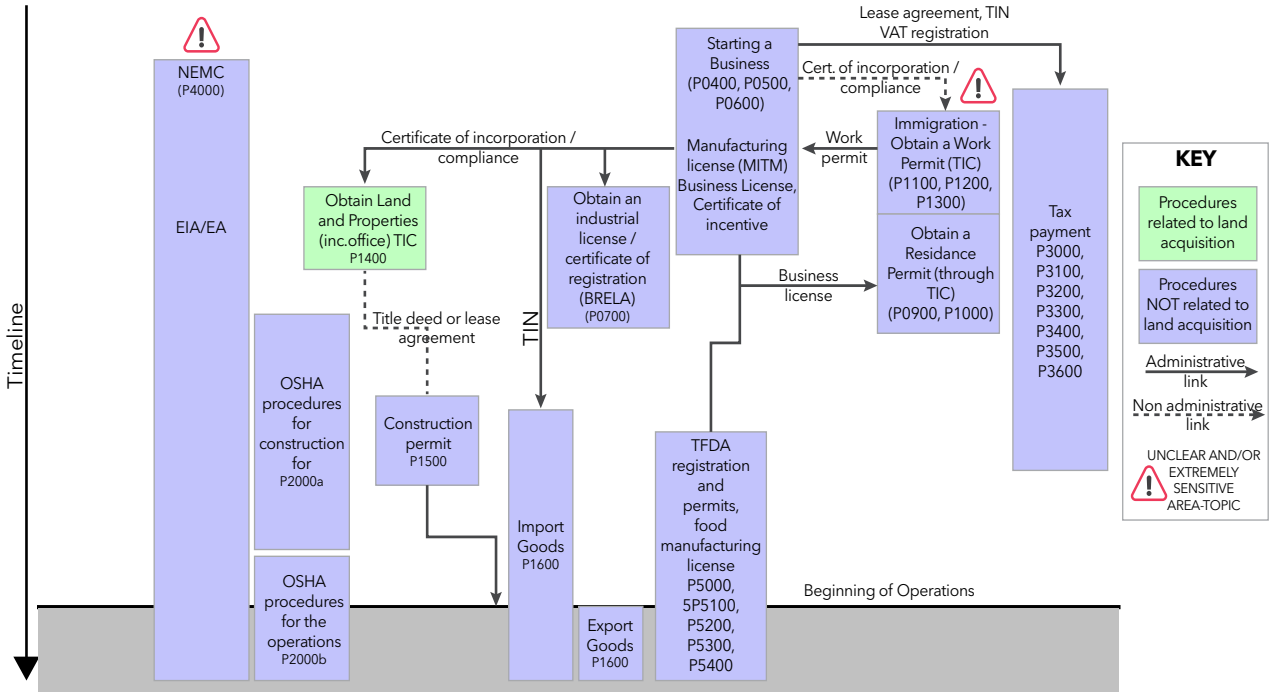
9.4 Environmental impact assessment

Agribusiness investors in Tanzania face challenges in managing social and environmental impacts through the EIA process, which is also hindered by complex and opaque areas in legislation surrounding land investment and ownership, further hindering the utility of this tool. Firstly, only "large-scale cultivation" requires an EIA, or agriculture that requires major water resource development, resettlement, or uses Genetically

Modified Organisms (GMOs) or new crop breeds. Secondly, for these large-scale agricultural projects, while the Tanzania Investment Center is cited as being a one-stop shop for investors, in fact, additional central and local authorities are needed to advance agricultural investment. The NEMC has the national mandate to oversee and enforce environmental management, including application and approval of EIAs. Actual decision-making regarding the EIA is done by the minister in charge of environment (within the Vice President Office) based on advice from NEMC and its consultation with local and provincial authorities. Thirdly, the agricultural land investment process in Tanzania is complicated and the exact steps are unclear, making it difficult to know when to conduct an EIA (Prorustica 2016). Competing claims to land also further complicate matters, with traditional occupancy and use, somewhat conflicting formalizations of land tenure in the Village Land Act and Land Act, and colonial and post-colonial state appropriations of land all factoring into this complexity. (Prorustica 2016)

Thus, agricultural investors are referred to NEMC for EIAs, but without clarity on exactly when and at which step in the land investment process to conduct it, such as clearly linking to other specific agricultural investment procedures (i.e. accessing or acquiring land or obtaining a business license), making it easy for an agricultural investor to act too late for the EIA to be most beneficial (see Fig. 9.1). Furthermore, NEMC does not have an office at the Tanzania Investment Center (TIC), which makes uncovering this info even more challenging, particularly as a foreign investor. On the other hand, many investors do not even go through the TIC processes, while others do not need to do so due to their limited size. (Prorustica 2016)

Figure 9.1 Agricultural investment process in Tanzania, and within SAGCOT. The top of the figure represents the start of an investment, with progression of the investment towards the bottom of the flow chart. Boxes are procedures to be completed by the investor



BRELA = Business Licensing and Registration Authority; NEMC = National Environmental Management Council; OSHA = Occupational Safety and Health Authority; TFDA = Tanzania Food and Drugs Authority; TIC = Tanzania Investment Center; TIN = Taxpayer Identification Number; VAT = Value Added Tax.

Source: Prorustica (2016)

The most challenging step in agricultural investment is accessing land. The Land Act, 1999, and the Land Amendment Act, 2004 (and the Tanzania Investment Act of 1997 for foreign investors) define how investors can acquire granted rights of occupancy on either general or reserved land and customary rights of occupancy on village land. Foreign investors must also possess a certificate of incorporation/compliance, with the condition that land is for investment purposes. The land investment process may take more than a year. Once an investor has targeted a piece of land, they then enter an elaborate process of requests and approvals at multiple levels, depending on how land rights are granted for that piece of land, but these typically include engaging local authorities including the district council, local village councils, assemblies and wards, as well as the Ministry of Land, and it may even entail funding and facilitation of a village land use plan as a requirement for an EIA. (Prorustica 2016)

Investors are not officially allowed to start the EIA until they have a title deed (or letter of acceptance/lease agreement) after all the approvals and payments of compensation (according to Village Land Regulations, 2001), in order to ensure the analysed land is where the project will take place. However, at that point, if the EIA indicates significant negative impacts that cannot be mitigated, the investor is largely already locked into their investment. In practice, investors do try to engage NEMC before the title deed is issued, sometimes because business licenses or other key certificates will not be issued without NEMC approval. However, no clear moment, step, or process is identified. (Prorustica 2016)

Benefits from the EIA process that could help address social impact issues are usually not initiated early enough in the land acquisition process to be effective in engagements with local communities. Water rights further complicate the situation, in that securing a water right is also not closely linked to conducting an EIA. An investor can only secure a water right after securing land, but it is not a guarantee that, after securing land, they can secure the appropriate amount of water for the desired investment (Proustica 2016). Even once the water use permit is secured from the Ministry of Water and Irrigation, the investor then engages with a host of other agencies including NEMC, again when it would seem that the assessment of the action has come too late. In practice, it was noted that private sector investors will often conduct their own "pre-EIA" EIA to get ahead of the official process (Prorustica 2016), but these investors would generally need to be the more savvy, experienced and well-resourced.

9.5 Strategic environmental assessment

Due to the World Bank's initial committed investment to SAGCOT's catalytic trust fund in particular, a SEA was conducted relatively early in SAGCOT's lifespan (though SEAs are a requirement for all programmes and plans under Tanzanian legislation). It was completed in 2013, the year SAGCOT's first workplan was developed, and approved in 2014. Implementation since then, however, has been limited. A 2016 assessment (Mwalyosi and Tarr 2016) indicated that the reasons behind this included: the unplanned evolution of the SAGCOT programme from large new farmers to existing farmers; focused activities starting in the Ihemi cluster, which was not analysed in detail in the SEA; and the need for an outcomes-based strategic environmental management plan (SEMP) for the Ihemi cluster. This SEMP should have also been monitored and updated annually.

Thus, in the case of the SAGCOT SESA, it required rapid modification and updating to align with changing conditions, as well as more detailed work at the cluster level, which was never completed. With the cancellation of the World Bank-funded catalytic fund, there was also no continued mandate to see

the SESA through and ensure monitoring and implementation, including funding for necessary revisions and updates. According to Mwalyosi and Tarr (2016), the process and products could have been improved further with the following.

- Consideration of alternatives within existing projects, such as improved farming techniques or adoption of technologies for achieving the same outcomes at reduced environmental/social costs.
- Conducting an environmental assessment that strategically identifies the most vulnerable ecological and social features, their impacts and avoidance/mitigation options.
- Conducting a SEMP at the cluster level that provides an "over-arching framework and roadmap for addressing the cumulative impacts of existing and planned projects and their associated infrastructure".
- Conducting a broader sustainability assessment that analyses the sustainability of the SAGCOT programme over the long term, and with a more expansive context, including balancing social, economic and environmental aspects and agreeing on acceptable trade-offs, which was not done in the original SESA.

The key to a useful SEA in this case would have been generating and tracking information at the cluster level, and ensuring associated documentation remained "live" and with regular updates to evolve with changing conditions to be realistic and practically applicable.

9.6 Inclusive Green Growth Tool

The need to understand and track potential impacts at a feasible scale (i.e. in this case, at the cluster level, as the unit and focus of implementation by the SAGCOT Centre), as well as to support efforts to mitigate or avoid negative impacts, spawned increased support for another type of tool: the IGG tool. The IGG was born of an idea as an investment screening tool for SAGCOT and investors/farmers to share a clear and common understanding of social, economic and environmental sustainability as an elaboration of the SAGCOT partnership principles. The IGG tool quickly evolved to fill a gap in environmental and social impact assessment and mitigation and is now being considered as a self-assessment tool both (1) to allow small-, medium-, and large-scale producers and processors to evaluate their own progress with inclusive green growth and do adaptive management accordingly; and (2) to help SAGCOT to tailor their support efforts to facilitate avoidance and mitigation. It includes a portion on regulatory requirements, as well as a self-evaluation scoring system aligned with SAGCOT partnership principles for green growth to support going beyond legal requirements towards best practice. There are three major sections: environmental management, inclusivity and business sustainability.

Initially conceived in 2016, the IGG tool underwent a number of iterations and testing from 2017 and 2019, to be finally launched and rolled out in March 2020 in the form of modified versions for small-scale investors versus medium- to large-scale investors, as well as for producers versus processors. Small-scale producers are those that rely predominantly on family labour, use low technology, have farms less than 10 hectares in area, and have invested less than 50 million Tanzania shillings (current value USD$ 21,565). On the other hand, a large-scale producer would have a farm of more than 100 hectares, depend on hired labour, use mechanized farm operations, and have invested over 1 billion Tanzania shillings (current value USD$ 431,273) (SAGCOT 2018). The first stakeholder workshop took place in May 2017, where 15 commercial agricultural investments in Ihemi and Mbarali clusters were assessed based on the IGG tool, through facilitation by a multi-stakeholder government and civil society task force. The same task force returned in April 2018 to monitor progress and evaluate improvements. A second assessment took place in November 2018 to review 17 additional small- to large-scale investments and feedback provided in 2019.

Initial testing and training of the IGG tool found producers and processors differed in compliance in many ways (Minja 2018). Medium- and large-scale investments that are mostly multinationals have shown higher compliance IGG scores within the tool, often scoring above 80 per cent, while small-scale investments averaged scores of below 40 per cent. Most small investments are dominated by farmers' cooperatives or groups of entrepreneurs. In general, among 33 investments assessed in 2018/2019, about 60 per cent were compliant with IGG principles (i.e. scoring at least "good" or above). The areas with weakest alignment to inclusive green growth principles included good governance, the capacity to develop and implement good business models, and social inclusivity. Investments from the first assessment were monitored six to nine months from their first evaluation (World Wide Fund for Nature 2018). In this follow-up evaluation, 30 per cent improved their inclusivity practices, 35 per cent improved their environmental management practices, and 22 per cent improved their business strategy practices over that time period. Indeed, for social and environmental aspects, nearly a quarter of these improvements were deemed "significant" (22 per cent and 24 per cent, respectively).

In the second assessment (SAGCOT Centre 2019), the 17 investments scored highest in social inclusivity (74 per cent) and lowest with environmental sustainability (58 per cent); economic sustainability scored 65 per

cent overall, and the majority of recommendations were made to address these business and developmental weaknesses. Only 19 per cent of recommendations addressed environmental issues. SAGCOT Centre is using this information to analyse needs and evaluate how best to support increased compliance. These initial results seem to indicate high potential for improvements in practices, with business strategies being perhaps the most complicated to improve. More detailed information, analysis, and follow-up is needed as the IGG tool continues to be rolled out.

It does seem that the process of self-assessment, more so than external evaluation, on which the IGG tool is based, plays a critical role of awareness-raising and empowerment of private sector stakeholders. Most recent feedback (in November 2020) found that users appreciated the IGG tool in order to adaptively manage for economic, social, and environmental sustainability; to identify gaps and associated mitigation measures; to understand how they compare with other companies; and to guide their own adaptive management of their business (SAGCOT Centre feedback, 2020). While timing is too early to assess substantial change in performance at scale, the self-empowerment approach taken by the roll-out of the IGG tool seems to be more powerful for on-the-ground change than tools applied by external audiences, and initial feedback seems to indicate uptake in implementation. More long-term analysis will be needed to track actual outcomes and performance.

9.7 Discussion and recommendations

Understanding and managing impacts for an agricultural growth corridor, particularly one the overall size of SAGCOT (which covers nearly one-third of the area of Tanzania) is a complicated endeavour, particularly when ambitious objectives include social inclusivity and environmental sustainability. Traditional tools such as EIA and SEA provide opportunities for impact assessment and management, but the realities of implementation on the ground hinder the utility and effectiveness of these tools. For EIAs, while there are capacity and data constraints, far more fundamental are the institutional constraints of how EIA is perceived and implemented. In the agricultural context, this is further complicated by unclear timing of the EIA process within the agricultural investment process. For SEAs, which are a newer impact tool applied in Tanzania, experience indicates that this too is more a theoretical product than a practical tool for integrating environmental management consideration. More needs to be done to keep the process and product live and in use by relevant stakeholders. In the SAGCOT case, since the SEA was already conducted to fulfill donor obligations, when the Catalytic Fund was cancelled (though years later), there was no impetus to continue support and follow-up of the SEA and its recommendations.

In general, it seems that EIA and SEA are still largely considered tick box exercises, rather than true opportunities to integrate environmental considerations into development decision-making. While legislation and a legal framework are important in setting the playing field for environmental management, there is much additional work needed to make the impact assessment process effective. The EIA requirement in Tanzania can still be met without demonstrated implementation on the ground. New supplemental tools and processes such as the IGG tool provide practical opportunities to fill these gaps, even when EIA and SEA efforts result in limited action to manage environmental and social challenges, and can support EIA and SEA implementation through greater buy-in and long-term monitoring. Any impact mitigation or management tool necessitates project proponent (e.g. the farmer or agricultural company) commitment to adopt and implement findings. The IGG

tool may offer such opportunity for ownership and buy-in that leads to actual implementation. We recommend the following.

- Traditional impact assessment tools need to be tailored to their local situation to be most effective.
- SEAs for development corridors should cover an appropriate geographic scope and scale in order to be successfully implemented.
- EIA processes must be clarified within the agricultural investment process to be made more useful. These should come as early as possible in the process, as once land has been secured, options may be limited to avoid or mitigate negative impacts.
- Supplemental tools (such as IGG) offer opportunities to manage social, environmental, and business risk and provide opportunity for inclusive green growth and climate-smart agriculture at a corridor and cluster level, especially where there are myriad actors, in this case smallholder farmers, who are typically not directly subject to other impact assessment processes.
- Monitoring should be increasingly tied to awareness and application of the IGG tool to support farmers to know what to do to reduce relevant risks and to advance sustainable development objectives at the same time.
- Even for development corridors, it may be most beneficial to rollout impact mitigation strategies at a cluster level (i.e. a focal economic development node). The regional corridor-level scale is often too challenging a scale to manage for impacts, except at the most strategic level.

On-the-ground realities challenge the application of existing impact assessment tools, even for investors and farmers who are interested in social and environmental sustainability. Impact assessment processes and products must be tailored to a more dynamic situation, particularly in the agricultural development corridor context.

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10

The Importance of Building Climate Resilience into Environmental Assessment Processes: The Case for the Southern Agricultural Growth Corridor of Tanzania

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ABSTRACT

The development of the Southern Agricultural Growth Corridor of Tanzania (SAGCOT), which was mainly designed for boosting agricultural productivity and reducing poverty, is faced with the challenge of climate change. As part of environmental assessment (EA) processes, climate change adaptation plans should be carefully designed to effectively enhance development corridors' climate resilience. Although an effort has been made to address climate resilience in the environmental assessment process of SAGCOT, the lack of a systematic methodology is a bottleneck for the effective assessment of climate change adaptation needs. In this chapter, we review the work done for increasing climate resilience in the design of SAGCOT and summarize the lessons learned that would be helpful for the next phase of SAGCOT's development. We find that both future climate projections and the analysis of the potential climate-related risks for ecosystems, society and economy is described too generally, hindering the ability to propose practical adaptation measures. Due to the vague linkage between the adaptation goals and climate risks, the crucial hamper is that no clear pathway has been clearified to realize the adaptation goals appropriate to future climate risks. Finally, issues for adaptive capacity building are too general and the adaptation technologies were not systematically constructed in this corridor. To better incorporate climate change adaptation planning into the EA process for SAGCOT, five steps are recommended; risk mapping, setting up of the adaptation objectives based on an assessment of climate risks, development of adaptation pathways to achieve the objectives, design of an adaptation actions plan and implementation. Finally, it is recommended to expand the current research on the impacts of climate change from focusing on field production – to the whole value chain – to promote agricultural technological innovation for developing and extending a set of agricultural adaptation technology systems, to verify the effects of adaptation technologies with field experiments (e.g. a climate-resilient demonstration farm) and to build the knowledge infrastructure to increase management capacity in SAGCOT.

10.1 Introduction

The Southern Agricultural Growth Corridor of Tanzania (SAGCOT) covers approximately one-third of the mainland of Tanzania, stretching from Dar es Salaam through Morogoro, Iringa and Mbeya, to Sumbawanga, which is near the border with Zambia. It is a national-level programme aiming to attract the investment to support significant economic development (Southern Agricultural Growth Corridor of Tanzania 2011). Six development clusters within SAGCOT (Ihemi, Mbarali, Kilombero, Ludewa, Rufiji and Sumbawanga) have been identified, where it is hoped that more focused agricultural investment could be concentrated and local smallholders can be incorporated into internationally competitive supply chains, with an ultimate objective of boosting agricultural productivity, improving food security, reducing poverty and ensuring environmental sustainability.

SAGCOT is implemented with an agriculture-first strategy to enhance food security, develop profitable agricultural businesses in clusters along the corridor, to increase agricultural supply chain competitiveness with efficient coordination of natural and social resources. A green growth approach has been adopted as a corridor development strategy. A regional strategic environmental and social assessment (SESA) was undertaken in 2013 by Environmental Resources Management Limited (ERM; Environmental Resources Management Limited 2013) and the report was submitted to the Government of Tanzania. The key social issues identified in the SESA report are food security, gender equality, poverty reduction, health, land use, employment opportunities and so on, while the main environmental issues identified are water resources, soil, biodiversity and habitats, and pollution. Climate change is also highlighted as an important issue. It is widely recognized that climate change will threaten the sustainable development of SAGCOT (Southern Agricultural Growth Corridor of Tanzania 2012), it is therefore essential to build a climate-resilient SAGCOT to cope with the additional stresses and uncertainties caused by climate change, to ensure that the corridor's development objectives can be realized.

The observed climates changes facts summarized in the SESA are that the mean annual temperature has increased by 1°C since 1960, with a warming rate of 0.23°C per decade in Tanzania. Annual rainfall has decreased by the rate of 2.8mm per month, per decade. The rainfall decrease trend has been more pronounced in the SAGCOT region. The SESA report also noted that either the flooding associated with El Niño or the droughts associated with La Nina events had been enhanced due to global warming. SAGCOT is particularly sensitive to climate change because the agriculture is mainly rain-fed, highly exposed to increased temperatures and evapotranspiration, increased rainfall variability in both water availability and timing, as well as the occurrence of pests and diseases. Considering these observed climate changes facts and projected future trends, the adaptation measures proposed in ERM's report include increasing water use efficiency in crop production, the development of alternative farming systems, water storage programmes and technologies, and community-based catchment conservation and management, as well as other relevant activities concerning reducing deforestation and improving energy sources (mostly referenced from Tanzania's National Adaptation Programme of Action, United Republic of Tanzania 2007), and crop modelling for agricultural impacts assessment and training in local communities to reduce farmers' vulnerability.

The SESA report was a pioneering effort for Tanzania, with its incorporation of climate change adaptation into planning processes. Now there is more advanced scientific understanding about climate change adaptation, reviewing the work done already on increasing climate resilience and summarizing the lessons learned would be helpful for the next phase of SAGCOT.

10.2 Current climate change adaptation measures in SAGCOT

There are many barriers to adaptation to climate change, which is reflected as place-specific disparities among groups (Armah *et al*. 2015). Tanzania's industries are mainly agro-based, strongly dependent on natural resources and very sensitive to climate change. Small-scale farmers are more vulnerable, as they are highly dependent upon rain-fed production. SAGCOT is suffering intermittent droughts and flooding, following extreme climatic events. Tanzania is also vulnerable to energy shortages, which will have severe social and economic implications. Despite recent off-shore natural gas discoveries, a large part of Tanzania's electricity supply comes from hydro-generation. Rainfall variability periodically affects power generation and supply.

Tanzania, and the SAGCOT region, are also globally important for biodiversity conservation. SAGCOT's poor rural population is dependent on the natural resources of the region, and they will face the stresses caused by climate change, as well as weak institutions and poor governance. If climate change adaptation is not designed in a coordinated and sustainable manner, the SAGCOT programme will face many difficulties, such as the loss of livelihoods, migration of people as climate change refugees, acceleration of habitat loss, degradation and fragmentation, and reduced river flows.

Climate change adaptation has much in common with measures taken to address other more traditional environmental problems, such as pollution and biodiversity loss. The goals are the same, that is, the protection of life support systems and support for socioeconomic development. However, adaptation is by definition an end-of-pipe solution. In both cases, the emphasis should, as a matter of principle and priority, be to shift production processes to preventative measures (i.e. pollution prevention or phasing out the use of greenhouse gases). Out of necessity the philosophy behind adaptation to climate change is slightly different because it emphasizes the inevitability of the consequences of climate change and thus the need to adapt to them as *fait accompli*. The predicted climate change impacts are, in the shorter term, irreversible and the need exists to adapt developments to be able to cope with those impacts. In contrast, addressing pollution by a shift to preventative strategies (i.e. pollution prevention, cleaner production, eco-efficiency etc.) will have more immediate results in addressing negative impacts on the environment. In addition to the preventative strategy of climate change mitigation, it is necessary to build adaptation into planning processes.

Relative to the traditional environmental problems, such as pollution control for air and water quality, habitats and species protection for biodiversity, climate change adaptation is sharing the common vision with the traditional environmental problems to secure the socio-economic development goals to be realized, but possessing its special features for the different rationales and approaches on maintaining the environmental sustainability. Firstly, the interaction mechanism of a defined system with the driving factors are different, the driving factors for the traditional environmental problems could be resolved with intensified human interventions on pollution control and protection on biodiversity for a defined system, while the climate changeability could not be controlled from human interventions, thus strong resilience is expected for a system to cope with the additional shocks from climate change, then proper and efficient adaptation actions should be planned and implemented to increase the system's climate resilience.

Tanzania has produced guidelines on how to integrate climate change into policymaking (The United Republic of Tanzania 2012), with a flowchart analysing the sectoral vulnerability to climate change, then evaluating the sectoral

adaptation options, institutional situation and the involvement of stakeholders, and potential interventions for adaptation. This resulted in a sectoral plan, and monitoring and evaluation requirements during implementation. A lack of a systematic methodology is a bottleneck for the assessment of climate change adaptation to be incorporated into EA processes. Specifically, there are the following problems for the present assessment on climate change adaptation.

10.2.1 Climate risks not well assessed

Though observed climate change facts were well summarized, future climate projections, and the potential climate risks for ecosystems and society as well as the economy are quite general. This is not rigorous enough for policymakers to make adaptation decisions on the ground. Consequently, the adaptation measures proposed were not practical enough to solve the challenges identified.

10.2.2 Adaptation goals and actions do not fit well to the climate risks

It is hard to recognize how the adaptation goals are linked to the climate risks. Neither are they particularly challenging, and in some cases, comprise business-as-usual work for the sectors to do. There is a need to indicate better how much risks could be lowered if the challenging adaptation goals could be realized, and how much these actions could be attributable to the realization of adaptation goals.

10.2.3 Lack of clear adaptation pathways to realize the setup adaptation goals

If the adaptation goals are set up, then there should be pathways to realize these goals. However, there is no description on these pathways. Without this, the separation of climate risks, adaptation goals and adaptation actions would reduce the effectiveness of the implemented adaptation activities.

10.2.4 Issues for adaptive capacity-building are too general and adaptation technologies are not systematically summarized

Adaptive capacity-building is recognized as being very important. However, currently the issues are not sufficiently specified, adaptation technologies are emphasized frequently, but are not systematically integrated. This hampers the financing mechanism for technological innovation.

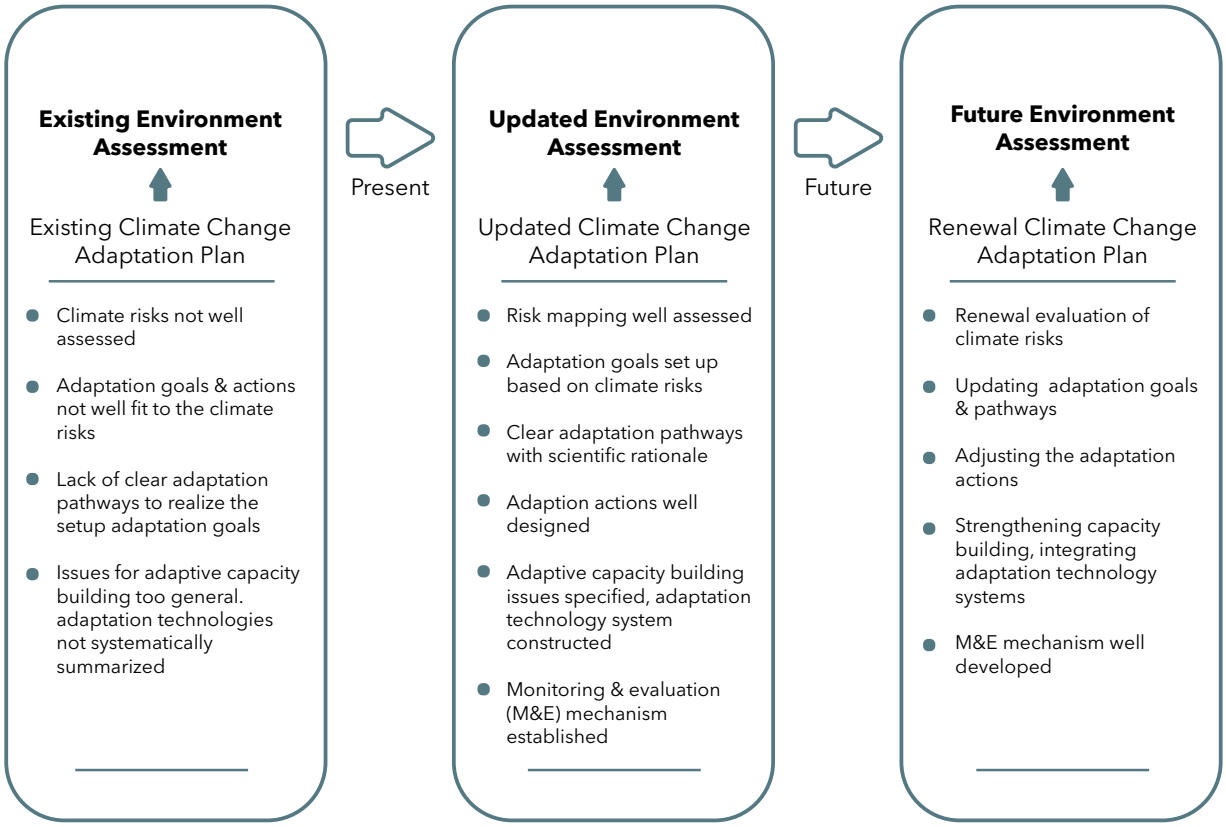
10.3 Proposed methodology for a strategic climate change adaptation plan for SAGCOT

Considering the additional stresses from climate change to the agricultural systems of SAGCOT, the process of a strategic adaptation plan for SAGCOT could be divided into the following five steps.

1. To evaluate the risk of climate change in SAGCOT.
2. To set up the objectives of adaptation in SAGCOT.
3. To narrow down the adaptation pathways to achieve the adaptation objectives.
4. To design the adaptation actions and measures for SAGCOT.
5. To implement the strategic adaptation plan.

Fig. 10.1 illustrates how to incorporate adaptation planning into the EA process. Unlike with former adaptation planning, there is a seamless connection between the adaptation objectives and climate risks with adaptation pathways, and a monitoring and evaluation (M&E) mechanism ensures that the adaptation aims are achieved.

Figure 10.1 Steps for climate change adaptation for environmental assessment



10.3.1 Step 1: evaluation of climate risk in SAGCOT

The climatic risks in SAGCOT should be analysed in two layers. One layer is the climate system itself, which concerns the new features of climate change for present-day observed climatology and the future climate scenarios projection under greenhouse gas emission assumptions. Another layer concerns the impacts of climate change on ecological and social-economic systems within SAGCOT, which would be centralized with agriculture and food security. The ecological and socioeconomic consequences from climate change on agricultural value chains should be also analysed.

10.3.2 Step 2: setup of adaptation objective

Setting up adaptation objectives provides a bridge from scientific understanding to on-the-ground actions. Adaptation objectives should be properly set up, over- or under-adaptation would both be problematic, and could result in waste of natural, capital and social resources. The adaptation objectives for the agricultural sector in SAGCOT should therefore be set up based on the key identified climate risks. The adaptation objectives should be supportive of socioeconomic development goals in the corridor, and the ad

aptation objective in corridor scale should also be compatible with Tanzania's national adaptation strategy and the adaptation tasks in clusters of Ihemi, Kilombero and Mbarali.

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10.3.3 Step 3: choice of the adaptation pathways

When the adaptation objectives are set up, theoretically there would be a lot of pathways to achieve the objectives, while the principle for the choice of adaptation pathways should be maximizing the utilization of climatic resources and minimizing the damage of climatic hazards on ecological and socioeconomic systems (Fezzi *et al*. 2018). Though Armah *et al*. (2015) argue that barriers to adaptation to climate change is place-specific, understanding the intrinsic attributes of ecological, social, and economic systems would be helpful for the choice of adaptation pathways. In Table 10.1, climate risks were systematically summarized in four layers: general warming trend; enhanced extreme climate events; ecological consequences and socioeconomic consequences due to climate change. The basic adaptation pathways could be shifts of agro-zones versus average warming trends, adjustments on the measures to reduce the meteorological disaster versus enhanced extreme climatic events, increasing the ecosystem services for climate resilience versus ecological consequences, and transforming society and the economy versus socioeconomic consequences.

Table 10.1 Climate risks in the layer of cascading impacts of climate change in SAGCOT

Key issues	Observation	Future climate risks	Adaptation pathway suggested
Average climate trend	Warming up to 1°C since 1960, rainfall decreased and more obvious over SAGCOT, rainfall patterns shifted from bimodal to unimodal rainfall regimes in some areas (Armah, *et al*. 2015)	Temperatures would increase 1-3°C in the 2050s, and up to 5°C in the high-emission scenario, and by 1.5-3°C in the low-emission scenario by 2100 Variability in projections is compounded by differences between seasons, regions, and rainfall regimes; some models projected a decrease in rainfall within the corridor (Cioffi Conticello and Lall 2016)	Shifts of agro-zones, utilization of agro-climatic resources
Extreme climate events	Periodic extreme events often occur, such as the severe droughts in 2003, 2005 and 2009, and the severe flooding in 1997/1998 and 2009	The most severe climate events are likely to be exacerbated and change of rainfall patterns would vary regionally, SAGCOT would be at risk of more frequent and more severe flooding and drought	Improving the work on agro-meteorological disaster reduction
Ecological consequences	Instability of water resources is shown and the hydrological cycling and distribution has been adjusted, shrinkage of lakes and wetlands caused natural habitat fragmentation, increasing grazing pressure and land degradation; a lot of livestock and wildlife have perished due to starvation and lack of water; changes in natural habitats are altered and the wildlife distribution patterns have changed, water shortage due to increased water abstraction for rice irrigation has significantly threatened the survival of wild animals Shifts of agro-ecological zones have occurred, and drought tolerant crops were introduced to curb the declining trend of crop yield Crop pests and diseases have become more prevalent over the past few decades, crop productivity had been considerably affected	Increased intensity and frequency of extreme events may result in climate-related natural disasters, such as landslides; the river flow may experience decreases; it is likely that the broad distribution of agro-ecological zones will change, and there will be greater variability in production; in addition, adverse impacts of prevalence of pests and diseases will appear, and the existing environmental challenges including water scarcity, land degradation, loss of biodiversity and ecosystem services, and deforestation will be aggravated	Increasing the ecosystem services for climate resilience

Socioeconomic consequences	Rural livelihood is greatly affected by decrease of agricultural incomes due to enhanced drought, semi-arid areas experienced more food shortages and insecurity; human health, property and infrastructure are greatly jeopardized by severe flooding	High pressure on natural resources, there would be little unused land, population increase would rapidly convert remaining village land to crops, grazing land and fuelwood supplies, these have been already critical issues in some areas; dry season river flows could not support the planned irrigation expansion unless storage dams were built; and in any case large-scale irrigation development would be likely to have significant negative hydrological and ecological effects through consumptive use of water and contamination by agrochemicals and wastes. Climate change may lead to social impacts affecting poverty, vulnerability, health and economic development (Watkiss *et al*. 2011)	Transforming the socioeconomic system

10.3.4 Step 4: design of adaptation actions

Once the adaptation objectives and pathways are established, a framework of agricultural strategic adaptation planning can be established, including clarifying priority adaptation issues for the design of adaptation actions. Actually, the adaptation task would not be limited to agriculture, related sectors such as water and ecosystem are very important, as agricultural resilience to climate change would be greatly enhanced if the eco-services could be provided. The adaptation actions could be categorized as incremental adaptation and transformational adaptation, those are two basic types of adaptation as defined in Intergovernmental Panel on Climate Change Working Group II Assessment Report (WGII AR5) (Intergovernmental Panel on Climate Change 2014). The adaptation actions will be dissected as sectoral (such as crop production, livestock, fishery for agriculture) or cross-cutting (such as nexus of food-energy-water). Besides, activities for capacity-building would also be arranged as adaptation actions with concrete contexts, such as technological innovation and field test for the effectiveness, guidelines for adaptation actions; those could be taken as the incremental improvement relative to the former adaptation planning. It is expected that there could be innovations both scientifically; for example, the rationale to support the construction of adaptation technology system, or technologically, such as integrated technologies at the grassroots and high-tech level. These sectoral, cross-cutting and capacity-building activities could be represented in a matrix with the four layers of adaptation pathways, as summarized in Table 10.1.

10.3.5 Step 5: implementation of strategic adaptation plan

For implementation purposes, there should be coordination, resource mobilization and implementation plans, as well as an implementation arrangement that indicates the roles of various actors in the implementation process. Collaboration and coordination could be more efficient as the cross-cutting issues become clearer, and this will help successfully implement the climate adaptation actions in SAGCOT, and more pilot research could be undertaken on financing mechanisms as the priority adaptation issues are

clarified along with clearer responsibilities for different stakeholders. This is very important given the initial policy driver of SAGCOT is to attract more investment for agricultural development. In addition, there would be more implications to facilitate resource mobilization in the face of global financial tightening. In order to better support the SAGCOT and solve the information asymmetry between funding demand and supply, the funding sources, inflow channels, and application methods for priority areas could be more clearly identified. M&E mechanisms are often weak. More investigation could be done for the M&E mechanism.

10.4 Conclusions

SAGCOT is and will be greatly affected by climate change. It requires a well-developed strategic adaptation plan and this should be better incorporated into EA processes for environmental sustainability, and to protect livelihoods. A systematic methodology to increase climate resilience is needed to ensure low-carbon, inclusive and sustainable development in the corridor. To better incorporate adaptation planning into SAGCOT, it is proposed that a strategic adaptation assessment could be carried out with five steps, which are risk mapping, setup of the adaptation objective based on the level of climate risks, the adaptation pathways to achieve the adaptation objectives, design of adaptation actions plan, and implementation. The pertinence of climate change is strengthened with the link of setup of adaptation objective and the climate risks, and the adaptation efficiency would be increased due to pathways to bridge the objective and the actions, and the effectiveness of adaptation could be assessed with an innovative monitoring and evaluation mechanism during implementation. Ojoyi (2017) emphasized that institutional and poor knowledge on climate change is a barrier to the implementation of adaptation. Hence adaptive capacity is always a priority issue. The following key issues would be highly recommended for adaptive capacity building.

- Institutional capacity-building: to expand research on the impacts of climate change from presently focusing on field production only to the whole value chain, such as the rice in Kilombero cluster. It would then be possible to make decisions on climate adaptation actions to prevent agricultural value chains from the severe damage induced from climate change; to compile a set of indicators for M&E to track implementation process to assess the effectiveness of adaptation actions (Tshibangu 2018).
- Agricultural adaptation technology innovation: to develop and extend a set of agricultural adaptation technology systems, either the collective innovation of labour intensive grassroots technology, or capital intensive advanced technology like the adoption of Big Data and Internet of Things.
- Showcase of a demonstration: Selecting typical farms to build the climate-resilient demonstration base to verify the effects of adaptation technologies with field experiment, especially in the vulnerable areas and communities, which would be well designed with strong scientific support with enough resilience to climate change towards 2030 or 2050.

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11

Public Participation in the Environmental Impact Assessment Process for Development Corridors in Kenya

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ABSTRACT

Kenya is a major gateway for East African links to the belt and road initiative (and its maritime silk road component). Under the Northern Corridor Transport network, Kenya has initiated high-profile projects, including the Lamu Port-South Sudan-Ethiopia transport (LAPSSET) and the standard gauge railway (SGR) corridors. Although these corridors are beneficial, they also have negative social and ecological effects, highlighting the need for impact assessment. Guidance on avoiding these impacts during their planning has been limited and attention is now focused on mitigating their impacts during construction an operation. This chapter explores the recommended Environmental Impact Assessment (EIA) process and its implementation in practice within the SGR and LAPSSET corridors based on the review of the EIA reports. We surveyed 974 community members within a 10km buffer along the corridors and interviewed key stakeholders. This chapter reveals that, although Kenya's EIA framework has good ambitions and is anchored on a sound legislative framework and institutional set-up, it lacks public confidence, effective participation and government capacity to implement appropriate measures to effectively address social and environmental impacts associated with corridors. The system is faced with lack of funding, limited capacity, corruption, duplication of regulations and a misunderstanding by society-at-large of the benefits of EIAs. The administrative system has little oversight of development projects with potentially significant environmental impacts, largely affected by the undue influence that the project proponent has over the EIA consultants, calling into question the impartiality of the process. There is a need for improvements in EIA practice to include capacity-building, transparency and stakeholder engagement. Importantly, recommendations will be made on how to better engage communities in the planning process for future developments.

11.1 Introduction

Infrastructure development projects have assumed great significance in global, regional and national social, cultural and economic growth. However, there is an emerging paradigm shift focusing on the concept of development corridors, away from traditional incremental infrastructure developments. As noted in the Introduction to this publication, there is no universally agreed definition of development corridors. However, they can generally be considered programmatic frameworks for spatially targeted investments to catalyse economic growth and development. They should be developed with multi-stakeholder and sectoral interests and their interdependencies in mind. True development corridors should include the integration of sustainability principles and appropriate environmental and social standards in their planning and development (see Chapter 1). Many governments, particularly in developing countries, have embraced corridors as flagship initiatives in national development policies (Schindler and Kanai 2019), as demonstrated by the numerous corridors implemented or planned, for instance, in sub-Saharan Africa (Laurance *et al.* 2015).

Kenya, a key economic hub of eastern Africa, and a maritime gateway to central African countries has initiated corridor projects in line with the country's Vision 2030 development agenda (Government of Kenya National and Economic Council 2007). These include the LAPSSET corridor and the SGR within the Northern corridor transport network to facilitate investment and to provide inexpensive and efficient mobility for people and cargo (Kithinji 2016). Several projects based on hard infrastructure such as roads, rails, water transfer, power generation, oil and gas pipelines, electricity transmission projects, technology and resort cities and ports have been mobilized (Development Corridors Partnership Kenya 2019). Although these projects contribute to overall national growth and development, they may often be accompanied by negative social and ecological externalities,

Figure 11.1 SGR and LAPSSET corridors

leading to loss of ecosystem functioning and integrity, loss of livelihoods for local communities and, subsequently, the erosion of the development gains (Laurance *et al.* 2015, Development Corridors Partnership Kenya 2019, Teo *et al.* 2019).

Historically, the choice of new development projects was primarily based on economic viability alone. However, environmental and social considerations have increasingly been recognized as an essential requirement, creating a more balanced, triple-bottom-line approach to economic, environmental and social considerations in project viability and acceptability (Modak and Biswas 1999). Ensuring social and environmental security should be under-written by meaningful public participation in environmental decision-making. In Kenya, public participation in the EIAs for development projects is required by the Environmental Management and Coordination Act of 1999 (EMCA) and the Environmental Impact Assessment and Audit Regulations

(EIAAR) No.56 of 2003 and further backed by the various provisions of the Constitution of Kenya, such as Article 232(1)(d) and (f) (Republic of Kenya 2000; Republic of Kenya 2003; Republic of Kenya 2010). These provisions are meant to ensure that development projects gain public support for successful implementation (Omenge *et al.* 2020). The SGR and LAPSSET corridor projects attempted to include public participation during the EIA and Strategic Environmental Assessment (SEA) processes (Africa Waste and Environment Management Centre 2012, Habitat Planners 2016, REPCON Associates 2017). Nevertheless, projects faced controversy and antagonism during their implementation (e.g. Kamau 2015; Wasuna 2016; Rajab 2017; Wafula 2018). This calls into question the effective use of the available EIA guidelines and the process as they relate to public involvement. This paper explores the recommended EIA process and its implementation in practice within the SGR and LAPSSET corridors in Kenya.

11.2 The SGR and LAPSSET corridors

The construction of the SGR began in 2014 in three phases. The operation of phase I began in 2017, phase II in 2019, while phase III is still under construction. The two completed phases of the SGR cover a total of 610km, connecting the coastal town of Mombasa through Nairobi to Naivasha Industrial Park in Enoosupukia (Fig. 11.1 1). The major stakeholders are government agencies, local communities, civil society organizations, private sector, county and local administration, services and utility providers and political leadership. The project was funded through a 90 per cent loan from the Exim Bank of China and 10 per cent from the Kenyan government (Kithinji 2016). The prime contractor on the railway was the China Road and Bridge Corporation (Development Corridors Partnership Kenya 2019).

The LAPSSET is ambitious. It comprises seven key infrastructure projects including: a new 32-berth port at Lamu (Kenya); interregional highways from Lamu to Isiolo, Isiolo to Juba (South Sudan), Isiolo to Addis Ababa (Ethiopia), and Lamu to Garsen (Kenya); a crude oil pipeline from Lamu to Isiolo, Isiolo to Juba; a product oil pipeline from Lamu to Isiolo, Isiolo to Addis Ababa; interregional SGR lines from Lamu to Isiolo, Isiolo to Juba, Isiolo to Addis Ababa, and Nairobi to Isiolo; three International Airports, one each at Lamu, Isiolo, and Lake Turkana; three tourist resort cities, one each at Lamu, Isiolo and Lake Turkana; and the multipurpose High Grand Falls Dam along the Tana River (LAPSSET Corridor Development Authority 2016; Development Corridors Partnership Kenya 2019). Unlike the SGR, the timing for construction and operation of these components has been varied. For instance, the Lamu Port construction was launched on 2 March 2012 and is still ongoing, whereas an airport in Isiolo is already complete. Similarly, the road that links Isiolo to Moyale on the Ethiopian border was completed in 2016 (LAPSSET Corridor Development Authority 2016).

11.3 The environmental and social contexts

The SGR and LAPSSET corridor projects have been lauded, with promises of social and economic benefits, including regional integration (Browne 2015, Kithinji 2016). However, the two projects traverse a vast region of great physical, sociocultural and economic diversity, and run through or near sites renowned for their cultural and/or natural heritage, such as the Lamu Archipelago, Marsabit, Tsavo and Nairobi National Parks (Habitat Planners

2016, REPCON Associates 2017). From the onset, social evidence has pointed to exclusion rather than inclusion of rural producers and their communities within these regions. For example, some early evidence from the pastoral communities along the LAPSSET corridor suggests that the LAPSSET enhanced pastoralists' livelihoods and well-being through quicker and more affordable access to the livestock markets (Letai and Tiampati 2013, Onditi 2018). However, the corridor also created new socio-political challenges for pastoralists such as exclusions from the consultation during planning phases, inadequate, inconsistent or no compensations for land acquisition and gender insensitive employment opportunities (Guguyu 2015, Ngala 2020). Furthermore, the development of the SGR and LAPSSET corridors led to the displacement of people and institutions and loss of property to create room for their construction (Letai and Tiampati 2013, Ngala 2020). On the other hand, these projects have been linked to escalation in natural resource conflicts, especially between pastoralists, dryland farmers and fishermen (Laher 2011). There is a growing concern that the construction of the SGR and the LAPSSET and associated projects will lead to environmental impacts including damage to water infrastructure and ecosystem services such as grazing land and wildlife habitats through fragmentation of rangelands (Laurance et al. 2015, Obrein 2016, Lala et al. 2021, Nyumba et al. 2021).

Image credits: Rob Marchant

11.4 The Environmental Impact Assessment framework

The government of Kenya formally introduced the EIA in 2000 under the EMCA (1999, amended in 2015) in response to growing concerns and demand from donor agencies for the integration of environmental concerns in economic development to foster sustainable development (Modak and Biswas 1999, Republic of Kenya 2000, Government of Kenya 2015). Prior to the EIA legislation, sectoral policies and laws, and international guidelines and procedures formed the basis for Kenya's EIA processes (Horberry 1985; Kameri-Mbote 2000; Angwenyi 2004). The enactment of the EMCA 1999 and associated regulations firmly grounded the EIA process within environmental management activities in Kenya, including the creation of the National Environment Management Authority (NEMA) to regulate and enforce environmental compliance and the coordination and implementation of the EIA guidelines (Republic of Kenya 2000). In addition to EMCA and the EIAAR, subsequent legislation and regulations have been passed to address emerging issues, and further guide the EIA process, such as waste management, water quality, conservation of biological diversity, fossil fuel emission control, wetlands, riverbanks, lakeshores and seashore management, and noise and excessive vibration pollution (Mwenda and Kibutu 2012, p. 86).

Sections 58 and 59 of EMCA 1999 provide for EIA including inter alia obligations of the project proponent to undertake at his/her own expense an EIA and preparation of an environmental impact report (EIR). The operationalization of the EMCA 1999 is based on a set of EIA guidelines and administrative procedures designed to protect both the social and environmental systems. The provisions prohibit the proponent from implementing a project that is likely to have a negative environmental and social impact, or for which an EIA is required (as determined through a screening process) under the Act or regulations, unless an EIA process (summarized in an EIR) has been concluded and approved. Of importance to this study is that the EIA process must include the participation of communities, state and non-state actors, and demand accountability from project proponents on the assessment and management of the impacts of their proposed projects.

11.5 The EIA process

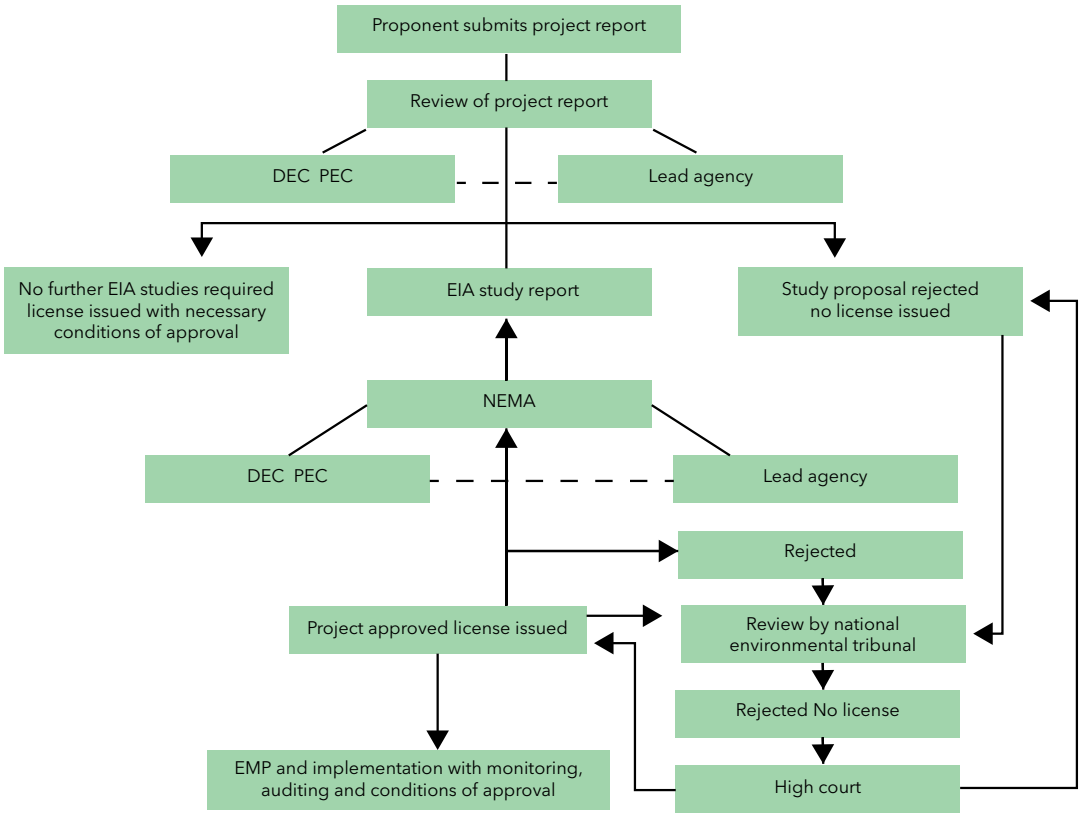
The EMCA 1999 defines EIA as a "systematic examination conducted to determine whether or not a programme, activity or project will have any adverse impacts on the environment" (Republic of Kenya 2000, p. 56). Subsequently, the Second Schedule of the Act identifies projects that must undergo an EIA including general projects that are likely to have significant negative impacts and may result in major changes in land use such as: urban development; transportation; projects on dams, rivers and water resources; aerial spraying; and mining, including quarrying and open-cast extraction (metals, stones, ores, coal, limestone, stone, sand, clay, petroleum, alluvial gold). Others are: forestry-related activities; agriculture; processing and manufacturing industries; electrical infrastructure; management of hydrocarbons; waste disposal; natural conservation areas; nuclear reactors; and major development in biotechnology (including the introduction and testing of genetically modified organisms) (Republic of Kenya 2000, p. 172-174). The EIA should be undertaken in the early stages of project planning and design to shape development

in a manner that safeguards local social and environmental systems based on the recognition that natural resources are finite and incapable of absorbing the unchecked demands of modern society.

Kenya's recommended EIA process is consistent with international best practice, incorporating screening, scoping, assessment and review stages (André *et al*. 2006; Omenge *et al*. 2020). The EIA process is accomplished in two main phases: initial environmental examination (IEE), and the environmental impact studies (EIS) or detailed EIA. The IEE is an important phase for an initial determination of the occurrence and significance of potentially adverse environmental impacts of a proposed project and whether they can be avoided, or simple mitigation measures can be implemented to address them. Relying on readily available information, the IEE is considered the prefeasibility phase of project planning and gives an indication as to whether a detailed study is needed. Despite the seemingly simple nature of the process, the IEE must be undertaken by a qualified and licensed expert, as described in Sections 42 and 44 of the EMCA 1999 (Republic of Kenya 2000). Where the outcome of the IEE determines that a detailed study is needed and, if necessary, then the second phase of EIS begins.

A detailed EIA to examine the environmental and social impacts of a proposed development project and to ensure that these are taken into account in project design should follow. These impacts can manifest in social, economic and ecological systems and, therefore, the EIS must adopt a multidisciplinary approach and should be done very early, at the feasibility stage of a project. The EIS consists of a series of phases from screening to monitoring, as shown in Fig. 11.2. The EIA guidelines provide for public participation, but this seems to be limited in practice to selected affected parties only and, consequently, this limits the opportunities for non-directly affected but interested parties from influencing decision-making.

Figure 11.2 Generalized EIA process



Source: [Adapted from] Republic of Kenya (2000).

In 2011, the Kenyan government developed the national SEA guidelines to address, inter alia, cumulative, synergistic, secondary and long-term impacts of policies, plans and programmes (National Environment Management Authority 2011). The SEA guidelines are based on an adaptation of the steps that are characteristic of the EIA extending the aims and principles of EIA upstream in the decision-making process (Mutia 2019) (i.e. an impact-centred approach to SEA; see Introduction). To align with international best practice, Kenya's SEA guidelines and procedures have been adapted from the International Association for Impact Assessment (IAIA) and involve four stages that are subdivided into steps/tasks. These are: establishing the context for the SEA; implementing the SEA; informing and influencing decision-making; and monitoring and evaluation (National Environment Management Authority 2011). Like the EIA, SEA should be a participatory process that involves all relevant stakeholders contributing inputs to strategic decision-making.

11.6 EIA and development projects

As discussed earlier, the EMCA 1999 outlines various projects that must undergo a comprehensive EIA before implementation. For such projects, the Act requires that the project proponent or its delegated agent publicize information on the EIA and solicit opinions from relevant experts and the affected members of the public over the course of the project feasibility study, the results of which are submitted for administrative approval. The Kenyan government has reported tremendous progress in the implementation of EIA for development projects, including disclosing information and addressing the public's concerns. However, our research suggests that the voices of the public in the planning, design, construction and operation of public projects have been largely ignored. Numerous instances where ecological and environmental costs absorbed by citizens directly affected by the projects have been overridden by the desire for economic development and political will have been reported (Wafula 2018). Consequently, some negatively affected citizens and interested parties have mobilized opposition to make their voices heard (e.g. Kamau 2015; Wasuna 2016; Rajab 2017).

Kenya has seen rapid growth and extensive investment in megaprojects, particularly within the LAPSSET and SGR corridors, to boost the economy. The LAPSSET and SGR projects have undertaken SEAs and EIAs, respectively, and it is expected that any additional projects within these corridors will undertake the same. In this context, it is important to encourage public participation to increase environmental and social transparency and accountability in their design, planning and implementation. According to the World Bank (2006), public engagement is critical to projects' success and sustainability. Documented evidence suggests that completed projects within the corridors did undertake EIAs, and particularly engaged the public and experts in the process (e.g. Habitat Planners 2016; REPCON Associates 2017). However, given the geographical extent and complexity of these corridor projects, public participation alone is not sufficient. Instead, there is a need for a deep transformation of cultural norms to ensure the public themselves, the government and EIA consultants appreciate the meaning and value of public participation.

Kenya, like other developing countries, has not developed effective mechanisms for public engagement and traditionally excludes the general public in project decision-making (Ronoh *et al*. 2018; Mbithi and Juma 2019). Nevertheless, the country is among the few African countries with a vibrant civil society that has managed to overcome resistance by the government that considers public participation a hindrance to development. Over the years, civil society has managed to mobilize local communities to demand accountability over development projects including the SGR and LAPSSET corridor projects (Kameri-Mbote 2000). Furthermore, the country's new constitution has increased public participation in various forums, including social, economic and environmental planning and decision-making through devolved governance units: the county governments (Republic of Kenya 2010). Although Kenya through the EMCA 1999 has outlined principles and guidelines for public participation in the EIA process, experiences have shown that attitudes towards, and capacity for, effective public participation cannot be achieved naturally and spontaneously through regulatory arrangements (Mitchell 2005). Factors such as entrenched cultural norms, political and ethnic interests, and financial and investment considerations play a major role in shaping such participation.

11.7 The study

Although the SGR and the LAPSSET corridors are expected to bring in numerous benefits and growth to Kenya, and indeed to the East African region, they are aligned within critical ecological and human systems with consequential environmental and social problems, requiring early identification and mitigation through the EIA process (Browne 2015; Onditi 2018; Development Corridors Partnership Kenya 2019). The evidence so far indicates that environmental impact identification and mitigation studies were conducted, but it is not clear if the processes followed the laid down guidelines with a particular emphasis on public participation. Given this context, the two corridors provide an opportunity to examine the application of EIA principles and guidelines to a large infrastructure project. This paper explores the recommended EIA process and its implementation in practice within the SGR and LAPSSET corridors in Kenya.

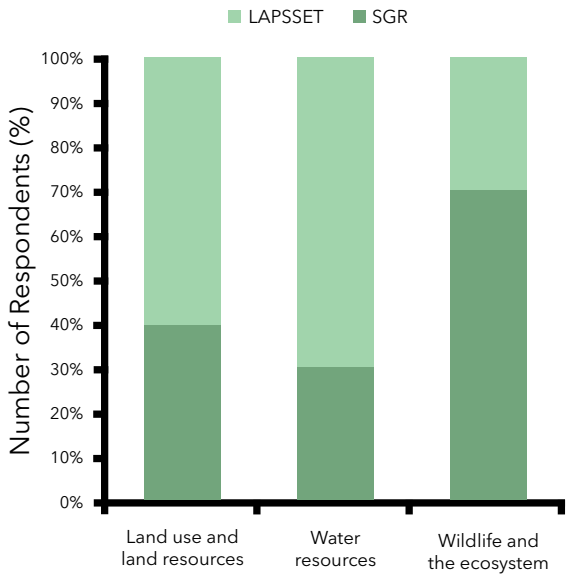
This study utilized critical-comparative document review of the EIA reports for the two phases of the SGR and the SEA for LAPSSET corridor projects (Africa Waste and Environment Management Centre 2012; Habitat Planners 2016; REPCON Associates 2017). Focusing on the public participation component of the processes, we reviewed the implementation process and compared the

process with the international best practices (Partidário 2003; André et al. 2006; Omenge et al. 2020) and the approved EMCA 1999 guidelines (Republic of Kenya 2000, National Environment Management Authority 2011). Furthermore, we conducted (qualitative and quantitative) interviews with local communities and experts in Nairobi, Suswa/Narok and Isiolo along the two corridors. The data were transferred to Statistical Package for Social Sciences (SPSS) PC version 23.0 software (IBM Corp 2013) for further statistical analysis.

11.8 Issues identified

Although we delineated our sampling within the 10km buffer of both corridors, the majority of respondents lived within 4.4±2.8km of the corridor alignment. Nearly half of the respondents from both corridors felt the projects had impacted negatively on land use and land resources in their communities. In particular, respondents along the LAPSSET corridor felt that water resources were the most impacted compared with those along the SGR, who felt that wildlife and ecosystems were the most affected (Fig. 11.3). Our study along the LAPSSET corridor focused on communities within Isiolo County. Isiolo is an arid and semi-arid landscape dominated by livestock production and small-holder irrigated and rain-fed farming and hence water resources are of major concern to the local communities, for domestic, livestock and irrigation purposes. On the contrary, communities along the SGR corridor are predominantly dependent on wildlife conservation activities and tourism, which depends largely on habitat quality and ecosystem services. Furthermore, the SGR traversed key wildlife conservation areas (Tsavo West, Tsavo East and Nairobi national parks, and Ngong forests, community conservancies) and drew a lot of attention during the construction, on its ecological impacts. These observations can be further reinforced by the findings of a recent preliminary study by Nyumba *et al.* (2021) along the two corridors.

Figure 11. 3 Impacts of the corridors



Other studies have established that citizens' capacity to participate in public projects under the EIA frameworks determines whether public participation can generate positive and desired results, including the identification of potential environmental impacts, collection of meaningful information, impact mitigation implementation and monitoring (Wood 2003; Doelle and Sinclair 2006; Chi, Xu and Xue 2014). In this study, the persistence of negative environmental impacts that should have otherwise been identified and avoided or mitigated during the EIA process points to challenges with the EIA process, as discussed in the subsequent sections.

11.9 Comparative EIA public participation process analysis

Here, we provide a comparison of the EIA processes and the recommended guidelines (see summary in Table 11.1 and a detailed account in Annex 2). In general, the EIA process for the SGR project aligned well with various guidelines, such as the explanation of the project and its effects. For example, in most of the meetings, all the EIA reports acknowledge that "the consultant and proponent explained that the proposed development would involve the construction of [the Standard Gauge Railway line from Mombasa to Nairobi], to be used by high-speed trains." In addition, the consultants were articulate in their approach to impact identification and mitigation as reported in the documents, for example, "the purpose [for the interviews] was to identify the potential positive and negative impacts and subsequently promote proposals on the best practices to be adopted and mitigate the negative impacts respectively […] in identifying any other miscellaneous issues which may bring conflicts in case project implementation proceeds as planned".

Image credits: Rob Marchant

The analysis further indicates that, under critical circumstances, the project proponents and consultants did not provide for meaningful participation and engagement of all stakeholders. For example, whereas the international best practice and the EMCA 1999 calls on the proponents to ensure the process is "well-planned and focused on negotiable issues, provides support to participants through, for example, adequate diffusion of information on the proposal and on the public participation process, equitable access to funding or financial assistance, and capacity-building, facilitation and assistance to groups who don't have the capacity to participate", evidence from the EIA process shows that information on proposed projects was only available at the website of the environmental agency (NEMA) and relevant proponent archives, whereas the diffusion of information on public participation process was limited to what was provided during the EIA

meetings and there was no provision for funding support to enable all interested parties to satisfactorily participate in the EIA process. This perpetuates the notion of "the quicker we can come to a decision, the quicker we can get on and solve the problem" and hence the adoption of the decide-announce-defend (DAD) approach, which is characterized by the involvement of fewer more powerful people, use of professional expertise to come up with clever solutions, hierarchy and power structures to ensure decisions get made, and orders are followed, regardless of opposition (Walker 2009).

Evidence suggests that for complex projects, engagement with a wide range of stakeholders and enabling them to deliberate together leads to smoother, more widely supported and faster implementation of such projects. Thus, the engage-deliberate-decide (EDD) approach is promoted (Walker 2009). Wood (2003) and Bull, Petts and Evans (2010) identify lack of knowledge regarding both EIA and the nature of public projects, limited access to information, unequal opportunity to participate, lack of time and resources to organize public participation, and remoteness and lack of communication infrastructure as the major individual and institutional barriers to meaningful public participation. Our findings point to similar barriers for the Kenyan EIA processes.

The process needed to be adapted to the social organization of the impacted communities, including cultural, social, economic and political dimensions. Our analysis shows that the EIA process for the SGR largely ignored the local contexts of the impacted people as the proponents already decided and only communicated this without considerations on the local community's capacity and ability to participate. In contrast, there is some evidence that the SEA for the LAPSSET considered the local context through participatory approaches, such as focus group discussions. The report expressly states that culturally sensitive issues were discussed with specific communities (religious, gender, occupation) to ensure maximum disclosure. For example, "the Turkana community at Kapendo observed that they rely on advice from leaders in the traditional faith system whose operating bases are shrines. Each age set also has their different shrines which, together with communal burial grounds should be isolated from LAPSSET activities".

Finally, our analysis indicates that, despite the attempt by the proponents to ensure credibility and rigour in their work, as outlined in the best practice and "EMCA 1999 recommendations", thus: adherence to established ethics, professional behaviour and moral obligations and facilitation by a neutral facilitator, there is no evidence that the public meetings and interviews were led by neutral facilities as they were all led by a "Lead EIA Expert" and "NEMA official". Furthermore, there are no indications to whether the expert mix included those from "inter- or trans- or multidisciplinary backgrounds". This has far-reaching implications for the quality of information obtained, deliberative engagement with the local communities and participation in the implementation and monitoring (e.g. Wood 2003; Doelle and Sinclair 2006; Bull, Petts and Evans 2010; Chi, Xu and Xue 2014). It is our observation that when the process is not aligned with the recommendations, negative public sentiments, perceptions and attitudes may arise, with serious implications for the acceptance and support of the project (Kameri-Mbote 2000; Wood 2003; Omenge *et al.* 2020).

Table 11.1 Public participation practice during the EIA/SEA process in Kenya's development corridor projects

Recommended procedures		SGR		LAPSSET
International Best Practice (André et al. 2006 and adapted from Omenge et al. 2020)	**EMCA 1999**	**SGR-I: Mombasa to Nairobi Consultant: Africa Waste and Environment Management Centre**	**SGR-II: Nairobi to Narok (Suswa) Consultant: HABITAT PLANNERS**	**LAPSSET Consultant: REPCON Associates**
Initiated early and sustained	Undertaken mainly during project planning, in implementation and decommissioning phases	Stage of public involvement is not explicitly stated but falls within the prefeasibility and feasibility stages	Stage of public involvement is not explicitly stated but falls within the prefeasibility and feasibility stages	Stage of public involvement is explicitly stated, detailing approaches in all the SEA stages
Well planned and focused on negotiable issues	Involve the affected persons, lead agencies, the private sector, among others	Focused on methods of stakeholder engagement; (recruitment, invitation and facilitation): explaining the project and its effects	Focused on methods of stakeholder engagement; (recruitment, invitation and facilitation): explaining the project and its effects	Process focused on rights and resource user groups; disclosure and impact identification mitigation approaches. Engagement was iterative and comprehensive
Supportive to participants: adequate diffusion of information on the proposal and the public participation process	Ensure effective distribution of the relevant project information to the affected persons to mitigate against unnecessary delays in decision-making and project implementation	Little or no information available or accessible; little or no funding for interested parties to satisfactorily participate in the EIA process	Little or no information available or accessible; little or no funding for interested parties to satisfactorily participate in the EIA process	Little or no information available or accessible; little or no funding for interested parties to satisfactorily participate in the process
Tiered and optimized in time and space to ensure more willing participation	Undertaken mainly during project planning, in implementation and decommissioning phases and through appropriate methodologies	Prefeasibility and feasibility stages through public meetings and expert consultations. Different parties engaged variously depending on the level of information and input required	Prefeasibility and feasibility stages through public meetings and expert consultations. Different parties engaged variously depending on the level of information and input required	Public meetings/ hearings before EIA report is compiled; comments received once the EIA report has been compiled; Public invited by notices, posters and radio announcement
Open and transparent	Ensure effective distribution of the relevant project information to the affected persons to mitigate against unnecessary delays in decision-making and project implementation	Facilitation to participate; participant lists availed and report compiled, but only in English (available at NEMA, website, print and electronic media)	Facilitation to participate; participant lists availed and report compiled, but only in English (available at NEMA, website, print and electronic media)	Accountability through signed attendance and interview lists; report compiled and made available for public scrutiny; the document is available in English language only; facilitation dependent on the budgets

Context oriented: adapted to the social organization of the impacted communities	Involve the affected persons, lead agencies, the private sector, among others	Local contexts of the impacted people were mostly ignored; no considerations on the capacity and ability to participate	Local contexts of the impacted people were mostly ignored; no considerations on the capacity and ability to participate	Local contexts critically considered; culturally sensitive issues discussed with specific communities
Credible and rigorous: adhere to established ethics, professional behaviour and moral obligations	Utilize a range of methodologies to engage the affected persons, lead agencies, private sector, among others	The public meeting and interviews led by Lead EIA Expert and NEMA official; no explanations on the expert mix	The public meeting and interviews led by Lead EIA Expert and NEMA official; no explanations on the expert mix	The public meeting and interviews led by lead EIA expert and NEMA official; no explanations on the expert mix

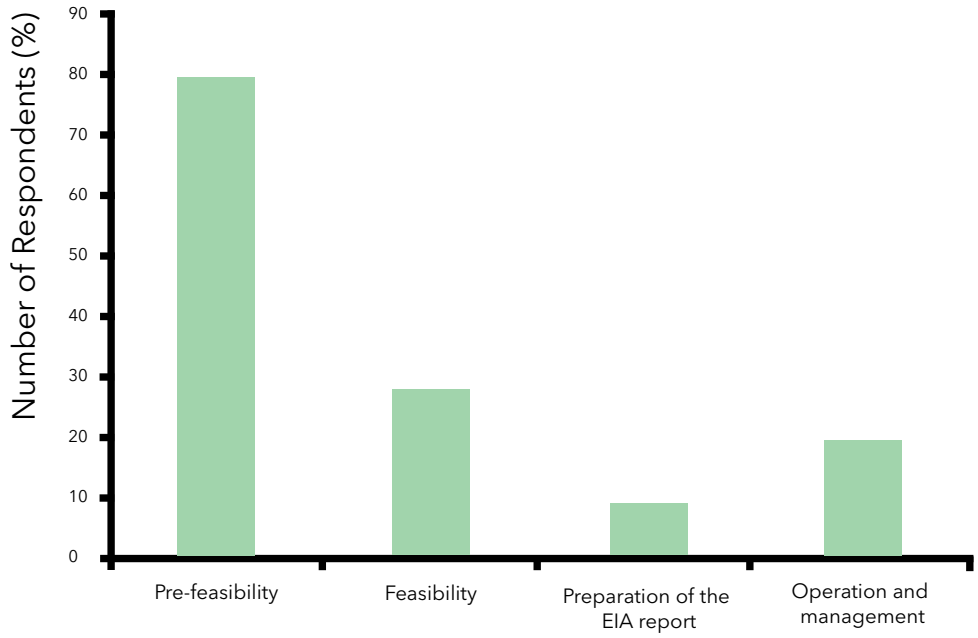
11.10 Stakeholder participation in the EIA for the corridor projects

Participation in different forms of public opinion or consultation processes among the respondents was of a major concern in both corridors. Locals expressed a lack of participation and/or involvement in any form of public consultations and meetings around the LAPSSET and SGR corridor projects. Such experiences might lead to feelings of lack of adequate public involvement, reinforced by the failure of the project proponents and other agencies to report back their findings to the public, as expressed in Table 11.2. These feelings are further exacerbated by the project proponents' skewed involvement of the locals in the EIA process. Within the two corridors, it was evident that, on the few occasions where locals were involved, they were heavily consulted during the prefeasibility stage, and just slightly during the rest of the stages (Fig. 11.4).

Table 11.2 Response to statements about EIA/SEA

	SGR		LAPSSET	
	Yes	**No**	**Yes**	**No**
1. Have you or any other household member participated in any form of public opinion or consultation process in your community?	25.3(152)	74.7(449)	22.1(80)	77.9(282)
2. Have you heard of any EIA meetings on development corridor project(s) identified in earlier, in your community?	13.6(83)	86.4(528)	14.1(51)	85.9(311)
3. Over the past five years, have you attended any EIA or planning meetings concerning the development corridor project(s) identified earlier in your community?	6.5(40)	96.6(590)	6.1(22)	93.9(340)
4. Do you think the general public was adequately involved/represented in the meetings?	12.1(69)	87.9(502)	8.0(29)	92.0(333)
5. Were the results of the public input into the EIA process ever reported back to the public?	3.4(21)	96.6(590)	2.0(7)	98.0(355)

Figure 11.4 Public involvement in the EIA/SEA process



11.11 Determinants of stakeholder participation in EIA

We used generalized linear models in SPSS to explore a range of factors that determine participation in the EIA process. For this study, continuous explanatory variables included age and distance between the respondent's homestead or property and the corridor alignment, whereas categorical explanatory variables included gender, education level of the respondent and length of residency in the study area. The results of the analysis showed that having no education and primary level education significantly predicted participation, while secondary level education marginally predicted participation. Meanwhile, those who lived far from the corridor alignment were more inclined to participate in the EIA process. In terms of length of residency, recent migrants (<10 years) and those who had stayed between 11 and 20 years in the area were more inclined to participate. Other variables, in particular, gender, age and long-term residency did not appear to influence participation in the EIA of the corridor projects (Table 11.3).

Table 11.3 Generalized linear model results for participation in the EIA process

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test		
			Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	1.839	.0425	1.755	1.922	1875.551	1	**.000**
Gender = male	-.012	.0160	-.043	.019	.570	1	.450
Education level (none)	.087	.0295	.029	.144	8.576	1	**.003**
Education level (primary)	.073	.0236	.027	.119	9.583	1	**.002**
Education (secondary)	.044	.0230	-.001	.089	3.670	1	**.055**

Age of respondent	.000	.0006	-.002	.001	.534	1	.465
Distance from homestead	.006	.0029	4.354	.011	3.901	1	**.048**
Corridor purpose (yes)	.020	.0160	-.011	.052	1.601	1	.206
Residency (<10 years)	.062	.0223	.018	.105	7.641	1	**.006**
Residency (11-20 years)	.047	.0242	-.001	.094	3.735	1	**.053**
Residency (21-30 years)	.019	.0253	-.031	.068	.554	1	.457
(Scale)	.058	.0026	.053	.064			

11.12 Stakeholder attitudes towards the EIA for the corridors

Finally, we sought the opinion of residents on various statements about EIAs of the SGR and SEA for the LAPSSET corridor projects. Our results show that the majority of respondents along the LAPSSET corridor remained neutral on six out of the eight statements as they did not enough information to enable them to respond to the questions.

On the contrary, respondents along the SGR expressed negative and strong negative sentiments to four out of the eight statements and only remained neutral to four statements. Both sets of respondents felt that public participation did not play an important role in the EIA processes of the corridor projects and that not all interested parties were allowed to participate in the EIA process. Specifically, respondents from the SGR corridor expressed strong negative opinions on the assumptions that project developers identified interested parties, that their concerns and and values surrounded the proposed projects and that local people's use, value or dependence on natural resources were taken into account (see Table 11.4 for the full list of statements and responses).

Table 11.4 Response to statements about EIA/SEA

Statement		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. Public participation played an important role in the EIA processes of the development corridor projects	SGR	12.0(71)	11.8(70)	22.7(135)	28.6(170)	24.9(148)
	LAPSSET	16.9(61)	6.8(23)	23.1(78)	28.7(97)	23.4(79)
2. The project developers had clear goals with public involvement in the EIA process	SGR	13.9(82)	16.9(100)	37.9(224)	20.6(122)	10.7(63)
	LAPSSET	7.4(25)	7.4(25)	33.7(114)	31.1(105)	20.4(69)

3. Project developers identified interested parties, their concerns and values surrounding the proposed projects	SGR	9.9(60)	15.4(93)	15.9(96)	22.4(135)	36.4(220)
	LAPSSET	4.4(15)	10.9(37)	36.7(124)	27.8(94)	20.1(68)
4. All interested parties were given the opportunity to participate in the EIA process	SGR	11.0(66)	17.6(105)	21.7(130)	29.9(179)	19.7(118)
	LAPSSET	6.5(22)	13.9(47)	29.3(99)	29.6(100)	20.7(70)
5. Gathering of scientific knowledge about the development projects and affected areas was the most important thing in the EIA process	SGR	4.7(28)	14.4(86)	47.9(286)	25.0(149)	8.0(48)
	LAPSSET	11.5(39)	16.0(54)	37.3(126)	20.4(69)	14.8(50)
6. Givers of opinion (opinion leaders) had much influence in the EIA process	SGR	13.5(80)	27.1(160)	36.9(218)	11.3(67)	11.2(66)
	LAPSSET	7.4(25)	20.1(68)	35.5(120)	21.0(71)	16.0(54)
7. Offers given by the project developers to participate were genuine	SGR	10.5(63)	22.2(133)	34.2(205)	19.0(114)	14.2(85)
	LAPSSET	3.6(12)	13.3(45)	49.4(167)	16.0(54)	17.8(60)
8. Local people's use, value or dependence on natural resources were taken into account	SGR	12.5(75)	14.0(84)	16.0(96)	25.7(154)	31.7(190)
	LAPSSET	3.6(12)	16.9(61)	28.5(103)	24.9(84)	22.8(77)

11.13 Conclusion and recommendations

This study has unpacked the issue of the environmental assessment processes and public engagement in the context of development corridor projects in Kenya. These projects should be subject to the EIA and SEA processes as recommended by law (Republic of Kenya 2003; National Environment Management Authority 2011). The current forms of public participation in the EIA and SEA processes in Kenya have been used for close to two decades and there is little doubt that these approaches have contributed to improving public awareness and participation on matters about the environment. However, this study shows mixed outcomes in the delivery of the EIA and SEA processes in relation to the international best practices and national guidelines in effective public engagement.

Whereas efforts were made to convene public meetings and consult stakeholders, questions can still be asked about the participants' limited capacity, facilitation, selection process and contextualization and design of the EIAs. The EIA for the SGR largely failed to adhere to the recommendations whereas the SEA for the LAPSSET followed the recommendations to a greater extent. However, this has not had a broader positive influence on public perceptions and hence lack of public confidence, effective participation and little or inappropriate measures to mitigate both social and environmental impacts associated with the development corridors. This is not surprising, since the EIA Act in Kenya places responsibility on the project proponents to "undertake or cause to be undertaken at his own expense an

Environmental Impact Assessment study and prepare a report thereof prior to the implementation of the project" (Republic of Kenya 2000). Subsequently, proponents avoided delays and additional costs and hence the process suffered from lack of funding, leading to corruption and a misunderstanding by society-at-large of the benefits of the EIAs.

The fact that the EIA/SEA processes failed to align with most of the international best practice and the national guidelines demonstrate a clear lack of oversight by the regulators and the public, and the undue influence of the project proponents with a direct interest in the outcome of the process on the EIA/SEA consultants. As alluded to by most of the respondents in this study, public participation alone is not sufficient. Instead, there is a need for a deep transformation of cultural norms to ensure the public themselves, the government and EIA consultants appreciate the meaning and value of public participation. A system of education and dissemination of information must be implemented, with the ultimate goal being the construction of a social consensus. Fortunately, the study has observed that the majority of residents within these corridors have some level of education and that education is one of the key determinants of public participation in the process. This demography is more capable of using information technology in acquiring information and communicating with the wider society.

Finally, the authorities should reconsider centralizing the funding for the EIA/SEA process away from the project proponents to effectively reduce the influence of the project proponents on the process. Consideration should be given to a different model, where the proponent underwrites the cost for the EIA but the amount is deposited with the regulatory agency, which independently engages a certified EIA expert to undertake the assessment according to best international guidelines. This will allow for more objective oversight by NEMA. This will ensure that adequate funds are made available to facilitate stakeholder facilitation, including capacity-building, transparency and stakeholder engagement. Project proponents need to demonstrates a credible commitment to public participation in the EIA/SEA processes to build public confidence in the process, provide a sense of importance and the perception of the efficacy of the processes, and motivate active participation and collective impact identification and monitoring. This will require a review of the public engagement approaches that build on new trans- and interdisciplinary techniques and international best practices.

Image credits: Rob Marchant

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Annex 1 Sociodemographic characteristics of respondents

Sociodemographic characteristic		SGR (N=611) %(No)	LAPSSET (N=362) %(No)
Age	18-25	11.1 (68)	14.4(52)
	26-35	29.8 (182)	28.7(104)
	36-45	24.2 (148)	26.5(96)
	46-55	17.0 (104)	14.6(53)
	56-65	9.3 (57)	8.6(31)
	66-75	5.1 (31)	5.8(21)
	76 >	3.4(21)	1.4(5)
Gender	Male	49.6(303)	42.3(153)
	Female	50.4(308)	57.7(209)
Education	None	14.1(86)	18.5(67)
	Primary	29.3(179)	40.3(146)
	Secondary	37.6(230)	26.8(97)
	Tertiary	19.0(116)	14.4(52)
Main occupation	Business person	29.6(181)	48.0(174)
	Civil servant	2.6(16)	4.7(17)
	Farmer	47.3(289)	19.1(69)
	Other	15.1(92)	23.8(86)
	Teacher	5.4(33)	4.4(16)
How long have you lived here?	<10 years	32.6(199)	28.7(104)
	11-20 years	19.0(116)	21.3(72)
	21-30 years	13.4(82)	20.4(69)
	> 31 years	32.7(200)	27.5(93)
Do you live here most of the time?	Yes	97.7(597)	93.4(338)
	No	2.3(14)	6.6(24)
What is the size of your land (in Acres)?	<1	43.5(266)	61.3(222)
	1-2	25.9(158)	30.1(109)
	3-4	7.7(47)	5.5(20)
	5-10	10.6(65)	1.9(7)
	10>	12.3(75)	1.1(4)

Annex 2 Public participation practice during the EIA process in Kenya's development corridor projects

Recommended procedures		Development corridor project		
International Best Practice (André et al. 2006 and adapted from Omenge et al. 2020)	**EMCA 1999**	**SGR-I: Mombasa to Nairobi Consultant: Africa Waste and Environment Management Centre**	**SGR-II: Nairobi to Narok (Suswa) Consultant: HABITAT Planners**	**LAPSSET Consultant: REPCON Associates**
Initiated early and sustained: (i) Public to be involved before major decisions are made (ii) Public to be involved regularly in the EIA process	Public participation should be undertaken mainly during project planning, in implementation and decommissioning phases (i) Prefeasibility (ii) Feasibility (iii) Detailed survey design (iv) Construction and operation	Stage of public involvement is not explicitly stated but falls within the prefeasibility and feasibility stages through: (i) key informant interviews and discussion (N=217)*; (ii) one technical consultative forums and dialogue meetings (N=14); and (iv) eight public consultation meetings (PMCs) (N=944).	Stage of public involvement is not explicitly stated but falls within the prefeasibility and feasibility stages through: (i) 13 key informant interviews and discussion (N=940); (ii) two technical consultative forums and dialogue meetings (N=96); and (iv) 12 public consultation meetings (PMCs) (N=1333).	The public is involved at scoping and detailed EIA stages: (i) 17 key informant interviews and discussion (N=17); (ii) 27 public consultation meetings (PMCs) (N=1846); (iii) two focus group discussions (N=10)
Well planned and focused on negotiable issues: (i) All impact assessment stakeholders should know the aims, rules, organization, procedure and expected outcomes of the public participation process undertaken (ii) Emphasize understanding and respect for the values and interests of participants	It should involve the affected persons, lead agencies, the private sector, among others.	(i) Process focused on methods of stakeholder engagement; (recruitment, invitation and facilitation): "In general, the entire consultation process mapped out institutions and individuals interested in the process; compiled a database of the interested and affected parties and administered the relevant data collection tools" (ii) Focused on explaining the project and its effects: "the consultant and proponent explained that the proposed development would involve the construction of a Standard Gauge Railway line from Mombasa to Nairobi, to be used by high-speed trains". (DAD[A] versus EDD)	(i) Process focused on methods of stakeholder engagement; (recruitment, invitation and facilitation) (ii) Focused on explaining the project and its effects: "After the proponent [KRC] gave the history of Kenya Railways and the background, description of SGR project [including a map of the route] and the envisaged benefits of the project to the meeting, participants raised the following concerns and issues" (DAD[A] versus EDD)[77]	(i) Process focused on methods of stakeholder engagement; (recruitment, invitation and facilitation): "Fundamental Right Holders (FRH) to strategic resources" and "Legal Mandate Holders (LMH)" within target jurisdiction. (ii) Focused on explaining the project and its effects: "As a basis for discussion, each meeting started with a brief explanation/ disclosure of the EIA Mission and an overview of LAPSSET.... they [public] were invited to give comments on their specific mandates/interests and how they were likely to interface with the proposed development." (DAD[A] versus EDD)

77 Decide, announce and defend (abandon) versus engage, deliberate and decide (Walker 2009)

(iii) Focus on negotiable issues relevant to decision-making		(iii) Focused on impact identification and mitigation approaches: "The purpose [for the interviews] was to identify the potential positive and negative impacts and subsequently promote proposals on the best practices to be adopted and mitigate the negative impacts respectively". In addition, it focused on "identifying any other miscellaneous issues which may bring conflicts in case project implementation proceeds as planned".	(iii) Focused on impact identification and mitigation approaches: "The purpose [for the interviews] was to identify the potential positive and negative impacts and subsequently recommend the best practices to be adopted to mitigate the negative impacts while optimizing the positive impacts".	(iii) Focused on impact identification and mitigation approaches: "Iterative consultations have been carried out during the study in order to identify priority issues that require in-depth analysis". "and exploring means of continuously improving beneficial environmental and social effects associated with the implementation of the project"
Supportive to participants: (i) Adequate diffusion of information on the proposal and the public participation process (ii) Equitable access to funding or financial assistance (iii) Capacity-building, facilitation and assistance to groups who don't have the capacity to participate	It is the responsibility of the project proponent to adequately ensure effective distribution of the relevant project information to the affected persons to mitigate against unnecessary delays in decision-making and project implementation.	(i) Information on the proposed SGR project is only available at the website of the environmental agency and relevant government departments and proponent archives. (ii) Diffusion of information on the public participation process is limited to what is provided during the EIA process (iii) There is no provision for funding support to enable all interested parties to satisfactorily participate in the EIA process	(i) Information on the proposed SGR project is only available at the website of the environmental agency and relevant government departments and proponent archives (ii) Diffusion of information on the public participation process is limited to what is provided during the EIA process (iii) There is no provision for funding support to enable all interested parties to satisfactorily participate in the EIA process	(i) Information on the proposed SGR project is only available at the website of the environmental agency and relevant government departments and proponent archives (ii) Diffusion of information on the public participation process is limited to what is provided during the EIA process (iii) There is no provision for funding support to enable all interested parties to satisfactorily participate in the EIA process

Tiered and optimized: (i) Public participation should occur at the most appropriate level of decision-making (ii) The public should be invited to participate regularly, with emphasis on the appropriate time for involvement (iii) Optimization in time and space to ensure more willing participation	(i) Public participation should be undertaken mainly during project planning, in implementation and decommissioning phases (ii) The methodology for public participation may include: meetings and technical workshops with affected communities; interpersonal contacts; Dialogue with user groups and local leaders; Questionnaire/ survey/interview; and participatory rural appraisal or rapid rural appraisal techniques	(i) The project engaged the public through public meetings and expert consultations before the EIA report was compiled Different parties were engaged variously depending on the level of information and input required (ii) Public participation was invited by notices, posters and radio announcement; local leaders mobilized for participation and selected participants to the meetings	(i) The project engaged the public through meetings and expert consultations before the EIA report was compiled Different parties were engaged variously, depending on the level of information and input required (ii) Public participation was invited by notices, posters and radio announcement; local leaders mobilized for participation and selected participants to the meetings	Public participated in public meetings before EIA report is compiled, in the public hearing and send comments once the EIA report has been compiled (ii) Public invited by notices, posters and radio announcement
Open and transparent: (i) Access to all relevant information by all stakeholders (ii) Provision of information and facilitation to ensure participation	It is the responsibility of the project proponent to adequately ensure effective distribution of the relevant project information to the affected persons to mitigate against unnecessary delays in decision making and project implementation	(i) Consultants accounted for the participants in the EIA process through signed attendance and interview lists (available at NEMA, website, print and electronic media) (ii) EIA report compiled and made available for public scrutiny; the document is available in English language only (iii) Proponents provided financial and other related facilitation for participants to take part in the EIA process; dependent on the available budgets	(i) Consultants accounted for the participants in the EIA process through signed attendance and interview lists (available at NEMA, website, print and electronic media) (ii) EIA report compiled and made available for public scrutiny; the document is available in English language only (iii) Proponents provided financial and other related facilitation for participants to take part in the EIA process; dependent on the available budgets	(i) Consultants accounted for the participants in the EIA process through signed attendance and interview lists (available at NEMA, website, print and electronic media) (ii) EIA report compiled and made available for public scrutiny; the document is available in English language only (iii) Proponents provided financial and other related facilitation for participants to take part in the EIA process; dependent on the available budgets

Context oriented: (i) Be adapted to the social organization of the impacted communities, including the cultural, social, economic and political dimensions	It should involve the affected persons, lead agencies and private sector, among others	Local contexts of the impacted people were mostly ignored as the proponents already decided and only communicate this; no considerations on the capacity and ability to participate (DAD versus EDD)	Local contexts of the impacted people were mostly ignored as the proponents already decided and only communicate this; no considerations on the capacity and ability to participate (DAD versus EDD)	(i) Local contexts of the impacted people seemed to have been critically considered (FGDs organization) (ii) Culturally sensitive issues were discussed with specific communities (religious, gender, occupation) to ensure maximum disclosure "The Turkana community at Kapendo observed that they rely on advice from leaders in the traditional faith system whose operating bases are shrines. Each age set also have their different shrines which, together with communal burial grounds should be isolated from LAPSSET activities"
Credible and rigorous: (i) Adhere to established ethics, professional behaviour and moral obligations (ii) Facilitation by a neutral facilitator	The methodology for Consultations and Public Participation (CPP) may include meetings and technical workshops with affected communities; interpersonal contacts; dialogue with user groups and local leaders; questionnaire/ survey/interview; and participatory rural appraisal or rapid rural appraisal (PRA/ RRA) techniques	The public meeting and interviews were led by lead EIA experts and NEMA officials; there were no explanations as to whether the expert mix included those from inter-, trans- or multidisciplinary backgrounds	The public meeting and interviews were led by lead EIA experts and NEMA official; there were no explanations as to whether the expert mix included and those from inter- or trans- multidisciplinary backgrounds	The public meeting and interviews were led by lead EIA expert and NEMA official; there are no explanations as to whether the expert mix included and those from inter- or trans- or multidisciplinary backgrounds

12

Exploring the Potential of Scenario Planning for More Effective Environmental Assessments: Standard Gauge Railway Development Corridor, Kenya

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ABSTRACT

In the last 30 years, participatory scenario planning has increasingly been recognized by environmental professionals and researchers as an important planning procedure with Strategic Environmental Assessments (SEAs) to chart plausible, pertinent, alternative futures. Key strengths arise from the fact that scenarios are created using a wide range of participants with different perspectives drawn from multiple sectors and combining dynamic environmental, social and economic trends. Yet scenario planning has rarely been used to assess the potential contribution of large infrastructure developments to achieving national development goals. Moreover, scenario planning is rarely applied in environmental assessments, even though these evaluate the future pros and cons of projects within broader strategies, ensuring they do not undermine sustainable futures. The aim of this paper is to explore the role of participatory scenario planning at the project level and how it can generate wider strategic choices about future alternatives in infrastructure development corridors. Using experiences from applying participatory scenario planning exercises in Kenya along the flagship standard gauge railway (SGR) project, we reviewed the extent to which Environmental Impact Assessments (EIAs) comprehensively identified the likely impacts, mitigation measures and highlight gaps in the process. We analysed the content of all the available EIAs we could access along the SGR phase I and II, specifically the routes from Mombasa to Nairobi, Nairobi to Naivasha, and areas comprising access roads and assigned for offshore sand dredging to supply concrete for the construction of railways, buildings and ports. We also analysed responses from civil society organizations. To contextualize these assessments and understand local perceptions of stakeholders from diverse sectors and the scale at which corridors are impacted, we ran six scenario workshops involving 155 participants, interviewed 110 key informants and had site visits in 2019. Our analysis shows that, generally, EIAs are applied in a reactive sense, while the quality of the

data quantifying impact and mitigation measures did not correspond to international best practice. Focusing on 20 key omissions, we argue that scenario planning and other futures techniques should be applied more widely in environmental assessments to understand people's perceptions of how SGR options would impact their futures. This offers effective and proactive insights about potential land use transformations, synergies and trade-offs, winners and losers. Such an approach may indicate one step in the direction of transforming transport corridors into resilient, futures-oriented development corridors, which are aligned with sustainability visions.

12.1 Introduction

Infrastructure corridors are rarely planned according to a long-term strategic vision of their role in potential sustainable futures or the contexts in which these can be achieved. They focus on their immediate key objectives. That is not to say that they are not often ambitious (and frequently prestigious) components of national development plans, but they are rarely subjected to sufficient scrutiny of how they will influence and be influenced by the broad and dynamic contexts in which they will exist over the long term. Instead, they have a narrow focus on the delivery of specific services. Beyond these primary objectives, projections of their potential role in the sustainable futures are given limited attention.

Procedures such as SEA can assist with this process and in reaching long-term goals – such as the Sustainable Development Goals (SDGs) – and help set universal development targets to which corridors can align (see Chapter 2). Within SEA processes, scenario planning serves as a tool that can provide a platform for public engagement in consideration of the role of corridor developments in alternative futures. It is, however, an underutilised tool (Hamilton *et al.* 2013). The strategic, governance and broader focus of scenario planning makes it a core part of an SEA processes assessing policy, plans and programmes.

However, EIAs also identify and assess the consequences of proposed developments, albeit at a more specific project level (see Chapter 1). Scenario planning can be a valuable exercise within project-specific EIAs where consideration of alternative scenarios is a key requirement. The futures in which a corridor will exist will comprise multiple uncertainties. Many of these may lie outside the remit of a traditional EIA, but it is a useful tool with which to engage all stakeholders and help them gauge the influence that the proposal will have on their lives.

Participation is an essential requirement for any level of environmental assessment, but rarely do these processes engage people in structured scenario analysis to establish a project's role in shaping alternative futures or how it might be affected by projected changes. Unlike forecasts, that extrapolate future situations based on past experiences, scenarios develop plausible, diverse alternative futures (narratives or storylines) concerned with strategic foresight (Thorn *et al.* 2020). Because they address the complexity of possible futures based on a wider range of perspectives, scenarios have the potential to be a useful component of impact assessments, helping to articulate a range of thought-provoking alternatives and gauge how a development may influence (or be influenced by) structural changes in governance, land use, climate, demographics, economics, cultural values and technologies.

While scenario planning has been used for at least 50 years in military and business sector planning, it has only relatively recently been applied to environmental futures, most notably in assessing socioeconomic climate change scenarios (Thorn *et al.* 2020). The scenario-planning process encourages uninhibited brainstorming and lateral thinking,

tempered with sound judgement based on expertise and experience. It blends information that there is some certainty about with plausible but unknown eventualities. The corridor is the key driver of transformation, along with the interests and respective influences of diverse stakeholders engaged in, or impacted by, the corridor. In boundary-setting exercises, time frames are agreed, as are the potential contextual influences and drivers of change; and trends and uncertainties are identified.

A study by Duinker and Greig (2007) showed how scenario planning has utility in defining future developments in anticipation of contextual changes. A further study by Liu *et al*. (2006) indicated that a general agreement exists that scenario planning is a practical and effective way to put environmental models into more beneficial use for long-term decision-making. While both studies make a strong case for the application of scenario planning in EIAs, they do not contextualize and test their application in particular case studies. As far as we are aware, no studies have explored the integration of the participatory scenario planning and EIAs in the context of a mega-infrastructure corridor in Africa. If it is used at all, it is more likely to be at the policy development stage as a component of a SEA (see Chapter 18 for an example in Asia).

The aim of this paper is to explore the role of participatory scenario planning at the project level (i.e. within EIA processes) and how it can generate strategic choices about a wide range of future alternatives in corridor planning. We use the case of the SGR transport corridor in Kenya, which consists of multiple projects (Table 12.1) based on different phases. Objectives are to: (1) review the extent to which EIAs comprehensively identified potential impacts and postulate how they may influence and be influenced by contextual changes; and (2) consider how can participatory scenario planning can be used to explore the potential to translate infrastructure and transport corridors, among other developments, into comprehensive sustainable development corridors, aligned to sustainability visions shared by all stakeholders.

12.2 Brief history of a flagship infrastructure project shrouded in controversy

Kenya's new SGR project replaces the former narrow gauge lunatic railway built by the British under colonial rule (Miller 1971). Historically, this precursor resulted in significant changes in Kenya, including the development of the capital, Nairobi, which was initially a construction camp and terminus for the railway; as well as inward migration of indentured labour from India. This significantly altered the racial mix of Kenya: a feature that remains in the country today.

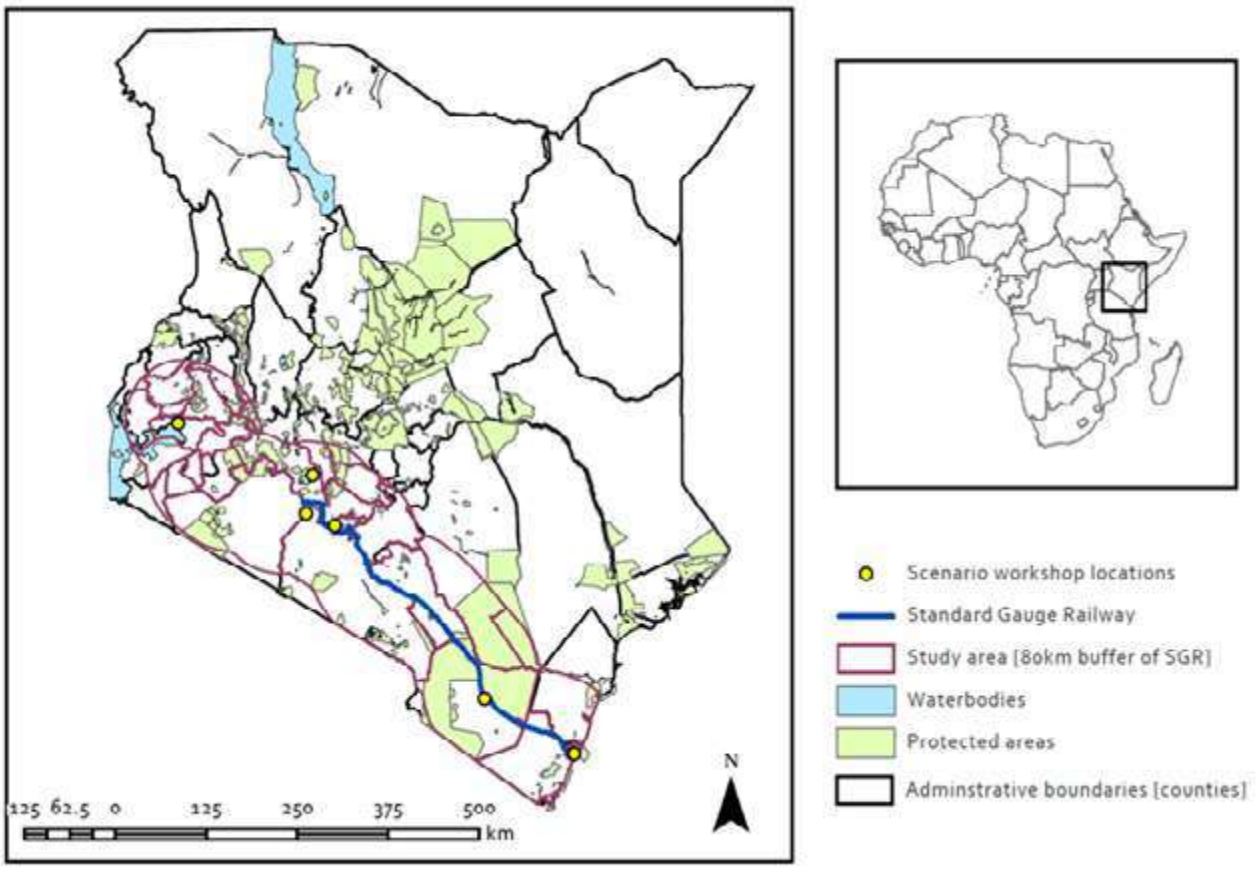
The SGR is being built in sections: (1) 609km from Mombasa-Nairobi, with 33 yards or terminals; (2) Nairobi-Naivasha (120km), including 24km of bridges and 7.8km of tunnels; (3) Naivasha-Kisumu (267km); and (4) Kisumu-Malaba (130km) (Fig. 12.1). Construction began in December 2014 and the first phase of the SGR was opened in May 2017. When completed, the SGR will link landlocked Uganda – and then potentially Rwanda, Burundi and South Sudan – with the Indian Ocean trade routes to the East.

In the last decade, the SGR has been promoted as a significant axis of development for Kenya and the wider East African region (Fig. 12.2). It represents part of Kenya's larger drive to accelerate mega-development, not only in infrastructure, but also mining, oil and gas, energy and commercial agriculture. It also holds the promise to improve regional connectivity and development, efficiencies in freight and passenger transport and alleviate chronic congestion on the highways. Importantly, the project is a symbol of Kenya's ambitions to create a

prosperous and productive economy under its own stewardship. The flagship project falls under Kenya's blueprint Vision 2030 by "deploying world class infrastructure facilities and services for a globally competitive Kenya", making firms more competitive, providing economic incentives to the public sector, and improving attractiveness to foreign investors. It is widely supported as a hallmark of Kenya's expansion and interconnectedness strategy (Ogollah *et al*. 2019, p. 2). Furthermore, the SGR aligns with other goals, such as the Jubilee Government's Big Four development agenda (2018-2022), the County Integrated Development Plans, the Constitution of Kenya 2010, the Physical Planning Act 1996 and the East African Railway Master Plan.

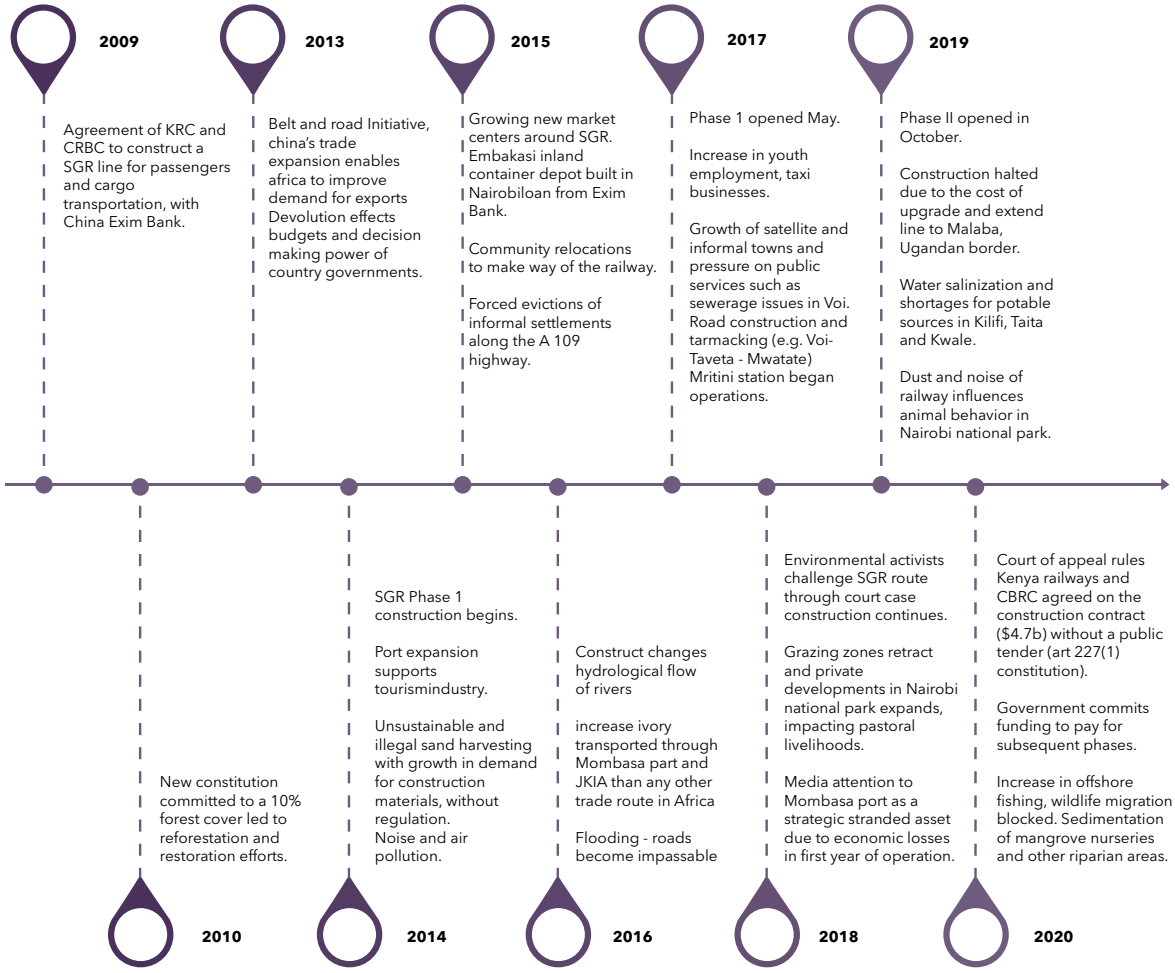
Despite the many benefits, poor planning, token commitments to legally required environmental assessment procedural requirements, limited public participation in such processes, significant environmental damage, particularly to wildlife, fragmentation of protected areas, commercial viability, allegations of impropriety in land allocation processes, suitability of compensation estimates, failure to link existing communities with the rail route, among other factors explored in this chapter (see also Chapters 3 and 11).

Figure 12.1 Map of the standard gauge railway



Phase I of the SGR runs from Mombasa to Nairobi. Phase IIA runs from Nairobi to Narok. Phase IIB runs from Narok to Malaba.

Figure 12.2 Timeline since 2009-2020 of the recent evolution of the SGR, according to scenario workshop participants



Source: China Road and Bridge Corporation.

12.3 Method

12.3.1 Content analysis

We conducted a content analysis of all EIAs accessible for SGR phase I and II (African Waste and Environment Centre 2012; Habitat Planners 2015; Mwaura 2017), specifically looking at Mombasa to Nairobi, and Nairobi to Naivasha Park, as well as areas comprising access roads and areas assigned for offshore aggregate dredging (Table 12.1). We accessed the EIAs through the National Environmental Management Authority platform or through direct requests, University of Nairobi, International Union for the Conservation of Nature and African Conservation Centre. We also reviewed responses from civil society organizations of EIAs submitted to the National Environmental Management Authority, and reports from ministries, academia, media and multilateral agencies. We were particularly interested in how future scenarios were considered and how local communities were involved in these discussions. Overall, we considered if the EIA process, as applied to the SGR developments, had any influence on decision-making.

Table 12.1 EIAs that were part of the SGR planning process reviewed for this report. None of these EIAs incorporated scenario planning.

Report and location	Consultants	Publication year
Report for Mombasa-Nairobi SGR development Project	African Waste and Environment Centre	2012
Report for the proposed SGR project from Nairobi South railway station-Naivasha industrial park-Enoosupukia, Narok County	Habitat Planners	2016
Report for the construction of Embakasi access road to the railway station in Nairobi Metropolitan Region	Ministry of Transport, Infrastructure, Housing and Urban Development, State Department of Housing and Urban Development	2017
Government of Kenya Makueni County Department of Water, Sanitation, Environment and Climate Change	Preliminary environment and social impact audit report on SGR project Report	2018

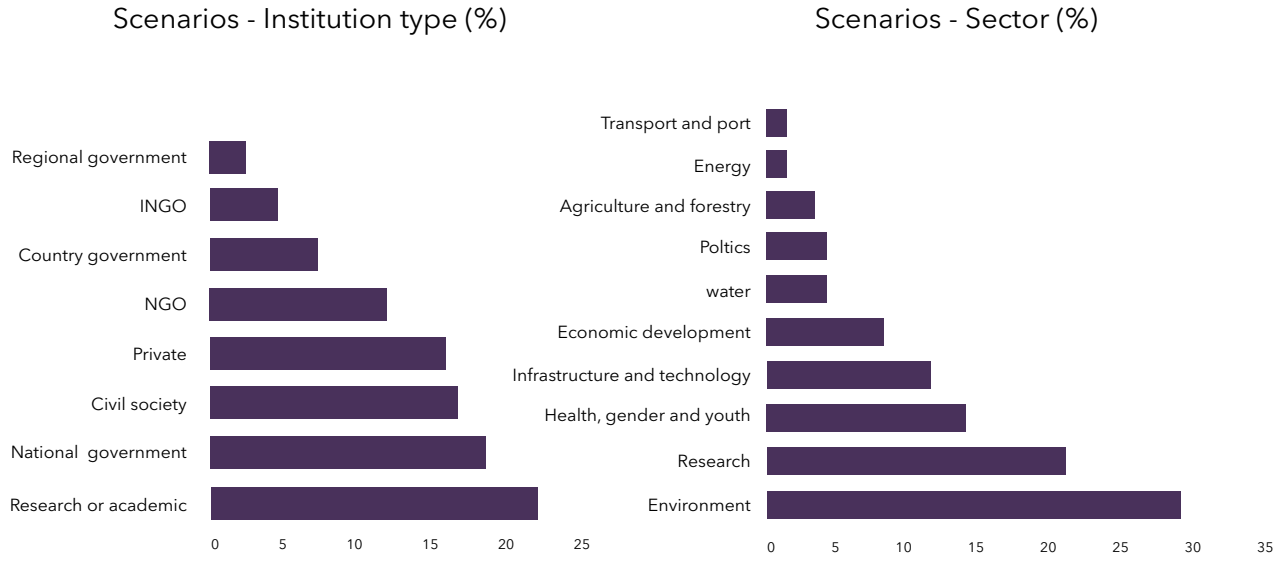
12.3.2 Participatory scenario planning workshops

We conducted six participatory scenario planning workshops of three days each, involving 155 participants between March and August 2019 in six counties where the SGR has already been constructed or construction was anticipated (Table 12.2). Participants were selected using purposive sampling to represent a range of diverse perspectives, stratified by gender (68:32), institution type, scale of operation and sectoral representation (Fig. 12.3). We developed three scenarios for two time frames of 2030 and 2063. These future tie points correspond to the SDGs and the African Union Agenda 2063, respectively. The aim of this process was to develop plausible, diverse visions of the future development, and explore how scenarios could be used to broaden participation, improve EIAs to include sustainability visions, and influence progress to a preferred option. The scenario workshops used the tool 'Kesho' (meaning 'tomorrow' in Swahili) (see Capitani et al. 2016, which provides a detailed discussion of the tool) and has been developed and applied in East Africa since 2014 to explore future land cover changes and how this impacts water, carbon and biodiversity interactions (Capitani et al. 2019), coffee and agroforestry production (Capitani et al. 2018), conservation and pastoral interactions (Kariuki et al. 2021). For a detailed description of the method also see Thorn et al. (2020).

Table 12.2 Participatory scenario planning workshops

No	Location	No.	Date	Main issues identified in the workshops
1	Voi (Kibwezi, Tsavo conservation area, Emali Tok Tok)	36	27-29 March	Wildlife migration collisions, arid region of 200mm rainfall/pa; railway traverses the Kibwezi river; affecting the quantity and quality, some boreholes have been drilled and water pans; Rapid growth and economic centre, feeder roads, impacts on the trucker's industry
2	Nairobi (Nairobi National Park, Oloolua, Ngong, Kajiado, Twala)	35	1-3 April	Loss in endemic vegetation through the forests (Nairobi National Park, Oloolua forest, Ngong tunnel); sealed boreholes, community conservancy conflicts
3	Mombasa (Miritini, Matheras wetland, bypass)	37	11-13 April	International connections with export/import markets, tourism, community management; start of the SGR, Mombasa Terminus, construction roads, construction road next to mangrove, bridge though wetlands
4	Narok (Suswa)	19	31July-2 August	Pastoral livelihood change – new skills arriving at region – land fragmentation, breaking corridor connectivity – human/wildlife conflict; sedentarization of Maasai around railways, rapid growth of urban centres, conflicts over water resources
5	Naivasha (anticipatory)	18	7-9 August	Horticultural and hotelier transitions – sedimentation of lake; construction of dams
6	Kisumu (anticipatory)	18	12-14 August	Regional integration in the East African Block; political positioning in the country

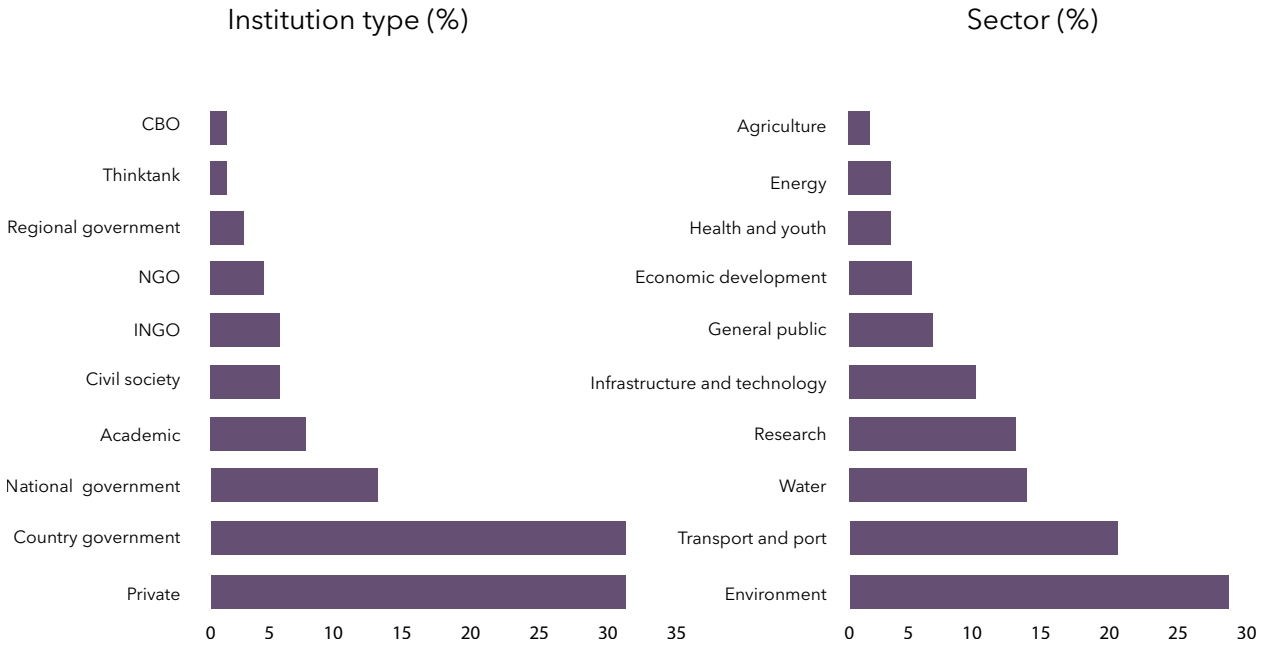
Figure 12.3 Participants from scenario workshops, represented predominantly research (21.9 per cent), national government (18.7 per cent), and civil society (16.8 per cent), and ten sectors – predominantly environment (29.0 per cent), research (21.3 per cent), predominantly health, gender and youth (14.2 per cent)



12.3.3 Semi-structured interviews

We conducted 110 semi-structured interviews. Informants represented a diversity of sectors and institutions (Fig. 12.4). Despite requests to have equal gender representation, ultimately the decision on who would represent organizations was that of the informants, and male:female ratio was 78:22. Interviews covered topics of effectiveness of rehabilitation strategies, local resource requirements (e.g. sand harvesting for concrete for railway construction), encroachment into riparian groves, water resource management; regulatory controls, and permitting; socioeconomic absorption of local employees, impacts on local livelihoods, market access and skill sets; compensation processes, public consultation and participation in planning, design and implementation; and envisioned futures; among others. We explored envisioned futures and how scenario planning can be used to make the EIA more effective.

Figure 12.4 Respondents during interviews represented several sectors, predominantly private industry (31.2 per cent), country government (31.2 per cent), national government (11.7 per cent), academic (6.5 per cent), and nine sectors, including environment (28.4 per cent), transport (19.4 per cent), water (13.4 per cent), research (11.9 cent), infrastructure and technology (8.9 cent), among others



12.3.4 Field visits

Third, transect walks were conducted over 14 days of fieldwork in January and February 2019. We covered nine counties of Mombasa, Kibwezi, Taita-Taveta, Nairobi, Naivasha, Nurok, Twala, Isiolo and Samburu. We visited sites to elicit local perspectives on the social and environmental impacts of the railway, understand to what extent the EIAs recommendations were enforced, and how subsequent phases of the SGR transport corridor could be better planned to maximise development opportunities.

12.4 Results and discussion

Overall, EIAs are generally applied in a reactive sense and their resulting recommendations are poorly enforced, especially if they involve significant changes to preconceived plans. We evaluate these gaps in terms of their environmental, economic and socio-political oversights. For each, we show how scenarios could overcome some of these persistent limitations found, not only in the case of Kenya, but other infrastructure developments across Africa and the world. Appendix 1 provides a full list of 20 key omissions in the EIAs, what was address and what data were omitted to estimate impacts, with mitigation options illuminated from scenarios generated in this study.

12.4.1 How participatory scenario planning can help improve environmental assessments

As mentioned, structured scenario analysis is rarely applied in either EIAs or SEAs, even though both are designed to ensure development does not lead to unintended consequences. When applied in the planning stage, scenarios can make cumulative impacts explicit and help identify what transformational consequences they may have in the future. It helps all stakeholders continually engage in developments throughout project cycle. Through a collaborative process, scenarios can build trust and reduce misinformation, which is a recurrent challenge that arises in EIAs (see Chapters 3 and 18). Moreover, outcomes can feed into existing planning processes using the language people are familiar with. It also involves the active integration of local inhabitants' voices, knowledge and expectations (Carpenter et al. 2012). Many development projects are constrained by a comprehensive understanding of local dynamics or multiple variables that are critical for a project's success, especially when some of the key actors are from different cultural and linguistic backgrounds. Scenarios can help overcome this limitation by applying a social-ecological systems perspective (Berkes and Folke 1998) considering social, biophysical, policy and economic interactions (Cumming et al. 2013), internal and external multi-layered levels, and nested systems where individual systems and subsystems are integrated into larger systems (Janssen and Andries 2013). When applied in combination with spatially explicit representations of future land use change, scenarios provide a structured way to illuminate potential outcomes of mitigation measures, and who are the winners and losers (Hamilton et al. 2013), and a broad range of long-term contexts. For these reasons, scenarios can help open the relatively restricted nature of EIA participation. To illustrate how scenarios can visualize potential futures, Box 12.1 presents examples of three plausible, diverse scenarios for 2030, developed by stakeholders during a three-day workshop in Nairobi, Kenya.

BOX 12.1 THE SCENARIOS

Scenario 1: the high road

Adaptive and transparent governance means international standards are adhered in planning corridors, resulting in the successful avoidance and mitigation of impacts on biodiversity, ecosystem services, and the livelihoods dependent upon them. National and county governments have sufficient funding, which is managed transparently. Holistic planning is rooted in stakeholder engagement and participation. Spatial frameworks are developed in all countries and are enforced. Effective and open communication across levels of governance, from grassroots to national government (bottom-up and top-down approach), leads to increased ownership

and participation from stakeholders of infrastructure developments. There is policy coherence and collaboration among development partners, governments, non-governmental organizations (NGOs), civil society organizations (CSOs), academic institutions and CBOs. Strict enforcement of and the availability of funding for Environmental and Social Impact Assessment (ESIAs) and Strategic Environmental Assessment (SEAs) controls development within the aspects of the mushrooming of towns, segregation of human and wildlife, blocked waterways and migratory routes. The national government develops evidence-based legislative frameworks, implements the Kenya Vision 2030, and fully adheres to SDG 15 by restoring degraded land. Consistent and resourced monitoring and evaluation programmes oversea the activities of contractors. Climate change mitigation and adaptation strategies are mainstreamed in county integrated development plans, such as renewable energy, climate-smart conservation agriculture and early warning systems.

Scenario 2: the middle road

International standards are given only token application, leading to distrust in decision makers and isolated pockets of biodiversity that maintain reduced tourist revenues. Indigenous communities' needs, values and place-based knowledge are insufficiently considered in development planning, and local skillsets are outcompeted by foreign contractors. Despite land use planning and environmental audits, inadequate implementation leads to encroachment into wetlands, waterway, and key breeding areas. National park managers only consider protected areas, ignoring animal dispersal areas or migratory corridors, resulting in islands of ecological refuge surrounded by industrialization, urbanization and mushrooming informal settlements. Overlapping and conflicting mandates of the Kenya Forestry Service, Kenya Wildlife Service and the National Lands Commission causes delays in decision-making. Although the SGR has successfully reduced the growth of road traffic congestion and accidents, there is also a rise in unemployed truck drivers and owners as well as associated businesses. This perpetuates poverty, food insecurity and poaching. However, compensation uplifts the economies of some communities when citizens negotiate land acquisition compensation prices that reflect market value. Taxi drivers and motorbike operators who provide services to passengers of the SGR also benefit. Communities become more aware and there is a growth in more advocacy, civil activism, and optimism.

Scenario 3: the low road

International standards are ignored in planning corridors, resulting in the loss of ecosystem service benefits, dissection and diminution of ecologically sensitive areas, and loss of tourist revenues and Kenya's status as a leading resource-based tourist destination. A lack of political goodwill and corruption, and inadequate consultation causes a disconnect and mistrust between the government and the citizens. Citizens are excluded from decision-making and remain uninformed regarding the rationale for infrastructure developments. Donors advance their own agendas, and the Kenyan government does not prioritize local rights, leading to a new form of neocolonialization (ukoloni mambo leo) and compromised national sovereignty. Kenyan taxpayers' money is spent on the repayment of excessive debt of billions of dollars to foreign governments, with threats of asset capture. Communities lose access to grazing areas, farmland, ancestral lands and natural resources. Prostitution grows and the spread of HIV/AIDS becomes widespread. Overpasses block wildlife movements and there is a huge surge is crop raiding, fishermen's livelihoods are compromised by degraded reefs and community forest associations cannot sustain mangrove nurseries due to watercourse sedimentation. When essential services become inaccessible conflicts arise, leading to civil unrest, and parts of the railway are destroyed. The public resorts to direct action and civil disobedience to overthrow the government.

12.4.2 Adequacy of data or scientific evidence to support assertions

Our content analysis, key informant interviews and workshops revealed that many of the EIAs lacked evidence. For example, in the Nairobi National Park EIA (Habitat Planners 2016) there was no detailed discussion of the impact of the SGR on the distribution and density of birds, reptiles, amphibians, and small-to-medium-sized mammals inside the national park (van der Ree 2016). There was little discussion of the interdependencies of species (e.g. predator prey relationships, dispersal, pollination). There was limited detail on the methods and data used to arrive at conclusions, while in some cases the methods used were not robust. For instance, in the same EIA, road transects were conducted instead of comprehensive longitudinal biodiversity assessments. Technical elements were missing, such as the terms of reference and scoping study (Kenyans United Against Poaching Trust 2018). In other cases, the right to access information (i.e. Article 35 of the Constitution) was not fulfilled. For instance, the feasibility study of the SGR phase II is not in the public domain.

Of particular significance is the case of the Nairobi National Park EIA, which did not have sufficient evidence to assume all wildlife would pass under the railway. First, it used studies reporting wildlife crossings use from the USA, Western Europe or Australia, but no examples from Africa (van der Ree 2016). In these cases, the railway was built before the park was designated (Conservation Alliance 2018). Second, evidence did not include detail of the changes in specific species behaviour. Third, it did not include studies of daily and seasonal wildlife migration. Fourth, it did not consider habitats inside the park, such as the river gorges (Conservation Alliance, 2018). Fifth, there was no detail on design specifications for the proposed underpasses in Nairobi National Park. Finally, the EIA excluded recent key studies (e.g. those showing the primary cause of the decline and extinction of migratory ungulates is due to habitat fragmentation from fencing, roads, and railways (Harris *et al*. 2009), with additional evidence of these declines becoming obvious in Nairobi National Park (Ogutu *et al*. 2013).

Another example is the case of an illegal EIA license being issued to harvest 800,000m^3 of sand for concrete off the coast of Likoni (Mombasa) up to Tiwi (Kwale) along a 0.4-1.0km strip. The purpose was to accommodate the construction of the SGR railway, buildings and port terminal of Port Reitz Cargo terminal in Mombasa. Yet, such abstraction comes against international standards for sea and sand harvesting, which stipulates a minimum distance of 5-10km from the shoreline, because sand was harvested 400m-3km from the shoreline. At the time, Kenyan legislation was unclear as to where sand should be extracted, or the anticipated demand. No offshore or underwater analysis, real-time monitoring of sediment plumes, and how they are affected by the wind, waves, and tides was conducted (Obura 2019). The report did not include the field assessment findings, mitigation measures and what would trigger harvesting activities to be postponed or altered to avoid damage to nearby sensitive reefs (Musyoka 2016). Consequently, a stop order to this was raised twice by the National Environmental Tribunal (Obura 2019).

Scenarios can help to overcome such data limitations by developing stakeholder-informed narratives. After systematic evaluation of the strengths and weaknesses of each scenario, recommendations are then made for strategies to progress towards the preferred scenario. For instance, scenarios could help identify where the railway corridor could disrupt movement of wildlife, even in cases where there are mitigation measures. It would also allow for improved social support of the process and avoid reputational damage.

12.5 Environmental impacts

12.5.1 No consideration of alternative routes bypassing parks and critical ecosystems

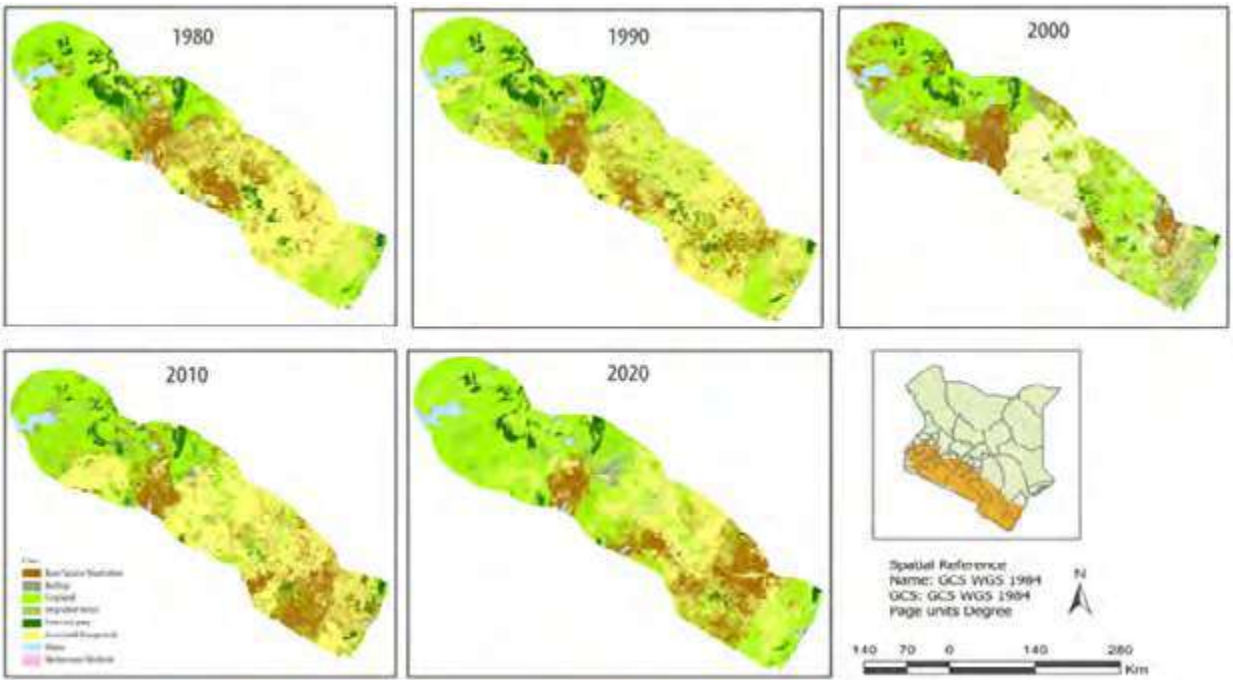
One of the main points of contention was the routing of the SGR through the Tsavo Conservation Area and Nairobi National Park. Of the seven proposed routing options from Nairobi, the Kenya Railways Corporation settled on the Modified Savannah Route 4, which ran through the park. In contrast to global best practices in EIA, none considered any option that bypassed the park. Respondents were concerned about impacts on the biodiversity inside and outside the park, and migration in the remaining open dispersal corridors connected to the Tuala Oloosirkon areas, adjacent community lands (Kenyans United Against Poaching Trust 2018). In response, several public campaigns, and protests from pastoralists, conservationists and landless people arose objecting to the routing of the SGR stating the Government of Kenya was taking an "ill-informed and unnecessary risk" (Coastal Oceans Research and Development – Indian Ocean 2019). The EIAs went against the Wildlife Conservation and Management Act of 2013 and the National Spatial Plan 2015-2045. Section 44 of the Act requires no development to occur in a national park without a gazetted management plan, but the last management plan of Nairobi National Park expired in 2010 (Kenyans United Against Poaching Trust 2018). Schedule 6 requires EIAs to describe endangered and threatened species that could be affected. The EIAs also contravened Section 30 of the Act, which prohibits any activity that is likely to have adverse effects on the environment. Stakeholders were concerned that the SGR set a precedent for other development projects to encroach into protected areas. Considering these factors, civil society organizations raised a legal case against Kenya Railway Corporation against positioning of the railway through the 216 acres of the park.

Similarly, the SGR is routed through a 35km stretch of the Oloolua Forest and drilled a 3.75km tunnel in Ngong hills (25.25ha). Construction in phase I had impacted important biodiversity areas, such as Kibwezi forest, Ngong hills, dryland forests, riverine forests, urban and farm trees, among others. The SGR also passes through Mombasa Wetland Park and close to fishery nurseries of community forest associations (Fig. 12.5). EIAs did not adequately consider impacts on local livelihoods, coastal erosion, mangrove ecosystem functioning, endemic species, watercourse sedimentation, carbon sequestration and air filtration. Rather, three EIA reports stated that the proposed railway passing adjacent the highly valued forests, the impact on the forest will be "negligible since no clearance will be done" (African Waste and Environment Centre 2012). Some of these included sacred coastal forests.

Figure 12.5 Embankment outside Mombasa, where construction impacted the growth of mangroves and other coastal forests (Habitat Planners)

Scenario planning helps to conceptualize alternative futures as part of a strategic planning process, as well as project-specific EIAs. Part of this process involves visualizing alternatives and developing spatially explicit models of how land use may be transformed (Fig. 12.6). Such scenarios provide insights into potential land-use futures and the drivers behind these land cover changes. For instance, in a workshop in Nairobi, participants highlighted how the SGR could create biodiversity islands surrounded by urbanization and industrialization.

Figure 12.6 Land use land cover change maps of an 80km buffer along the standard gauge railway, showing how infrastructure development impacts surrounding land use cover. Maps are shown in annual increments between 1980-2020



Source: Thorn et al. in prep.

12.5.2 Omission of the issue of human/wildlife conflict

Despite being raised in EIA participatory consultations in Ongata Rongai and Tuala (Kajiado), the issue of human/wildlife conflict was overlooked, with the only mitigation measures proposed being improved security, installing fencing and anti-collision nets to control elephant, giraffe and buffalo crossings, raising the track to 40m with viaducts and bridges, and building underpasses. Light deterrents, or compensation mechanisms were not considered. Subsequently, monitoring of collared elephants in 2016-2017 by Save the Elephants and Kenya Wildlife Service has shown the restriction of movement of elephants on one side of the railway, suggesting they do use the nine wildlife passages that have been installed to connect Tsavo East and West Conservation Areas (Okita-Ouma et al. 2017). In 2019, there was a rise in compensation claims in Taita Taveta county, where elephants were destroying crops along the railway. In 2019-2020, 494 people died from human wildlife conflicts across Kenya, which earmarked US$ 5.4 million in claims to the regional government (Xinhua 2019) (Fig. 12.7).

Scenarios help stakeholders to think about the bigger picture in both time and space, contextualizing specific project proposals and envisioning their role in longer-term futures. Scenarios also help to explore situations where conflicts could escalate in the future. We found, for example, stakeholders in our workshops in Suswa, Nairobi and Voi

foresaw the knock-on effects development could have not only on human wildlife conflict (e.g. severed migratory routes, impaired ecological functioning), but also poaching (e.g. increased access to illicit markets) (Laurance et al. 2008; Laurance et al. 2015a; Laurance et al. 2015b). Employing a systemic perspective, they argued a need to maintain good governance, avoid land grabbing adjacent to the railway and better manage land conversion and subdivisions. Scenarios further emphasized the need to reduce inequality and support alternative livelihoods so farmers and pastoralists would not solely depend on one season of crops or one herd. By having a great diversity of land use options, communities could reduce losses, while improving intercultural interactions between tribal groups to with limited resources and land.

Figure 12.7 Elephants killed on Mombasa Road not adapting to the SGR embankment

Source: Kenyans United Against Poaching Trust 2018

12.5.3 EIAs did not apply the precautionary principle when there was uncertainty

The precautionary principle is useful when there is inconclusive evidence and public controversy over appropriate activities and full extent of risks of a development, which often demand hard and fast decisions. In the case of the SGR, where the desired level of protection is undefined and the risk of harm cannot easily be quantified, the principle is appropriate. But it was not applied, and so various actors appealed to the National Environmental Management Authority, calling for the precautionary principle to be applied to avoid irreversible damage to the habitat, flora, and fauna (Conservation Alliance 2018; Kenyans United Against Poaching Trust, 2018).

In a world of uncertainties, scenario planning helps to design alternative options in view of multiple possible futures (e.g. climate change, land use change, behavioural change). Understanding uncertainty requires a close analysis of: (a) the sources of uncertainty; (b) the magnitudes of these uncertainties and how they propagate from one phase of the SGRs construction to another; and (c) measures to communicate these uncertainties to decision

makers. All three of these elements of uncertainty are required for contractors, investors, engineers and other actors working in the development corridor to establish clarity, credibility and transparency (Liu 2006).

12.5.4 Insufficient consideration of long-term expansion and land use change

Expansion of the SGR in the coming decades will likely require additional railway lines, bridges or tracks. It could take up considerable land surrounding the railway, whether in national parks, settlements or other zoned land uses. It could also increase in congestion due to trucks taking containers from the internal container depot in Syokimau, Embakasi, to Machakos, as well as private commuter traffic and Nairobi (van der Ree 2016). Yet, in the absence of a railway master plan and a national spatial planning framework, the fact that the location was not suitable for a transit railway station was overlooked, since it is an end-station, hemmed in between high-value assets of the city.

Here, spatially explicit scenarios could the Nairobi Metropolitan Area proposed development plans, human settlement patterns and how the SGR would likely blend into the surrounding area. Scenarios can overcome the fact that current EIAs do not consider the equitable sharing of costs and benefits of future generations and in different parts of the landscape.

12.6 Economic impacts

12.6.1 Insufficient consideration of redundancies or impacts on non-skilled livelihoods

EIAs reported many economic benefits to key industries (e.g. taxi businesses, tourism industry, commuters, shipping agents; Appendix 1). However, the impacts of construction and operation of the SGR on certain livelihoods were not fully considered. For instance, redundancies were likely to happen due to the closure of businesses, resulting in job losses for loaders, drivers, mechanics, roadside businesses, clearing agents and other warehousing businesses. Ogallah *et al.* (2019) estimated national job losses in long-distance trucking industry would be 1,008; in container freight stations it would be 4,340; and in local transport it would be 2,963. Hotel accommodations could be closed due to fewer bus passengers and truck drivers along Mombasa-Nairobi Highway. Farmers could be affected by the dust from construction and blasting (Fig. 12.3) (Government of Kenya 2018). Dive operators and fishermen could be affected by the dredging of sand on the reefs of the coastline. In addition, local hiring should be a central component of ensuring social licensing from contractors, and local buy-in and legitimacy. Although the China Road and Bridge Corporation said they would employ local skills, the company had no obligation to buy from local private companies, nor did they have a concrete plan to build capacity.

Scenarios can help bring to fore diverse interests through the process of multistakeholder workshops and help achieve consensus on preferred futures and discuss measures needed to progress towards them. Scenario planning can also illuminate the potential dangers of inaction and importance of securing local livelihoods.

12.6.2 Revenue to local and national government and indebtedness

Much attention has been paid to the Kenyan debt that will be incurred from investments loans.

The approximate estimated construction cost was US$ 3.8 billion, with around 90 per cent financed by the China Exim Bank and the remaining 10 per cent by the Government of Kenya. Critics argued that Chinese lending generates substantial economic gains, higher debt burdens, weaker debt affordability and weaker external positions (Rogovic quoted in IOL Business Report 2018; Cardomy, Taylor and Zajontz *et al.* 2021). At the time of this report (May 2021), the Government of Kenya was unable to pay monthly loans of US$ 1 million for 21 months, and so the Chinese government did not issue the loan for the final stage of funding in 2020.

Scenario narratives indicated concern, given the historic context of colonialization, that development corridors such as the SGR could present a situation where foreign countries give loans with stringent conditions that could run the risk of loss of territory, resources, sovereignty and control of decision-making. Respondents highlighted potential risks associated with recent the rise of foreign private infrastructure contractors in Kenya would lead to less generation of revenue from the SGR construction being fed back into the local economy (Sanghi and Johnson 2016).

12.6.3 Cost–benefit analyses did not include environmental and ecosystem service costs

Route option analyses did not include any elements of ecosystem service valuation. No cost comparison analysis was given to value to protected area land or the broader impacts on ecosystem services the Nairobi National Park provides (Kenyans United Against Poaching Trust 2018). It did not consider the routing of the would also have repercussions on the reputation of Kenya as a wildlife tourist destination, with impacts on the gross domestic product, considering Nairobi National Park has the highest visitation rate of all parks in Kenya (Conservation Alliance 2018). Scenario analysis can be issued in this context to look at the ecosystem service impacts, to assess the relative cost in all routes.

12.7 Social impacts

12.7.1 Selective and rushed participatory public consultations

Effective stakeholder engagement is arguably one of the most challenging elements of EIA processes, and one of most cited issues identified in scenario workshops and interviews. In the case of the SGR, EIA consultations were too narrow in terms of their duration, how they were conducted and constituents of who was involved. For instance, the consultation process took 1.5 years, using methods such as media, community meetings (*barazas*), roadshows and plays. However, opponents argued that engagement for the construction was selective. For instance, the SGR Port Reitz Cargo terminal EIA consultation used a local representative to select participants, which respondents felt ran the risk of elite capture. The Kenyans United Against Poaching Trust (2018) stated some key stakeholders were excluded from EIA consultations altogether, such as pastoral communities living adjacent to Nairobi National Park, which contravened the Environmental Management and Coordination Act of 1999.

In phase IIA, the Conservation Alliance (2018) argued the EIA consultation process conduct-

ed by Habitat Planners consultancy was rushed and there was not enough time to conduct the EIA. Information was not provided beforehand for participants to interpret and understand the route. Moreover, consultations only focused on sections of the phase IIA, rather than the entire route. For instance, in the selection of the Modified Savannah Route 4, the public was not briefed on the range of potential routes, but only the Bomas route, which would impact on large areas of inhabited land.

Engagements were considered briefings, not consultations, because there was no forum to ask questions, as stated: "(We) were simply lectured as if the route was a done deal" (Kenyans United Against Poaching Trust 2018, p. 2). Ogallah *et al*. (2019) suggested "structured stakeholder engagement (did) not assess the possible downsides as result of action" (see section 3.3). Some opponents to the Nairobi National Park routing stated that "the public consultation sessions were mainly to create awareness and critical views of those who attended the meeting were not considered" (Conservation Alliance 2018, p. 7). For example, in the EIA reports, content was excluded from the outcomes of two meetings with conservation NGOs held at the Ministry of Environment and Natural Resources, which rejected the proposed route through Nairobi National Park. On the other hand, some consultations that occurred from 22 September 2016 to 12 October 2016, which were in contempt of a court order issued by the National Environment Tribunal for the phase IIA EIA, were nevertheless included in the EIA.

This clearly indicates procedural inconsistencies in the evidence presented within the EIA, leading to a series of public protests (Fig. 12.8). Overall, there appeared to be inadequate communication and sensitization from community liaison officers of the Kenya Railway Corporation being responsible for very large populations they were unable to reach. The degree of acceptability of stakeholders, transparency and inclusivity was low according to the participants in workshops, communities, local businesses and NGOs interviewed for this research.

Scenario analysis can support effective communication from grassroots to the institutional level (bottom-up and top-down approach) and increasing ownership and participation from stakeholders of infrastructure developments. Scenarios promote engagement which could ultimately lead to more policy coherence and more efficient, effective decision making and better ecological outcomes (e.g. between Kenya Forestry Service, Kenya Wildlife Service, Ministry of Lands and National Lands Commission). Scenarios, furthermore, help to improve coordination across institutions and stakeholders to utilize local governance structures already in place and improve incentives for local participation and information sharing.

Figure 12.8 Public protests the routing of the railway through Nairobi National Park took place across the country, from the coast (as shown in Mombasa above) to inland

Source: Coastal Oceans Research and Development – Indian Ocean East Africa 2016.

12.7.2 Lack of mitigation measures for sexually transmitted diseases and teenage pregnancy

Workshop participants regularly indicated that the SGR could spread sexually transmitted diseases (STDs), including HIV/AIDS, along the route. EIAs contradict one another on this matter: where one EIA reported the SGR could expose workers and surrounding communities to sexually transmitted diseases, while another EIA said it would reduce the spread. Mitigation measures included awareness raising in construction camps and market centres, voluntary counselling, testing for construction workers and surrounding communities, encouraging the use of contraceptives to construction staff. Reports did not discuss the spread of HIV from construction workers. In one EIA, this was described as "sexual immorality", which assumes abstinence is the appropriate response, which has proven ineffective in controlling the spread of STDs (McGrath 2003). While the potential risk of a rise in prostitution was reported in the phase IIA report, no mitigation strategies were proposed. The issue of teenage pregnancy was ignored in all EIAs, even though it came up as a frequent concern in the workshops.

Scenarios apply a systems approach, which helps to consider factors that may be outside of the facilitator's discipline. We found, for instance, that workshop participants envisioned futures where there is widespread family planning education, particularly surrounding schools. They highlighted the need to develop a code of contractors for the use of child labour or sexual workers, and collaboration with health and other departments at county level. They also called for more community health workers and new upgraded health clinics close to railways.

12.7.3 Inadequate compensation

Some respondents (e.g. in Kitui-Meru) were satisfied with their relocation compensation for the land acquisition of the SGR. They felt the price was fair relative to the value of the land, it "uplifted livelihoods", and led to the growth of areas such as Voi, Mtito Andei and Emali. Others (e.g. beach management committee and community forest user groups in Mombasa, or pastoralists in Taita Taveta) argued that locals did not receive full compensation for losses. Staff of regional offices in Kibwezi of the Kenyan Forestry Research Institute, whose tree research plots were destroyed to make way for the railway indicated they were not consulted, although this may have occurred at headquarter levels and they received inadequate compensation. Other damages were reported in our research, such as flyovers blocking people from accessing their personal land, schools, market centres and water points, and destroyed water pipes, among others (Fig. 12.9), (Government of Kenya 2018). In addition, compensation did not consider the impact of relocation on the social ties. That is, forced relocation severs social capital, that is, the resources that are embedded in social networks, which can be particularly important in situations of vulnerability where they are used in cost-saving measures, as a form of social insurance or to supplement livelihoods. Respondents were concerned about the erosion of indigenous and other cultural identities, as people move away from rural homestead. The Nairobi National Park EIA did not include a complete Resettlement Action Plan prior to construction, including an estimation of the number of people living adjacent to the railway to be affected by each alternative, mitigation measures, and costs for implementation (Kenyans United Against Poaching Trust 2019). Although the Kenya Railway Corporation contracted two consultancies (Ecoplan Management and Earthscope Survey Services) to prepare the Resettlement Action Plan for phase IIA, the EIA was not provided prior to construction, which is illegal. This caused substantial conflict with the surrounding communities.

Scenarios can practically develop strategies and partnerships to overcome such unintended consequences. For instance, our scenario workshops emphasised the importance of the Ministry of Culture working with the National

Lands Commission to actively promote local languages and maintain cultural heritage. Scenarios also emphasized the importance of providing training to local communities, so windfall profits are not squandered. Interviewees emphasized that compensation prices should be negotiable and reflect local market value, following an independent assessment.

Figure 12.9 (a) Cracks in Kathekani Secondary school from construction; (b) collapse of SGR embankment due to heavy rains in Makueni. Construction blocked several rivers, formed gullies, increased flooding and destroyed roads from rising surface runoff (e.g. Kawese River in Makueni county, Darajani water pan in Mtito Andei, Kibwezi East, Emali town, Mang'elete wetland, Kiboko spring); (c) Mang'elete quarry sites left unrehabilitated; (d) farmlands lost from the dumping of waste, and mango and banana trees and beehives severely affected by dust at the Mang'elete quarry site area.

Source: Kenyans United Against Poaching Trust 2018; Government of Kenya 2018.

12.7.4 Timing of the release of EIAs and construction was mismatched and relied on outdated laws

Despite being a compulsory requirement for all development projects before they can proceed, construction activities took place before EIA licenses were issued, contravening the Environmental Management and Conservation Act 1999. Specifically, Kenya Railway Corporation and China Road and Bridge Corporation began construction at the Ngong Tunnel commenced in May/June 2016, but the EIA for phase IIA was released at the end of October 2016.

The same situation took place in Nairobi National Park, where the route was finalized, and construction had started without conducting an EIA. This led the National Environment Tribunal issuing a stop order to prohibit any activities related to phase IIA from being conducted until the matter was heard in court. However, on 20 October, the construction of the phase IIA began, despite this order being in place (CORDIO 2019). A response by opponents of this stated: "This begs the question

whether the EIA was a simple afterthought to justify actions already taken" (Kenyans United Against Poaching Trust 2018, p. 2).

A third example was in Mombasa, where the South Coast Residents Association, National Environmental Civil Society Alliance of Kenya with the natural resource network appealed against a license NEMA/EIA/PRS/1581, which was issued to China Road and Bridge Corporation by National Environmental Management Authority twice: in May 2015 and February 2017. They argued the EIA was illegal because the National Environmental Management Authority went ahead with issuing a license to China Road and Bridge Corporation to harvest the sand in Likoni without undertaking an EIA. The timing of the EIA came in too late to alter ongoing project implementation. It also went against Article 69 of the Constitution of Kenya 2010 in respect of the environment and public participation in the management and conservation of the environment. In an unprecedented ruling, the court ordered that an underwater survey be conducted to identify the species and the ecosystems that might be affected and how this would be mitigated (Environmental Justice Atlas 2017). At the time of the report, authors were not certain whether this survey had been conducted.

Beyond inappropriate timing, other EIAs relied on some repealed laws, such as the Forests Act of 2012, which was repealed by the Forest Conservation and Management Act of 2016. EIAs also relied on the East African Railways Master Plan, which has not been updated since 2009.

To overcome these challenges, scenarios are useful for getting on board the relevant expertise to ensure plausible impacts are anticipated and mapped out. Our workshops indicated the need to improve governance oversight mechanisms and the influence of civil society. Without transparency and enforced legal frameworks, other sectors of society would be adversely impacted, such as education and health, or poor substandard infrastructure projects and ecological harm. A scenarios approach allows the safe exploration of these alternatives.

12.8 Conclusions: scenarios as tool for strategy development in EIAs and SEAs

Using the case of the SGR development corridor in Kenya, this paper reviewed the extent to which EIAs comprehensively identified the likely impacts, mitigation measures and how participatory scenario planning could be used to overcome common omissions in EIAs, and SEAs more broadly. Clearly, the current application and engagement in the EIA process is not fit for purpose. Part of this challenge comes from the speed of all phases of infrastructure developments such as the SGR, where construction and ambition is operating at a high pace to tight timetables. The application of participatory scenario planning and the ensuing divergent land use futures can play an important role in EIAs and SEAs in identifying pathways to transition from a linear transport corridor, into a much more wholesome, futures-oriented development corridor aligned to longer sustainability visions. Scenario planning has the potential to look at ways that infrastructure corridors can be truly defined as development corridors by exploiting their multifaceted opportunities. We therefore recommend that scenarios are applied more widely for strategy development in both EIAs and SEAs for development corridors in Africa and indeed, worldwide.

Yet, limitations remain. Currently, we have little evidence on how effective participatory scenario planning insights have been in changing people's decision-making processes. Moreover, few actors operating in the infrastructure value chain routinely use participatory scenario planning (e.g. government agencies issuing tenders, private companies or banks) so there is a need to scale understandings of why and how to apply scenario typologies (Thorn *et al.* 2020). Although participatory scenario planning can take at least a few months to be done well, individuals

only need to engage in this for a few days to explore the divergent options. Yet, even a few days can limit the number of high-ranking officials who become involved in the process. Finally, bringing together a diversity of stakeholders with competing interests can trigger conflicts, and facilitators need to be trained to manage inherent power dynamics (Oteros-Rozas *et al.* 2015).

Therefore, although more research is needed, evidence is mounting that adopting a scenario planning within environmental assessments can ensure decision space is opened to allow maximum benefit to reach a wider selection of the population and avoid unintended consequences of the current operation. Considering the benefits of scenario planning in terms of potential insights and avoiding consequences of poor futures planning, it is relatively low-cost. While the use of scenarios in phases I and II in Kenya of the SGR would be late, we encourage the application of scenario analysis as early in the design process as possible, as the SGR is extended to Uganda, Rwanda and beyond, or indeed other similar linear infrastructure investments (e.g. ports, roads). This more active planned approach to investigating the consequence of linear infrastructure will go a long way to realizing wider sustainable development goals through Vision 2030, especially goals 9 (industry innovation and infrastructure), 11 (sustainable cities), 12 (responsible production and consumption) and 15 (life on land), as well as 3, 4, 8 and 13. This potential will depend on how willing governments, developers and financiers are to embrace participatory scenario planning procedures and act on findings.

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Appendix 1. Key omissions in EIAs and mitigation pathways suggested in scenario workshops and key informant interviews

Results suggest major evidence showing that the EIAs are based on incorrect or insufficient information

No	Key omission	What was addressed	No data to estimate impacts	Mitigations identified in scenarios	Sources
1	Size and severity of the effect zone of the SGR was under-represented	- vegetation lost below the viaducts	- total area of usable habitat and species lost - impacts on different land uses (e.g., grassland, shrubland) - impacts on different topography, water availability, vegetation growth due to shading, invasive species - edge effect inadequately estimated to impact only one direction - changes in animal behaviour, with most animals staying to the southern side of SGR	- bundle infrastructure in same corridor	Van der Ree *et al*. 2016; Laurance 2015; Laurance *et al*. 2015a; 2015b

2	No detailed consideration of future greenhouse gas and other emissions	- reduced emissions associated with large vehicular movement - combustive product emissions (nitrogen oxides, particulate matter, carbon dioxide) - exhaust and fugitive emissions	- long term emissions of GHG v. diesel engines - embedded carbon costs including construction materials - dust emissions levels on mangroves - detail of pollution of gas and smoke on vegetation	- need to address national issues in intermittent electricity supply - adhere to Air Quality Regulations of 2008 - need for fuel efficiency and management	Kipyegon *et al.* 2019
3	Vague descriptions of how railway infrastructure can withstand climate change	- build large bridges with a flood frequency between 1/100-1/300 event/ years - install drainage channels - design culverts to withstand severe storms and shoreline corrosion	- No consideration of climate change adaptation - Embakasi Access Report made no mention of climate change - For example, in phase I there were some cases of collapsed embankments in Makueni county	- gully rehabilitation - water harvesting structures - coastal storm surge barriers - nature-based solutions - behavioural change	Habitat Planners 2019
4	Lack of detail about construction activities	- noise from the operation of the railway - an explosive and blasting management plan	- generation of noise during construction activities (e.g., campsites, quarries, crushing plants and batching plants) - did not specify local materials would be sourced and by 2015, China Road and Bridge Corporation had imported most materials from China	- maintaining close communication with surrounding communities to restrict disruptions - watering roads - minimising vibrations	Sanghi and Johnson 2016; KUAPO Trust 2018
5	Lack of detail about waste management	- vague descriptions of mitigation measures to manage pollution, effluent treatment, and waste oil facilities	- lack of information of location, processes, disposal and managing contaminated soils and waste oils from SGR	- rehabilitate quarry sites - use waste to generate biogas - monitoring pollution - ensure waste management responds to population growth	Sanghi and Johnson 2016; KUAPO Trust 2018

6	Railway embankments inappropriately located and too low	- embankments - building underpasses	- inappropriately located in Emali and elsewhere cut through water, livestock markets and traditional homesteads, breaking up family land - diminished the dispersal wildlife living in Mbagathi Riverine Dispersal Corridor - road collisions along embankments of elephants and giraffes increased along Mombasa highway not adapting behaviour by moving under underpasses but avoid them	- systems view identifies that the costs will cause external losses - install more underpasses and overpasses -more in depth study prior to identifying locations of underpasses	Okita-Ouma *et al.* 2016; Okita-Ouma *et al.* 2017; Koskei et al., 2018; KUAPO Trust 2017
7	Illegal offshore sand dredging for SGR Port Reitz Cargo terminal construction from shoreline	- sand harvesting of 19-50m or 400m-3km from the shoreline along a 0.4-1km strip (800,000 m^3)	- impact on livelihoods of deep-sea and shallow fishermen, divers, wildlife managers, and hoteliers' livelihoods -impact tourism industry from removal of beach sand - marine contamination of heavy metals from the mud dumped off Likoni (Mombasa) up to Tiwi (Kwale) - impact of coastal dredging on fragile reefs, beaches, tidal hydrology, benthic and bottom marine ecology	- restoration and rehabilitation measures of degraded coastal sites and ecosystems - adhere to international standards of sand harvesting which is between 5-10 km from the shoreline	Musyoka 2016; EJA 2017; Obura 2019
8	Routing through 35 km stretch of the Oloolua Forest and the drilling of a 3.75km tunnel in Ngong hills (25.25ha)	- impacts of communities, water quality and flow, forest structure, composition, and diversity, traffic - potential benefits of the movement of farm forestry products, by reducing travel time to markets - restoring soil structure and reducing compaction	- mixes the terms afforestation and reforestation (or uses the terms interchangeably) - does not specify the need to use indigenous (except in the case of Ngong) - does not specify the need to use drought tolerant species - no proposals for biodiversity or carbon offsetting where natural irreplaceable features could not be restored once affected by development	- avoiding clearance and disturbance – enforce Forest Act of 2005, Environmental Management and Coordination Act 1999, Forests: OP/BP 4.36 - apply mitigation hierarchy of avoid, minimise, mitigate and offset	KUAPO Trust 2017; CORDIO 2020; Conservation Alliance 2018

9	Limited consideration of impacts on critical mangroves ecosystems	- impacts on indigenous and sacred forests and their importance for coastal protection, riparian stabilization, religious value, non-timber forest products, water regulation, and habitat connectivity - culverts constructed so seawater could continue to flow normally to mangrove areas	- mangrove growth, birds and other species was adversely impacted by dust deposition from construction - impact on transportation of materials along subsidiary roads constructed close to mangrove nurseries and river sedimentation - impacts on coastal erosion, mangrove ecosystem functioning, carbon sequestration and air filtration	- involvement of beach management units - awareness raising - nursery construction	Kipyegon *et al.* 2019
10	Omission of human wildlife conflict	-railway fenced all along route -security improved especially adjacent to protected areas - anti-collision nets installed to control the crossing of wildlife (especially elephants, giraffes, and buffalos) - raising the track to 40m with viaducts and bridges	- escalated conflict in pastoral communities living next to Nairobi National Park, Tsavo National Park and in Suswa - rise in compensation claims after the SGR was built - rise in human, wildlife and livestock deaths associated with human wildlife conflict - poaching	- light deterrents - mechanisms to fund compensation claims - alternative livelihoods and insurance mechanisms and reduce inequality - improve intercultural interactions - good governance, avoid land grabbing adjacent to the railway, and reduce encroachment - establish long term habitat management and monitoring plans	Okita-Ouma *et al.* 2017; Xinhua 2019
11	No consideration of alternative routes outside protected areas or critical habitats	- seven routes within the national park	- routing inside Nairobi National Park - routing through migration route of Tsavo Conservation Area - repercussions on brand image of Kenya as a wildlife destination - impacts on dispersal corridors	- working with local communities to establish woodlots - create a mitigation fund for the benefit of local communities which have lost critical ecosystems	KUAPO Trust 2017; CORDIO 2020; Conservation Alliance 2018

12	EIAs did not apply the precautionary principle	NA	-precautionary principle was not applied, and so various actors appealed to National Environmental Management Authority calling for the precautionary principle to be applied to avoid irreversible damage	-scenarios address uncertainty - scenarios help to design alternative options in view of multiple possible futures	Conservation Alliance 2018; KUAPO Trust 2017
13	Insufficient consideration of long term expansion of the SGR and land use change	-an end-station, hemmed in between high value assets of the city, was not suitable for a transit railway station	- how land use change, the Nairobi Metropolitan Area proposed development plans, human settlement patterns and how the SGR would likely blend into the surrounding	- consider the equitable sharing of benefits of future generations who could bear the cost of this investment - decision makers use spatially explicit land use models	KUAPO Trust 2017
14	Insufficient consideration of redundancies or impacts on other non-skilled livelihoods	- strategic execution team put in place to monitor pre-emptively adverse impacts - business opportunities for small-scale traders such as food vendors around construction sites - taxi businesses and tourism benefits from more passenger capacity, reduced commuting costs, local/international activities - shipping agencies benefit from ferrying cargo directly from the Mombasa Port to the Nairobi Inland Container Depot	-redundancies from closure of businesses, job losses for loaders, drivers, mechanics, roadside businesses, clearing and freight agents, shop attendants, warehousing businesses in container freight - accommodations could be closed due to less bus passengers and truck drivers along Mombasa-Nairobi Highway - farmers could be affected from the dust from construction	- secure local livelihoods - consider local content and skills - buy from local private companies - China Road and Bridge Corporation has a concrete plan to build capacity	Ogallah *et al.* 2019

15	Cost benefit analyses did not include environmental and ecosystem service costs	- NA	-route option in Phase IIA did not include any elements of ecosystem service valuation - no cost comparison analysis to value to protected area land or the broader impacts on ecosystem services the Nairobi National Park provides - potential impact on national park visitation numbers potentially detracting from their experience with repercussions on the revenue of the park	- Scenario analysis can be issued this context to look at the ecosystem service impacts – to assess the relative cost in all routes - land use development plans and zoning for the built environment protecting national parks	KUAPO Trust 2017
16	Excessive indebtedness	- scheduled debt process	- scenarios to pay back the return on investment and debt - public perceptions on the acceptability of national debt and potential threats to national sovereignty and asset capture	- conduct a sound economic analysis of scenarios of the revenue generated into the next 20 years	IOL Business Report 2018; Cardomy *et al*. 2021
17	Unclear compensation processes	- compensation for land acquisition - community representatives - grievance redress system	- unclear process of compensation process - consideration of the impact of land acquisition on local social ties, indigenous cultural identity, and language - Nairobi National Park EIA complete Resettlement Action Plan prior to construction, including an estimation of the number of people living adjacent to the railway to be affected by each alternative, mitigation measures, and costs for implementation	- Ministry of Culture works with the National Lands Commission to actively promote local languages and culture - provide training to local communities so windfall profits are not squandered - compensation prices should be negotiable and reflect market value	Government of Kenya 2020; KUAPO Trust, 2018

18	Selective and rushed participatory consultations	- community engagement officer - engagements over 1.5 years with community meetings, media, and other fora	- perspectives various stakeholders (e.g., community forest user groups, pastoralists) not engaged - ratio to community liaison officers and populations is low - information was not provided beforehand for participants to interpret and understand the route - critical feedback from conservation NGOs excluded	- provide information beforehand for participants to interpret and understand the route - effective communication from grassroots to institutional level - increased ownership and participation from stakeholders	Conservation Alliance 2018; KUAPO Trust 2017
19	Lack of mitigation measures for sexually transmitted diseases	- voluntary counselling - testing workers and surrounding communities - encouraging construction staff to use contraceptives - Kenya Railway Corporation refurbished health care centre in Voi and elsewhere - education bursaries	- likely spread of HIV from construction workers - no measures to manage the rise in prostitution - no mention of the rise in teenage pregnancy	- family planning education especially in surrounding schools, and health clinics - develop a code of contractors for the use of child labour or sexual workers - raise awareness in schools of pregnancy and contraception -collaboration with health and other departments at county level	McGrath 2003
20	Timing of the release of EIAs mismatched to the timing of construction	- civil society use of the court to appeal against the issuing of licenses	- EIA license release after construction of Ngong Tunnel - EIA license release after construction of Nairobi National Park construction began - The timing of the EIA came in too late to alter on-going project in Likoni sand harvesting	-EIA be issued before construction begins to be able to alter actions taken - improve governance oversight mechanisms and the influence of civil society - scenarios are useful for getting in board the relevant expertise to ensure plausible impacts are anticipated	CORDIO 2019

13

Community Engagement in Corridor Planning and Implementation in Kenya

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ABSTRACT

In the last decade, the economic prospects for sub-Saharan Africa have been described as "Africa Rising", reflecting a future ripe with investment opportunities and economic growth, with development corridors seen as instrumental to this optimism. Some countries have aligned their national industrial development policies directly with China's Belt and Road Initiative (BRI). In Eastern Africa, for example, Kenya has become a champion of national industrial development advanced through the BRI. It is currently implementing two megaprojects that are central to Vision 2030, its national development plan to achieve a middle-income status in fewer than two decades: Lamu Port-South Sudan-Ethiopia-Transport (LAPSSET) corridor and the Standard Gauge Railway (SGR). This paper will critically review whether these large-scale infrastructure projects are developed in an inclusive way and will ultimately benefit the most vulnerable groups of people in Kenya. It will also consider if and how genuine community engagement can be included in corridor planning in order to achieve a long-term equitable distribution of benefits to all stakeholders.

13.1 Introduction

In the last decade, economic prospects for sub-Saharan Africa have been described as "Africa Rising", reflecting a future ripe with financial investment opportunities, economic growth, and the upward socioeconomic mobility of its populations. Development corridors that are supposed to provide connections for markets to develop and flourish are seen as instrumental to this optimism. In this context, some countries have aligned their national industrial development policies directly with China's BRI. Adopted in 2013 by the Chinese government, the BRI supports infrastructure development and related investments in nearly 70 countries across Asia, Europe and Africa (World Bank 2018). In Eastern Africa, for example, Kenya has become a champion of national industrial development advanced through the BRI. It is currently implementing several megaprojects that are central to its Vision 2030 national development plan, which aims to transform Kenya into "a newly industrializing, middle-income country providing a high quality of life to all its citizens by 2030 in a clean and secure environment" (Government of the Republic of Kenya 2007, p.1).

The first of these projects is the LAPSSET corridor. Labelled the most ambitious infrastructural megaproject in Eastern Africa, LAPSSET is meant to connect land-locked countries in

the region – that is, South Sudan and Ethiopia – and to give them access to the Indian Ocean via Kenya, thereby avoiding potentially "hostile" Sudan. Initiated in 2009, LAPSSET includes a deep-water port at Lamu on the Indian Ocean coast of Kenya, a highway, and a railway system from Lamu to the main economic hubs in Kenya and on borders with Ethiopia and South Sudan, and a pipeline for crude oil exports from the Eastern Africa region. The wider project also includes modern resort cities, new airports, as well as agricultural commodity processing and export hubs, which are expected to generate economic growth and socioeconomic development (LAPSSET Corridor Development Authority 2016).

Image credits: Rob Marchant

The second national megaproject is the SGR. Entirely funded with financial loans from the Exim Development Bank of China, the SGR now connects the largest Kenyan port of Mombasa with the capital city of Nairobi (487km), and then stretches a further 120km into the northwest of the country, with additional developments planned to reach the Ugandan border.[78] Initiated in 2012, under the East African Railway Master Plan, the Kenyan SGR is supposed to be linked with other SGRs being built in Eastern Africa, thereby completing the regional master railway plan and thus bringing prosperity and development to Kenya and the wider region.

Both of these megaprojects embedded within the official state narrative of national development articulated in Vision 2030 are supposed to provide opportunities for long-desired development and prosperity in the country. As the policy document specifies, "the 'Vision 2030' aspires for a country firmly interconnected through a network of roads, railways, ports, airports, water and sanitation facilities, and telecommunications. By 2030, it will become impossible to refer to any region of our

78 Phase IIB that includes the further extension of the railway line to Kisumu in Lake Victoria, has been put on hold due to the lack of funding (Railway Gazette 2019).

country as 'remote'" (Government of the Republic of Kenya 2007, p. 6).

These megaprojects present significant opportunities for industrialization and socioeconomic development across diverse landscapes of Kenya. As research on Kenya shows (Elliot 2016; Kochore 2016; Enns 2017), as large-scale investments take place, local landscapes start to change at a rapid pace, accelerating the previously limited opportunities for finance, business or employment for some segments of local or migrant populations. However, these potential positive changes are only a part of the story of corridor development.

However, megaprojects such as LAPSSET or the SGR also result in the exclusion of some population groups, particularly those who historically have been marginalized within the socio political structure of Kenya and thus do not have the capacity to influence or benefit from investment projects. Reflecting on several examples from the ongoing independent academic research on social and political effects of large-scale infrastructural investments in Kenya, this chapter suggests that in Kenya – although national standards for community consultation and participation should be followed – do not, in fact, undertake community engagement in corridor planning and implementation in a meaningful way. As a result, development corridors are not implemented in a socially inclusive way that would effectively address the concerns and interests of the most vulnerable population groups.

In the light of this argument, the paper considers if and how genuine community engagement can be included in corridor planning and implementation in order achieve a long-term equitable distribution of benefits to all stakeholders. It argues in particular that consultation that focuses on genuine consent before, during and after project implementation is essential to ensure the social sustainability of development corridor projects. This highlights that community engagement, rather than approached as an administrative formality, should be understood as an ongoing process of dialogue and not as a single point in time, after which consultation ends.

13.2 National regulations on community engagement in Kenya

In Kenya, environmental and social impact assessment of any large-scale project are an integral part of the procedures of the Environmental Impact Assessment (EIA) and audit regulations specified by the Kenyan government in the Environmental Management and Co-ordination Act (EMCA)1999. Amended in 2015, this is the main legislation that governs environmental and social impact assessment (ESIA) studies in Kenya (Republic of Kenya 1999). Under Schedule II of the Act, large-scale projects are required to be registered with the National Environment Management Authority (NEMA), as well as to develop an ESIA to avert the potential adverse impacts of a project in question and propose recommended mitigation measures. Public participation within ESIA in Kenya is referred to as consultation and public participation, which is supposed to be conducted during the project report and EIA study stages (National Environment Management Authority 2002; Republic of Kenya 2003).

In practice, this means that if approved, any large-scale project needs to develop an appropriate environmental and social management strategy of the project. The core outcome of this is an environmental and social management and monitoring plan, which ought to be used to enhance the positive and mitigate the negative impacts of the proposed project.

Under this plan, specific tasks might include:

- Evaluation of the existing situation at the project proposed sites;
- Appreciation of the project concepts through studying design documents, construction and intervention layout, feasibility of the project and other documents;
- Identification of potential impacts associated with the proposed projects;
- Identification of suitable mitigation and preventive measures appropriate for project impacts;
- Development of a comprehensive environment and social management plan for integration into the project implementation.

However, while the ESIA of any proposed project is supposed to adhere to robust national standards, the actual practice on the ground does not necessarily reflect these national legal regulations. This is demonstrated by several cases of megaprojects in Kenya, which are briefly reviewed below.

Image credits: Diego Juffe Bignoli

13.3 Case study: LAPSSET

On 2 March 2012, the Kenyan president Mwai Kibaki, at the inauguration ceremony of the LAPSSET Corridor in Lamu stated, "I have no doubt that this day will go down in history as one of the defining moments when we made a major stride to connect our people to the many socioeconomic opportunities that lie ahead" (BBC News Africa 2012). At the event, which was attended by the presidents of South Sudan and Ethiopia, and local and international media, Kibaki's words highlighted how LAPSSET, as an integral part of Kenya's Vision 2030, is supposed to bring development to Lamu County, and to Kenya more broadly.

A new planned modern port of 32 berths is a focal point of LAPSSET. The Kenyan national authorities expect this corridor development to attract more than 1 million newcomers to Lamu County that, with the planned urban developments, will provide numerous opportunities for economic growth (World Bank 2018; LCDA 2016). As one civil servant observed, "the master plan [of the Special Economic Zone in Lamu] is full of spectacular investments that the Kenyan government wants to bring – casinos, hotels, laboratories, even an opera house; it is going to be like the Middle East" (Nairobi, November 2019).

In this context, for the LAPSSET Corridor Development Authority, large-scale infrastructures are "the driver to socioeconomic growth and development that defines the path to transformation and evolution of human society; It increases efficiency in the delivery and management of public services; It allows societies to expand their opportunities, to exploit their full potential; and to realize a peaceful living environment" (the presentation made in 2016 by LAPSSET Corridor Development Authority).

The story on the ground, however, is rather different. In the context of the anticipated changes in the governance of natural resources and the projected influx of 1 million newcomers to Lamu County, the construction of Lamu Port has resulted in local civil society mobilization that has challenged the exclusionary nature of the infrastructure-based development in the region, and in Kenya more broadly. In 2010, several locally and nationally active civil society groups that work on human rights, local development, and community empowerment formed the Save Lamu alliance. The main point of this mobilization was that the local population of Lamu – including artisanal fishermen, small-scale farmers, mangrove cutters, pastoralists, hunters and gatherers that historically have been marginalized within the socio political structure of Kenya – were not consulted in the process of LAPSSET planning.

In this context, Save Lamu has focused on the meaningful inclusion of the populations local to Lamu in the LAPSSET development processes, and specifically demanded a comprehensive environmental and social impact assessment of Lamu Port. In the face of landscape-changing infrastructural developments, Save Lamu deemed the Kenyan State's efforts to represent the real development aspirations of Lamu's population to be fundamentally limited and ineffective to ensure their meaningful participation in matters of infrastructural development that directly affect their lives by drastically changing their relationship with the natural environment.

In 2014, Save Lamu submitted a court case against the LAPSSET Development Authority for not taking into consideration how the project is going to affect local people's livelihoods. Challenging the Kenyan state for failing to meaningfully follow the national legal regulations in the implementation of large-scale development projects, the legal case fundamentally questioned the deliberate exclusion of certain historically marginal populations from the national legal regulations. As one civil activist observed, "the problem with these projects like LAPSSET is that they are not done according to the law, and that they do not include local communities. People are

left out, as if they were outside the law, as if they were not supposed to be properly presented by the national law of Kenya" (Lamu, January 2020).

On 1 May 2018, in an unprecedented High Court ruling, Save Lamu won against the LAPSSET Development Authority. The case was successful on all eight grounds. The three-judge bench in the High Court of Malindi ruled that the Lamu Port construction resulted in clear violations of: (1) the right to public participation, (2) the right of information, (3) the right to a clean and healthy environment, and (4) the right to culture; as well as (5) not involving the local county government in the LAPSSET project planning and implementation. In relation to the livelihoods of the artisanal fishermen, the court ordered the Kenyan government to (6) report the external costs of the project, (7) recognize fishing rights as amounting to property, and (8) pay US$ 170 million in compensation to 4,700 fishermen displaced by the construction of the port. In the context of this, the court ordered the ESIA report of Lamu Port to be sent back to NEMA to meaningfully address all eight points specified in the judgement.

While this ruling was celebrated by Kenyan civil society as an unprecedented case in the history of human rights in Kenya, it was immediately appealed by the government on all but three points that directly concerned the financial compensation for the fishermen in Lamu.

However, at the time of writing, no meaningful progress has been made and the fishermen are yet to be paid the financial compensation allocated by the High Court. Their representatives fear that the compensation process is being hijacked by different interest groups – local political elites, private suppliers of modern fishing equipment, or the Ministry of Agriculture, Livestock and Fisheries interested in developing Blue Economy – competing over central financial resources.

This case demonstrates how, in spite of the existing legal regulations of ESIA that are meant to ensure social sustainability of development projects, vulnerable populations are excluded from large-scale development projects without any form of meaningful consultation. Even if civil society is able to successfully contest these forms of injustices – resulting in the ordering of financial transfers to the affected communities, in the case of the fishermen in Lamu, for example – this does not result in the needed mitigation.

As others have observed, without proper planning and consultation, the monetization of mitigation (i.e. offering financial compensation, rather than addressing the issue), even when completed, can exacerbate the social impacts experienced by vulnerable peoples (Burdge and Vanclay 1996; O'Faircheallaigh 1999). This is even more so in such cases where compensation is not even paid and the project is ongoing in spite of the fact that it breaches national regulations. In legal terms, when the ESIA conditions are not fulfilled, the project license ought to be suspended until the conditions are fully met. However, as in other contexts (Santilli 2013), the case of the ongoing Lamu Port construction – with the completion of the first three berths projected for 2021 – reveals that the project construction is intended to meet its schedule, while mitigation measures lag far behind.

This case demonstrates that, regardless of the existing national regulations, some affected communities, particularly those who historically have been marginalized and excluded from national development projects only find out about development projects when excavations or constructions start to take place. In this context, where projects commence without environment and social impact assessments, these communities, are the victims of the promised development.The negative impacts of LAPSSET project are not effectively addressed in spite of civil society's mobilization and the favourable court ruling. This demonstrates that, in order to achieve social sustainability of the project, community engagement needs to be an integral part of the planning process, not just in law but also in practice.

13.4 Case study: SGR

Not all megaprojects ignore the national regulations for community engagement in project planning and implementation processes. In this regard, the SGR presents a different case study. Just like with LAPSSET, the Kenyan government has celebrated the SGR as a promise of greater connectivity, prosperity, and development for Kenya and its people. Speaking at the inauguration of Phase I of the SGR project on 1 June 2017, President Uhuru Kenyatta, for example, noted: "This is a historic day and it is a day that everyone of us should feel proud to be a Kenyan. […] Today, despite criticism and opposition, we have launched the Madaraka Express to reshape the story of Kenya for the next 100 years" (Railway Technology 2017).

This new railway service between Mombasa and Nairobi has largely replaced the existing old meter gauge railway – the Uganda Railway – that was constructed more than 100 years ago during the British colonial period, and was central in establishing the Kenya Protectorate as an important colonial project of the British Empire (Hill 1949, v). Previously, the unavailability of an efficient railway system between these two cities had put enormous pressure on the highway from Mombasa to Nairobi, resulting in increasing delays and rising costs in passenger movement and cargo transport. The introduction of SGR services is, therefore, expected to effectively address these problems, contribute to the growth of the national economy and facilitate industrialization across Kenya.

Even though the SGR project harbours some potential to transform Kenya's economy, it has resulted in a number of daily difficulties for populations living in close proximity to the new railway infrastructures. On the one hand, the railway project has changed people's movement across the landscape by dividing villages, family and individual lands, and thus has presented severe challenges for the mobility of local populations, particularly pastoralists and those dependent on easy access to their land holdings.

On the other hand, the new railway system and new national regulations that require all containerized cargo entering Mombasa Port to be transported by the SGR, has had a serious impact on the populations that are dependent on the pre-existing national transportation systems. This means that 40 per cent of all the city's trucks are parked empty in its side streets, drivers are sitting idle and storage yards are without containers. These changes also impact the livelihoods of rural populations that are dependent on the traffic of the Nairobi-Mombasa Road and the opportunities of commerce and economic exchange that it provides, including food, hospitality, car maintenance and other services.

It is inevitable that any large-scale project such as the SGR will have undesirable impacts and trade-offs. However, what is striking about the SGR is how little contingency planning seems to have gone on at the coast and the informal livelihoods dependent on the Nairobi-Mombasa Road. The ESIA is meant to address and mitigate such concerns to an extent. According to Kenya Railways Cooperation, the project-implementing national agency, the SGR has undergone a community consultation process in the planning stages of the project. Kenya Railways recruited a team of community liaison officers from the areas that the SGR passes in order to communicate the issues and concerns between the local populations and the project implementors. This was supposed to address any potential issues during the construction and operation of the SGR project.

However, according to civil activists local populations, instead of being consulted about potential social, economic and ecological impacts, were only informed about the SGR project after all key decisions about project priorities, design and implementation had been made. As one community liaison officer (who preferred to remain anonymous) recounted, "we did not really ask what these local communities really want and how they see the development going for them. Before we reached them, everything was already decided – the route, the bridges, the underpasses. All of that was done. The instruction for us was to get the community on board, so they [do not] oppose the project, and [do not] cause us problems later" (February 2019).

This form of consultation usually took place at a community meeting, where government officials and community liaison officers presented the SGR project to village elders and household heads, which were usually men. In order to prevent any potential discontent emerging at local level, these presentations were often dominated by narratives of "better life", "development", and "lifelong employment" that were used to convince the representatives of local communities to support the SGR project. As one village elder in the county of Kajiado East recounted, "we were told about the [SGR] project and that it will bring us benefits like employment, so we accepted it, because employment is something that everybody needs here" (anonymous interview, March 2019).

This, however, is not specific to Kenya. Experiences in community engagement elsewhere show that, even with a regulated social and Environmental Impact Assessment process, fraud, bribery, box-ticking, and rampant disregard of the interests of local population groups continue unchecked, and proponents still attempt to "engineer consent" (Cariño and Colchester 2010). In the case of Kenya, this consent is evidenced by government officials (or consultants working on behalf of private companies) who are keen to provide photographs of meetings with local populations to demonstrate community engagement. Local critics of this process, however, indicate that physical presence in these meetings does not equal consent, nor the genuine engagement of the local population. As one local informant observed, "it is easy to get the people to come to a *baraza*. It is easy to take pictures of them and say that this was a community engagement. If these people actually understood what was going on, and how [the project] is going to affect them, is a different story altogether" (anonymous interview, May 2019).

Besides the questionable nature of these meetings, another problem is that there has been no continuous engagement of the affected populations in the implementation

stages of the SGR project. In several villages alongside the SGR line, the representatives of affected populations indicate that, during the construction and after the completion of the project, there has been no formal procedure for how to voice concerns and issues in relation to the project. These include the damage done to housing during the construction, such as cracks in house foundations caused by the movement of construction machinery, redirected water systems or altered mobility patterns. As one man observed, "we do not have anybody to complain to. When we talk to the local government, they say that it is the central government project. And how can we reach the central government? For us – it is impossible" (anonymous interview, March 2019).

The short-lived nature of the community consultation process is not unique to Kenya. In other contexts, it has also been observed that, besides participation in the ESIA at the planning stage, the affected populations are not given an opportunity to participate in the follow-up of the ESIA process (Morrison-Saunders and Arts 2004; O'Faircheallaigh 2007), a requirement that should be documented in a social impact management plan or a similar instrument (Franks and Vanclay 2013).

What this case of the SGR demonstrates is that, regardless of existing national legal regulations, the affected communities are offered only a limited form of community engagement in the planning stage of large-scale development projects, and have no opportunity to engage in the implementation stages of the project. This fails to count as a meaningful form of community engagement – for the consultation only takes place as a one-time event. The nature of this engagement – and whether it is an actual consultation or the delivery of information about the upcoming project – is also questionable, as the case discussed above demonstrates. In this context, the SGR project does not result in the socioeconomic development promised by the Kenyan government. Instead, it disadvantages the affected populations as those circumstances are not mitigated after the project completion.

13.5 Conclusions

The examples of megaprojects and corridor development in Kenya show that community engagement in corridor planning and implementation is not a procedure that investors and the national government readily follow. In some cases, ESIA assessment is only adhered to after civil society mobilization to hold project implementing agencies accountable and to make them address the concerns of affected populations. On the other hand, when undertaken, ESIA is understood in a limited sense as a one-time event to inform impacted communities about the upcoming development projects. Therefore, as Kimani (2010) and Mwenda *et al*. (2012) observe, in the case of Kenya, community engagement remains a mere administrative formality.

As in other national contexts (Lane and Corbett 2005), these dynamics highlight that national legal requirements for community participation in ESIA, even if existent, as in the case of Kenya, are not sufficient to ensure a meaningful community engagement in corridor planning and implementation. Instead, of fundamental importance is a political will to meaningfully involve affected populations in corridor planning and implementation.

This political will ought to be demonstrated through a continuous engagement with affected communities throughout all stages of project planning and implementation. This must be done with the actual existing possibility for affected populations to non-consent when the project in question is determined to be too disruptive to their environments and ways of life.

To realize large-scale infrastructural investments projects in a socially sustainable manner and thus achieve a long-term equitable distribution of benefits to all stakeholders in the process of corridor development, in the

light of the case studies discussed, it is recommended the following are focused on.

» A defined and effective processes for continuous and iterative community engagement before, during and after the implementation of the project. Rather than being undertaken as a one-off mechanism to obtain approval to proceed, after which consultation ends, community engagement in a form of ESIA needs to be understood as an ongoing process of dialogue. In practical terms, the requirement for ESIA must apply at each stage of a specific project life cycle, from concession application, project implementation, through to project closure. The approval at each phase of a project must be regarded as only valid for that specific stage in the process of project implementation.

» Central to this process of continuous engagement must be a genuine commitment to reaching legitimate community consent, and not just consultation. As shown in other contexts (Lane and Corbett 2005; Barelli 2012), mere consultation by itself does not equal actual consent, nor can it ensure meaningful community engagement. What is instead needed is a defined and effective process for participation to reach consent and community approval, with early engagement, trust between parties, respect for the community's right to disagree, a long-term outlook, and sufficient time and human resources to facilitate this process.

» Following the point above, community engagement in ESIA should only be encouraged when the process is legitimate and affected communities have a chance to influence the outcome. If it is only a tick-the-box process, with no genuine commitment to engagement, then non-participation ought to be considered and supported as the appropriate strategy for affected populations.

Image credits: Rob Marchant

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14

Guidelines on Mitigating the Negative Impacts on Biodiversity of Road, Rail and Power Corridors: South African Experiences

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ABSTRACT

Driven by the desire to achieve growth in employment and income through investment, in 2014, a National Infrastructure Plan (NIP) was designed to strengthen the capacity of South African infrastructure, ultimately improving the lives of citizens as well as greening the economy. This plan ensures that infrastructure and assets allow reduced carbon emission and pollution, that energy and resource efficiency is enhanced and biodiversity is conserved. Under the NIP, 18 strategic integrated projects were developed, bringing together hundreds of separate construction projects, including several proposed economic corridors, improved access to – and greener – electricity and distribution, and upscaled transport programmes. However, it can be argued that practically all economic activity that involves construction, physical infrastructure or land use change has some level of impact on the environment that cannot be avoided or entirely mitigated on site. The South African National Environmental Management Act (NEMA) of 1998 provides the overarching legislative framework for defining institutional mechanisms such as those for environmental authorizations and Environmental Impact Assessments (EIAs). South Africa has a relatively progressive legislation governing development. However, certain flaws/loopholes in regulations have resulted in land being irreversibly transformed and extensive losses in ecosystem services. It is important to consider the various impacts that development has on biodiversity and ecosystems, since these are often non-specific, and a multitude of species may be adversely affected. Major linear infrastructure projects that comprise networks of roads, railways, power lines and pipelines, which improve efficiencies in trade and facilitate the movement of people and commodities, are of major concern, as many of these projects are slated to occur in environmentally sensitive areas.While much progress has been made in the last decade to, first, recognize the threats of infrastructure development and then to determine successful measures to reduce the negative impacts of corridors, much more scientific rigour is needed in the planning and routing of developments. Maintaining the integrity and functionality of the South African landscape in conjunction with infrastructure development should be integral to any development project.

14.1 Infrastructure development in South Africa

African economies are currently among the world's fastest growing (Edo, Osadolor and Dading 2020), with linear infrastructure within potential development corridors strongly related to socioeconomic drivers (Seto 2011). Although Agenda 2063 (African Union Commission 2015) recognizes that there will be environmental challenges associated with economic growth, there is little evidence to suggest that sufficient rigorous planning and management is (or will be) in place to mitigate the negative impacts of these developments (Politzer 2008; Laurance and Arrea 2017). EIAs are not always applied effectively when assessing the suite of potential impacts associated with corridor projects that cover large geographic areas. For example, the South Africa to Maputo, Mozambique (SANSEA 2020) multi-DCP illustrates the challenges of tangibly assessing cumulative impact, public participation and species risks when considering large-scale developments. This DCP will comprise multiple pipelines (~94km condensate [both oil and gas], ~1,293km gas, ~992km oil and ~1,460km refined products), from source to port, bisecting critical biodiversity areas (South African National Biodiversity Institute 2020).

In South Africa, the National Development Plan (Vision 2030) indicates how the country can eliminate poverty (United Nations Statistics Division 2017), reduce inequality and enhance economic development by 2030 (Trading Economics 2020). In 2011, the Presidential Infrastructure Coordinating Commission of South Africa was established to provide for the facilitation and coordination of the National Infrastructure Plan (2014) that aimed to strengthen the capacity of infrastructure, ultimately improving the lives of citizens, as well as greening the economy. As a result of the National Infrastructure Plan, 18 strategic integrated projects were developed, bringing together hundreds of separate construction projects, including several proposed corridors. This provided improved access to – (greener) – electricity and upscaled transport programmes. However, it can be argued that practically all economic activity that involves construction, physical infrastructure or land-use change has impacts on the environment that cannot be avoided or entirely mitigated. This means that actions to mitigate these impacts need to go beyond the site level and consider a landscape-level approach.

The effects of linear infrastructure on the biotic and abiotic components of the ecosystems through which it passes are usually indiscriminate (Coffin 2007), and their influence may be both subtle and profound. For example, a road may cause habitat destruction, disturbance and fragmentation (Benítez-López, Alkemade and Verweij 2010); the habitat fragmentation may strongly reduce individuals' dispersal among resource patches and hence influence population distribution and persistence, as well as impact genetic diversity (Kindlmann and Burel 2008). Land use, land cover and connectivity within the landscape may change due to expanding road networks (Perz *et al.* 2008; Liang *et al.* 2014).

By 2050, and with an allocated budget of US$ 920 million (National Treasury 2020), the Department of Transport (DoT), and the Department of Mineral Resources and Energy plan to "spur a major revolution" in South Africa's transport system through investments in public transport, including all forms of linear infrastructure, such as road, rail, power lines, pipelines and man-made waterways). As of 2017, road networks in the country are the 10th longest in the world (Central Intelligence Agency 2017) and comprise a total of ~750,000km (of which 158,124km are paved and 591,876km are unpaved). The rail network is ranked 13th longest in the world, and totals ~20,986km (Central Intelligence Agency 2017). The DoT has developed a Green Transport Strategy (GTS; 2018-2050), which aims to "provide a transport system that provides equitable and reliable access for all in an economically and environmentally sustainable manner to advance inclusive growth and competitiveness of the country" as well

as minimizing the adverse impact of transport on the environment. The upgrading of freight rail infrastructure is key to the objective of shifting more freight from the road network to the rail network, as well as finding the balance between road and rail in respect to transportation of goods. Plans have been proposed to upgrade the railway lines and the associated substations.

With 30 power stations, and a network of almost 400,000km, for both distribution and transmission lines (Eskom 2021), Eskom, the country's national power utility, is responsible for the longest network of linear infrastructure in the country. This linear network comprises high-voltage transmission lines (up to 765kV), as well as the lower voltage distribution grid that is constantly expanding, particularly in rural areas. Eskom plans to add ~6 500km of further high-voltage transmission lines and 46,000MVA of transformer capacity before 2028. This is in line with its Transmission Development Plan, for the period 2019-2028.

The wildlife impacts of such linear energy infrastructure include avifaunal collisions with conductors and electrocutions on structure (in addition to bird nesting activity), with significant ramifications for both wildlife and power supply. In the case of collisions, distribution lines are the more significant hazard than high-voltage transmission lines because of the closer distances between conductors. They may, however, be overlooked by EIA screening regulations that only require assessments for transmission lines.

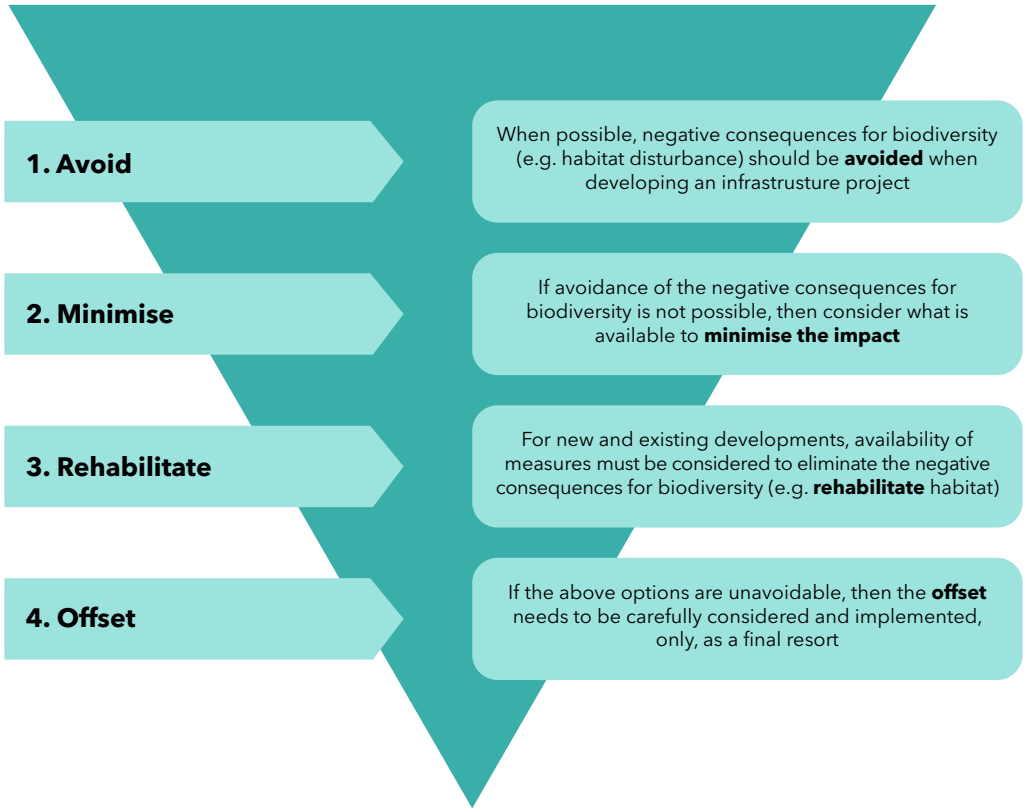
In this chapter, we review some of the tools available in South Africa to maintain the integrity and functionality of the South African landscape in conjunction with infrastructure development.

14.2 Legal framework for addressing the environmental and social impacts caused by development corridors

South Africa has relatively progressive legislation governing development and a well-developed regulatory process (see Appendix 1 for a summary on these regulations and commitments), of which the principles of environmental sustainability are encapsulated in the NEMA 109 of 1998. This overarching Act provides guidelines for conducting EIAs and, as part of the legislative framework, necessitates EIAs to be undertaken prior to any form of development (not just linear). This triggers a comprehensive set of listing notices to be issued (see Appendix 1). However, certain flaws, loopholes, and capacity limitations in the implementation of these regulations have resulted in unsustainable land-use change, causing irreversible transformation and extensive ecosystem service loss. In addition to providing the overarching legislative framework for the environmental sector, the NEMA defines the institutional mechanisms such as those for environmental authorizations and EIAs.

The mitigation hierarchy, which should shape the EIA process, seeks to minimize negative environmental impacts through the following steps: avoid, minimize, restore or rehabilitate, and finally, offset (Morrison-Saunders and Bailey 1999; Snell and Cowell 2006; Morrison-Saunders and Retief 2012). Biodiversity offsets are intended as the option of last resort in the mitigation hierarchy, only after comprehensive consideration of the other preceding steps, to address residual impacts on biodiversity and ecosystem services, but carry the most risk in terms of uncertainty of the outcome (Fig. 14.1).

Figure 14.1 The mitigation hierarchy model used to manage the impacts of infrastructure projects on biodiversity



The four stages of the mitigation hierarchy surrounding a development support the process of an EIA. These are: screening, scoping, assessment and the recommendations (report) phase. These ultimately inform the decision-making stage. The EIA process should be underpinned by public consultation to ensure transparency and the incorporation of local knowledge.

14.2.1 Screening

A screening process is initially required to establish if the nature of a development proposal and the sensitivity of the receiving environment indicates that an EIA is required. The information generated during the screening phase will determine the level of detail, the parameters of the scoping report and the nature of the specialist studies required. The recently developed Environmental Screening Tool (National Screening Tool 2019), supports this phase by detailing known and predicted threatened species' presence and informing site sensitivity. The reports produced by this system have been mandatory for all EIAs in South Africa since October 2019, and are underpinned by one of the world's most comprehensive national-level biodiversity data baselines, which is supported by the National Species Environmental Assessment Guideline (South African National Biodiversity Institute 2020).

14.2.2 Scoping and assessment

A scoping report that describes the main environmental issues to be addressed, identifies available resources and assets, and outlines what interventions and alternatives might lead to preferred outputs is required (Fig. 14.2). An initial scoping report will indicate if it is feasible and acceptable to continue with the development and/or upgrade, and provided there is no possibility of realignment, to avoid a negative impact on the environment and/or wildlife.

Figure 14.2 An example of the process to be followed when producing the scoping report

Identify the biodiversity impact to be addressed, through assessing the following:

- What linear infrastructures are present and planned as part of the development?
- What species are present and of potential concern (including non-threatened species)?
- What habitat types are present?

Consider existing infrastructure and surrounding land-use:

- Will this infrastructure have a negative/positive impact on biodiversity?
- What natural or man-made features can be adapted to allow connectivity? (e.g. a drainage culvert; Collinson & Patterson Abrolat 2016?)
- Is it a new development being built, an upgrade or a maintenance operation?

Options:

- Develop a risk profile for the impact which assesses the short and long-term and cumulative impacts of the development over its lifespan in terms of probability and severity.
- Recommend a mitigation strategy based on the techniques laid out in the EWT's handbook (Collinson & Patterson Abrolat 2016) and in line with the mitigation hierarchy (Fig. 14.1). This should be a multi-tool approach detailing what mitigation measures are to be used and where they are to be located.

14.2.3 Assessment

The outputs of the assessment phase are the EIA report or statement, and, if approved, recommendations will be included in an Environmental Management Plan. These documents must address the concerns raised during public participation undertaken throughout the EIA process. A mandatory stakeholder engagement process must include the possibilities of avoidance or feasible mitigation measures to address the concerns raised by potential negative impacts, including an evaluation of project alternatives.

The EIA Report or Statement will provide recommended mitigation measures, with impacts rated on their significance before and after the mitigation is applied. Assessment of the impacts that the development has on biodiversity can be difficult to quantify due to their non-selective impact on species, and the long lifespan of the infrastructure. As such, it is strongly urged that the steps as outlined in Fig. 14.1 be considered as levels of priority when working on any form of development EIA, with ongoing monitoring and evaluation being factored into the overall budget, along with mitigation and/or offset costs. The resultant Environmental Impact Report is submitted to the provincial authority to inform the decision they are responsible for making.

14.2.4 Public participation

Throughout the EIA process, it is necessary to engage all relevant stakeholders. One important advantage of this is the added value of local knowledge and proposed local solutions to address technical, social and environmental problems (Georgiadis *et al.* 2019).

14.3 Implementing and enforcing the mitigation hierarchy

It is now well established that in the application of the mitigation hierarchy, offsetting should not be the default option, but a last resort, especially when avoidance has failed. Offsets must only be used when all other options have been considered and ruled out. The mitigation hierarchy has the potential to be a driver for protecting conservation value, although low development costs could lead to substantial environmental damage (Stokes 2015). A key aspect of this is that there is often insufficient attention to fundamental thresholds and the assessment of significance by environmental assessment practitioners, mainly due to a lack of trained personnel in the field of assessing linear infrastructure and their ecological impacts (Ehrlich and Ross 2015; Singh *et al.* 2020). There is also often a lack of ability to enforce adherence to the conditions made in the Record of Decision (ROD), since the EIA often places the greatest emphasis on the stages leading up to the ROD, with little emphasis on the subsequent implementation and necessary monitoring and auditing of impacts (Hulett and Diab 2002).

The direct and indirect effects of corridors, and their potential cumulative effects on biodiversity, create an ongoing conflict between development and biodiversity objectives in South Africa, as elsewhere. To improve this, the South African National Biodiversity

Institute (SANBI), the Department of Environment, Fisheries and Forestry (DEFF) alongside non-governmental organizations (NGOs) have developed species guidelines and a national protocol for assessing sensitivity of proposed development sites. This framework links the high-level biodiversity monitoring in the National Biodiversity Assessment with the wide range of biodiversity-related monitoring projects that exist nationally and internationally.

Acknowledging these outputs for the mitigation hierarchy, and thus the potential benefits derived from infrastructure development is essential for a country's economic growth. One such example was launched by the Development Bank of South Africa (DBSA) in 2015, through an infrastructure investment programme for South Africa, to provide grant funding in support of loans for essential infrastructure projects. This highlighted a need, particularly during the EIA process, for the development of best practice guidelines and standards, which are adopted by relevant stakeholders to be incorporated into the planning and design stages of any proposed form of development. In South Africa, these measures are slowly being implemented through multiple national and regional initiatives. For example, the DEFF, is a signatory to the Convention on Biological Diversity (CBD) and the Global Partnership for Business and Biodiversity (South African Council for Natural Scientific Professions 2020a). As such, there is a national agenda to mainstream biodiversity into businesses practices, including the development of new projects such as infrastructure provision.

14.4 Tools and solutions to assess and manage environmental impacts

The importance of partnerships between infrastructure providers and science-based NGOs cannot be underestimated. These help to ensure developments that effectively consider and manage negative environmental impacts, working closely with corporations to generate solutions which are often win–win in character.

Two examples of such partnerships are described below:

1. With the transport and energy sector in which the Endangered Wildlife Trust has partnered with three of South Africa's toll road concessionaire companies, effective post-impact monitoring, which is necessary to improve the quality of future predictions, requires robust data-gathering on road kills and so on. The collection of data to inform such decisions depends upon trained staff using scientifically proven techniques and/or technology. For example, highway agencies conduct regular patrols to resolve any issues that could affect road user safety, and energy utility staff monitor wildlife collision rates along power lines. Such patrols can provide systematic data over long time periods, and have the dual benefit of raising awareness among the staff and institution. Therefore, partnerships and training of researchers and patrol agencies and their staff offer significant potential for more effective and robust data collection.

Further to this, the EWT's Central Incident Register for both roads and power lines manages data on wildlife collision mortalities. The Eskom-EWT partnership is the longest-running database of its kind in South Africa.

2. The country's national power utility, ESKOM. The partnership model includes several components, such as ensuring benefits to all parties and establishing an institutional framework for regular dialogue and sharing of ideas, as well as training relevant staff to develop the necessary skills and resources. One example is the production of a bird identification guide for Eskom lines inspectors to communicate

problematic incidents with avifauna. This helped to collect reliable data that could be used to test and develop bird friendly options for the future, such as:

- Corrective measures (such as different designs of high visibility audibility bird markers to prevent collisions with conductors)
- Informing better design of structures (to ensure adequate distances between conductors to prevent electrocutions when birds of large wing span use towers) and
- Bird friendly power line routes (such as ensuring avoiding dissecting high activity flight paths; Ledger and Annegarn 1981; Ledger 1984).

It is essential that data collected be communicated back to the utility in question and that it can be used to inform both policymaking and the implementation of mitigation measures.

For example, Eskom established a Biodiversity Centre of Excellence with a view to managing a long standing EWT-Eskom partnership, testing new ideas, and mainstreaming the adoption of best practices based on the information gathered and results generated.

NGOs such as the EWT can play a valuable role in the analysis and interpretation of data, drawing on their knowledge of a species' ecological needs, as well as ecosystem functioning.

BOX 14.1 THE BENEFITS OF MAINSTREAMING BUSINESS INTO BIODIVERSITY: A WIN-WIN PARTNERSHIP

Since 1980, the EWT has had a strategic partnership with Eskom, the country's national power utility. Initially established to address concerns about frequent electrocutions of the endemic, vulnerable cape vulture (Gyps coprotheres) and the associated threats to power supplies, this partnership has expanded to ensure a decrease in mortalities of other species and a more reliable supply of electricity to the benefit of the environment, power utility and end-users. This partnership is estimated to save Eskom some $3.5 million annually through improved network performance; a result of sound wildlife-interaction-management. Assistance has included retrofitting power lines constitute an electrocution or collision hazard with markers or extra insulation to make them 'bird friendly' and proactively finding ways to redesign or appropriately position power lines. The partnership helps plan routes and design electricity structure that takes account of the threat that ill-considered options pose to both avifauna and maintaining reliable power supplies.

BOX 14.2 STANDARDISED RESEARCH METHODOLOGY FOR WILDLIFE-ROAD MORTALITY

Robust data-gathering can be used for informed decision-making, and in 2011, the first national multi-species protocol for the monitoring of wildlife-road mortalities in South Africa was developed (Collinson et al. 2014); this ultimately led to mitigation trials for specific species. This protocol identified the factors affecting roadkill rates and was implemented in the Greater Mapungubwe Transfrontier Conservation Area (GMTFCA) in the northern Limpopo Valley of South Africa, a World Heritage Site. This protocol for data collection has since been adopted for use in other countries such as Tanzania, Ethiopia, and the USA (Collinson et al. 2017).

It is important that future research becomes more standardized to enable statistical comparisons between different studies and sites, and over time. The conservation implications of the multi-species protocol are far-reaching since roads are a necessary component of economic development and yet negatively impact upon biodiversity.

14.5 Conclusions

The South African government seeks to transform into a globally competitive industrial economy and it is clear that development corridor programmes have enormous socioeconomic value. However, in some cases, there could be irreversible, negative impacts for biodiversity and ecosystem services, and these impacts need to be avoided and minimized. This is especially true in a country of such rich natural heritage.

While much progress has been made in the last decade to identify the scope and scale of the threats from infrastructure development on biodiversity, further means to determine successful measures to reduce the negative impacts of corridors are needed in the planning, routing and operation of developments. It is important to consider the various impacts that developments have on species and ecosystems, since these impacts are largely non-specific, and a multitude of species and ecosystem functions may be under threat.

An ecologist specializing in the relevant sectors comprising linear infrastructure as well as the species impacted can provide valuable input to the overall EIA process and should be involved as early as possible in the process. Both the faunal and floral assessment components of the EIA process must evaluate all possible impacts of development, as well as cascade effects along the trophic hierarchy; that is, an unforeseen chain of events resulting from a development project that will have a negative impact in all biological communities (Manlick and Pauli 2020). Any form of development should consider the protection of ecological corridors and avoid any further loss of habitat connectivity. (Clevenger and Wierzchowski 2006). Ultimately, any form of linear infrastructure will threaten populations (Trombulak and Frissell 2000), species (Ferraras *et al.* 1992; Havlick 2004; Kroll 2015), and critical habitats (Liang *et al.* 2014), especially when appropriate mitigation measures are not put in place.

Maintaining the integrity and functionality of the South African landscape in conjunction with infrastructure development should be integral to any development plan and/or project. Following the mitigation hierarchy approach during the planning and implementation process will not only minimize negative environmental impacts, but should also lead to the path to achieving no net loss or net gain for biodiversity (Constitutional Court of South Africa 2018). To this end, SANBI coordinates several bioregional and ecosystem programmes that focus on priority actions for biodiversity in South Africa's most threatened biomes and ecosystems, identified through science and stakeholder consultation. Such information is essential for strategic spatial planning that can provide robust guidance to corridor planners for avoiding areas of irreplaceable biodiversity, while also identifying areas where infrastructure development is appropriate and should be encouraged.

South African partnerships that are developed with innovative business leaders to identify and manage the business risks and opportunities that result from interactions with the natural world can provide a platform for partnerships to discover solutions that lead to sustainable business growth (South African Council for Natural Scientific Professions 2020b). For example, the EWT-Eskom strategic partnership model has been internationally recognized as an effective approach to the management of wildlife interactions on power line infrastructure, and has been replicated in other countries (Ledger 1989; Ledger 1990). Several more power utilities across the African continent are currently targeted for implementation of the EWT-Eskom strategic partnership model, strongly supported by several financial institutions that increasingly recognize the need to ensure long-term environmental sustainability. There is a strong motivation to not only uplift the economy, but to ensure that our natural systems retain critical ecosystem services for the well-being of our people.

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Appendix 1 International, national, and regional stipulations to address infrastructure development and DCPs for South Africa

#	Legislation	Description
		International
1	**United Nations Sustainable Development Goals**	The Sustainable Development Goals (SDGs) aim to build infrastructure that promotes economic growth demands, while protecting biodiversity and our environment into the future. From an international perspective, Development Corridor Partnerships (DCPs) should directly address three of the United Nations (UN) 17 SDGs: "to build resilient infrastructure through innovation (Goal 9), to protect and promote the persistence of life on land (Goal 15), and to promote partnerships for the goals (Goal 17)". https://sdgs.un.org/goals
2	**United Nations Convention on Biological Diversity**	The Convention on Biological Diversity's (CBD) Aichi Target 9 was signed by all African nations in 2011 and ranked South Africa as sixth out of the world's seventeen megadiverse countries. Subsequently the Unite Nations' 17 Sustainable Development Goals (SDG) and Aichi Targets of the CBD established that conflict between linear infrastructure and biodiversity is especially important where the last large tracts of unfragmented land with high biodiversity remain. In 2018 mainstreaming biodiversity in energy, mining, and infrastructure development, was a major goal in the framework of the CBD to achieve Aichi Biodiversity Targets by 2020. The desired aim of Aichi Biodiversity Target 5 was that the rate of loss of all-natural habitats and degradation and fragmentation is significantly reduced. However, according to Global Biodiversity Outlook 4 (Secretariat of the Convention on Biological Diversity 2014), the habitats' degradation and fragmentation reduction is still in negative trends. Furthermore, the Global Biodiversity Outlook 4 states that actions to enhance progress towards Target 5 (and other targets), if more widely applied relate to: "Identifying, at the national level, the direct and indirect causes of habitat loss as the greatest impact on biodiversity, to inform policies and measures to reduce this loss; » Developing a clear legal or policy framework for land use and spatial planning that reflects national biodiversity objectives (Target 2); and,

		» Aligning existing incentives to national objectives for land use and spatial planning, and the use of further incentives to reduce habitat loss, degradation, and fragmentation, including as appropriate, payments for ecosystem services and Reducing emissions from deforestation and forest degradation (REDD) mechanisms (Target 3)". » However, as the world, gears up to adopt a post-2020 Biodiversity Framework, there are concerns that while DCPs will likely improve some livelihoods, the scale of those that are adversely affected through reduced ecotourism opportunities could be as much as 70 per cent. https://www.cbd.int/
National		
3	**The Constitution of South Africa**	The Constitution of South Africa (Act 108 of 1996) states that everyone has the right: a. "to an environment that is not harmful to their health or well-being; and b. to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that i. prevent pollution and ecological degradation. ii. promote conservation; and iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development". https://justice.gov.za/legislation/constitution/SAConstitution-web-eng.pdf
4	**The 2011 National Development Plan (2030)**	The vision of the National Development Plan (NDP) is that by 2030, investment in infrastructure development, (primarily the transport sector) will ensure that it serves as a key driver in empowering South Africa and its People, enabling, "greater mobility of people and goods through transport alternatives that support minimised environmental harm". https://www.gov.za National Development Plan 2030 | South African Government
5	**National Framework for Sustainable Development**	The National Framework for Sustainable Development (NFSD) Strategic Focus Area 5 clearly states that one must, "respond appropriately to emerging human development, economic and environmental challenges". https://www.environment.gov.za/documents/strategicdocuments/nfsd National Framework for Sustainable Development | Department of Environmental Affairs
6	**SANBI Biodiversity and Land Use Project**	The Biodiversity and Land Use Project, implemented by the South African National Biodiversity Institute (SANBI) together with its partners and funded by the Global Environment Facility (GEF) through the United Nations Development Programme (UNDP), was established to support municipalities in protecting critical biodiversity through better land management (Fig. 14.2). It was initiated in March 2015 and is in its second year of implementation. The overarching objective of the project is "to minimise the multiple threats to biodiversity by increasing the capabilities of authorities and landowners to regulate land use and manage biodiversity in threatened ecosystems at the municipal scale". https://www.sanbi.org Biodiversity and Land Use Project | SANBI

7	**Department of Forestry and Fisheries (DEFF) (Environmental Screening Tool – EST)**	The Department of Forestry and Fisheries have established an ongoing, open access national Environmental Screening Tool (EST), which by law, must be incorporated into the scoping phase of all EIAs (as of October 2019) to prevent threatened species being overlooked and reduce subjectivity inherent in previous assessment processes. The EST screens for environmental sensitivity on proposed development sites. In the case of the Terrestrial Animal Theme (which forms part of the greater Biodiversity Theme and includes data from birds, reptiles, amphibians, mammals and butterflies), a four-tiered sensitivity rating has been applied, namely, "low", "medium", "high" and "very high" sensitivity. These sensitivities are intended to indicate the presence of threatened species and guide development decisions. https://www.environment.gov.za Home | Department of Environmental Affairs
8	**National Environmental Management Act 107 & 109 of 1998**	The transport sector, especially in the context of environmental sustainability, is informed by several national policies, strategies, and legislation, as well as international agreements to which South Africa is a signatory. The National Environmental Management Act (NEMA) requires that an Environmental Management Programme (EMPr) be submitted where an EIA has been identified as the environmental instrument to be utilised as the basis for a decision on an application for Environmental Authorisation (EA). "NEMA 109 of 1998 also provides guidelines for conducting Environmental Impact Assessments (EIAs). Updated in 2010, South Africa's EIA regulations outline the process of assessing, investigating, and reporting potential environmental impacts of developments and activities. EIAs are governed by the following regulations: Environmental Impact Assessment EIA Regulations (Government Notice R.543 in Government Gazette 33306 of 18 June 2010; » Listing Notice 1 (Government Notice R.544 in Government Gazette 33306 of 18 June 2010) – activities requiring a basic assessment report (BAR); » Listing Notice 2 (Government Notice R.545 in Government Gazette 33306 of 18 June 2010) – activities requiring both scoping and Environmental Impact Reports (EIRs); » Listing Notice 3 (Government Notice R.546 in Government Gazette 33306 of 18 June 2010) – activities which require only an environmental authorization through a BAR if the activities are undertaken in a specified geographical area; and, » Environmental Management Framework Regulations (Government Notice R.547 Government Gazette 33306 of 18 June 2010)". » As an example of energy and NEMA, the scope of a generic EMPr applies to overhead electricity transmission infrastructure including and upward of 132kV requiring environmental authorization in terms of the NEMA. Lower voltage is currently only subjected to a Basic Assessment (BA) process with less stringent requirements placed on developers. However, despite efforts made for the provision of smaller clearances between phases, distribution networks contribute significantly to the countries overall bird collision mortalities. https://www.environment.gov.za National Environmental Management Act [No. 107 of 1998]

9	**National Forests Act 84 of 1998**	Chapter 1 (Introductory Provisions) of the National Forests Act 84 1998, establishes the purposes for which this Act is passed. It defines important words and terms used in the Act and guides its interpretation. The purposes of this Act are to: a. promote the sustainable management and development of forests for the benefit of all; b. create the conditions necessary to restructure forestry in State forests; c. provide special measures for the protection of certain forests and trees; d. promote the sustainable use of forests for environmental, economic. educational. recreational, cultural, health and spiritual purposes; e. promote community forestry; and, f. promote greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination". https://www.cer.org.za National Forests Act No. 84 of 1998 – Centre for Environmental Rights (cer.org.za)

15

Lessons Learned from the Maputo Development Corridor: An Environmental and Social Perspective

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ABSTRACT

The Maputo development corridor (MDC) has been described as a successful transport corridor due to its positive economic impacts, but is perhaps less successful when viewed through an environmental, social and planning lens. In this chapter, I identify what lessons can be gleaned from the successes and failures of the MDC to achieve the target of a holistic development corridor. The linkages of the MDC with three areas: environmental, social and land-use planning are explored, with a view to creating an enabling environment for transport corridors to be true development corridors from the very outset. Through a literature review I explore the background, aims and practical implementation of the MDC. Shortcomings at the outset of corridor creation in the areas of environmental assessment, community and public participation and the prioritization of investment and infrastructure over other objectives, are some of the pitfalls that should be avoided when creating development corridors. There is a requirement to balance the need for investment and the fast-track approach, which is so inviting to investment with a suitably environmentally sustainable approach, so that the rapid implementation of development projects do not predominate over environmental and social issues. The key takeaway from this chapter is that a development corridor requires the adoption of a plan that is clearly communicated, the setting up of meaningful community engagement and the involvement of local government and people surrounding the proposed development corridor area at the early stages of corridor development. A holistic approach must be taken to ensure that a development, rather than simply an infrastructure or transport corridor, is the result.

15.1 Introduction

The MDC is an international transport corridor connecting the landlocked Gauteng Province in the Republic of South Africa (South Africa) to the port at Maputo in the Republic of Mozambique (Mozambique). These countries are both located at the southern part of the African continent. The MDC constitutes the shortest road and rail linkage between the provinces of the Gauteng, Northwest, Limpopo and Mpumalanga in South Africa, and a deep-water port located in Maputo, Mozambique (Mtegha *et al.* 2012). The MDC can be said to be the most prominent project of South

African's Spatial Development Initiative (SDI) programme (Mtegha *et al*. 2012). This SDI programme, developed by the government of South Africa in 1995, aims to generate investment in key areas of the country, with a view to facilitating economic growth and employment (Rogerson 2001).

It is generally agreed that transport infrastructure is vital for economic development and human well-being (Quium 2019) and that development corridors have the potential to promote trade competitiveness, economic diversification and local economic development, as well as providing opportunities for those communities and persons living in the vicinity of the corridor. Transport corridors focus on the enhancement of the flow of goods and people from one area to another, while development corridors focus on wider social and economic development growth (Cox and Hope 2015), as well as looking at the corridor development more holistically, without a focus on a specific area, such as transportation. Development corridors often start as transport or trade corridors and then evolve to support broader socioeconomic development, and to consider more holistically their social, environmental and economic effects and benefits (Cox and Hope 2015). While the MDC is widely regarded as successful from an economic development perspective, the same may not necessarily be said when evaluating it through an environmental and social lens. Therefore, while the MDC is known as a development corridor, the word development even being in its name, it could be said that, in practice, it has not yet evolved into one.

The timing of the MDC is notable, and assists in contextualizing the MDC. In 1994, South Africa celebrated the end of the apartheid system[79]. The apartheid government had made use of planning laws and policies in order to underpin segregationist policies. These planning laws and policies were used to create an unequal dispersal of facilities, infrastructure and even accessibility, with difficult transportation routes and large distances between the areas in which the poor and rich lived (Berrisford 2011). Mozambique had also, in 1992, come out of a period of civil war, which had ravaged the country for nearly 16 years. Both governments were eager to stimulate economic growth, as well as to re-establish the historic trade between the two countries (World Bank 2014). The MDC was revived in 1995 pursuant to South Africa's post-apartheid SDI programme, intended to create a conducive environment for investors. The inception of the SDI programme was therefore inherently economic (Jourdan 1998). The SDI's aim was to bring together spatial planning and development projects to grow areas of unrealized economic potential (Cox and Hope 2015). The MDC can be said to be a part of, as well as the prototype for, the SDI system (Roodt 2008).

The MDC was planned against an existing route that had previously linked South Africa's economic hub with the Maputo Port. The route had subsequently become unused and deteriorated due to neglect caused by geopolitical factors such as the civil war in Mozambique and the sanctions placed on South Africa during apartheid (Dzumbira *et al*. 2019). The focus of the MDC included infrastructure development, namely the revamping of the Witbank Maputo N4 toll road, the upgrading of the Maputo port, construction and revamping of electricity infrastructure and the railway line, as well as the establishment and development of the Mozal aluminium smelter, the Maputo Iron and Steel Project and the Pande/Temane gas fields (Roodt 2008; Dzumbira, Geyer Jr, H.S., Geyer, H.S. 2017). This focus on physical infrastructure development and investment was due in some part to the drivers of the MDC initially being the transport ministries of both countries (Roodt 2008). Although the MDC was planned on an existing route, drivers for the geographic location of anchor projects were the availability of cheap electricity for Mozal and the availability of gas in Southern Mozambique for the Sasol petrochemical complex in South Africa (IMF 2014).

The characteristics central to the SDI concept are transport infrastructure and logistics consisting of primary and feeder roads, railway facilities, infrastructure at ports and borders between countries, if applicable. Key anchor projects in the mining, agricultural and other sectors with high demand for transport and logistics services, which have the ability to unlock the economic potential of the targeted corridor area are also integral to the SDI concept (Sequeira, Hartmann and Kunaka 2014). The placement of these large-scale anchor developments, and the ancillary infrastructural developments may add to the environmental controversies surrounding development corridors, such as the MDC. For example, the Mozal smelter is estimated to consume some 564,000 tons of water per year, to generate 153,000 tons per year of waste water and it is one of the largest consumers of electricity in the whole of Mozambique (Jenkins 2000).

The MDC had four stated objectives (Mitchell 1998; Söderbaum and Taylor 2001):

1. The rehabilitation of primary infrastructure along the corridor, together with the participation of the private sector.

2. The maximization of investment in inherent corridor potential, including access to global capital and the facilitation of regional economic integration.

3. Social development, creation of employment opportunities, economic growth and increased participation of historically disadvantaged communities.

4. Environmental sustainability through the

79 Apartheid was a legislated system and policy delineated along racial lines from the years 1948 – 1994. The spatial effects of apartheid fall outside of the scope of this article. For more on this topic, read the article Berrisford, S. Unravelling Apartheid Spatial Planning Legislation in South Africa. Urban Forum 22, 247–263 (2011). https://doi.org/10.1007/s12132-011-9119-8.

development of policy, strategies and frameworks encompassing a holistic, participatory and integrated approach to environmental management.

Despite environmental sustainability being listed as one of the four objectives to the MDC, there is a substantial lacuna in the literature addressing this objective, with much of the literature surrounding the MDC focused on the economic and physical infrastructural developments and effects. The aim of environmental sustainability, although progressive, was perhaps premature given that the legislative tools that would today be considered to ensure environmental sustainability were not yet promulgated at the time of the MDC. As an illustration, in South Africa the National Environmental Management Act No.107 of 1998 (NEMA), which promoted the concept of sustainable development, was only promulgated in 1998. While there had been environmental legislation prior to this, it was not as extensive as NEMA. Furthermore, the apartheid structures that in effect disaffected the majority of South Africans from land, had the effect of cultivating negative and hostile attitudes towards environmental issues and policies (Sowman, Fuggkle and Preston 1995). Despite the goal of environmental sustainability, until September 1997 the provincial government in South Africa was not legally empowered to require Environmental Impact Assessments (EIAs) for major projects such as roads, railway lines and power infrastructure (Mitchell 1998).

15.2 Problem statement

Despite many successes, the MDC has garnered criticism for various failures, such as:

- The top-down management structure of the MDC and its implementation did not consider the priorities of local stakeholders. The institutional approach to the MDC of facilitating GDP growth through export projects does not necessarily result in a community and people-orientated development (Dzumbira et al. 2019). This highlights the importance of planning and engagement at different structures of government to avoid a deficit at the community and local government level.
- The goal of attracting transnational private investment and empowering local communities has been said to be contradictory (Söderbaum and Taylor 2003). The focus on large-scale anchor projects and infrastructure has left socioeconomic development at a community level and environmental issues that have not been effectively explored as part of the MDC. As stated above, the focus on infrastructure and investment was largely due to the fact that the MDC process was conceived of and driven by the transport ministries of South Africa and Mozambique (Roodt 2008).
- Despite environmental stability featuring as one of four key objectives of the MDC, there was very little legislative basis for the requirement of EIAs for projects such as railway lines and the construction of roads in 1996, at the time of the inception of the MDC and the construction of much of the infrastructure flowing therefrom (Mitchell 1998).

The MDC could be said to suffer from being a transport or infrastructure corridor centred around central key infrastructure development and investment, rather than a sustainable development corridor in a holistic sense, that maximizes development opportunities (including, but not limited to, transport and infrastructural development) in an environmentally sustainable manner.

The aim of this article is to examine what lessons can be learned from the MDC to maximize the potential positive outcomes of a corridor through early planning. Specifically, it looks at the linkages of the MDC with three areas: environmental, social and land-use planning, to ascertain how to create an enabling environment for corridors to be true development corridors.

This has become even more important in recent years, with the concept and implementation of development corridors becoming more widespread, especially within Africa. SDI's have, since 1995, gained the most attention in Africa, aided by their promotion by the New Partnership for Africa's Development. In 2002, the Southern African Development Community took up the idea of SDIs for the region, creating the Regional SDI Program, adapted in line with various southern African countries. Development corridors are also integral to African Mining Vision (AMV). Indeed, Annex 2 to the AMV is dedicated to development corridors, with mining activities and infrastructure constituting the anchor projects, and the MDC as exemplary of the successes of development corridors (African Mining Vision 2009).

15.3 Linkages with environmental and social environmental assessment in planning and management of corridors

15.3.1 The environmental link

At the time of the development of the MDC in 1996, the issues of sustainability and an integrated view towards environmental assessment were arguably not as predominant as they are today. This, together with the fast-tracked SDI system, saw the development of a corridor that did not effectively consider environmental factors. Mitchell (1998) sets out three weaknesses of the SDI process of the MDC in respect of environmental impacts and assessment, namely:

The MDC focused on a project-based approach, which was very useful in fast-tracking implementation, but which fragments the assessment process and does not allow for a holistic view of the impact of the entire corridor.

An extremely narrow deadline was set by the Mpumalanga provincial government for conducting and producing the EIA of a toll road. This resulted in an EIA that was deficient in many respects, and in conflict within communities affected by the toll road. This was due in large part to the time demands of project implementation as well as the driver of the project being the Department of Transport in South Africa, as opposed to a collaborative approach between the ministry and the provincial government.

The MDC was launched at a time when there was very little legislative basis for the requirement of EIAs at a provincial level for projects such as railway lines and the construction of roads. It would only be in 1997 and 1998 that enabling legislation was promulgated.

Perhaps the first notable issue that must be tackled from an environmental sustainability perspective, with respect to development corridors, could be said to be the choice of anchor project. Anchor projects have been crucial in supplying the economic rationale for the MDC. Particularly emblematic is the anchor on the Mozambiquan side of the MDC namely the Mozal smelter and the Pande/Temane gas fields. The aluminium smelter constituted Mozambique's first megaproject since the end of its civil war, and aimed to attract investors through financial incentives and access to low-cost energy (IMF 2014). This access to relatively low-cost energy was provided by the importing of electricity from Eskom (a mainly coal-fired energy provider in South Africa), and to a smaller extent electricity from Cahora Bassa (a hydropower station in Mozambique) (IMF 2014; Sequeira Hartmann and Kunaka 2014; World Bank 2014).

In a post-Paris Agreement world, there has been a substantial move away from coal as an energy source. Future corridor developments should look holistically at the anchor projects and the requirements, such as its electrical, spatial and water needs. While anchor projects may have their own legislated EIA requirements (for example, the Mozal smelter has an EIA), this project-based approach is one of Mitchell's criticisms of the MDC (Mitchell 1998). There must be an overarching environmental strategy and assessment to ascertain what the impacts of the corridor in its entirety will be, rather than on a project-by-project approach. This approach must take place at the policy cross-sectoral level, and can be achieved through a Strategic Environmental Assessment.

The tightened timeframes and fast-track approach of the SDI model perhaps exacerbated the lack of focus on thorough EIAs. A balance must be struck between creating an enabling regulatory environment for investment in a corridor, while ensuring that EIAs are prioritized. However, South Africa

and Mozambique's legislative environmental frameworks have evolved considerably since 1996[80]. The EIA requirements for the N4 toll road in South Africa without the astrophe s and other infrastructure developments would be constructed pursuant to far stricter legislative requirements. Exemplary of this is the upgrading of the N13 road forming part of the Nacala development corridor, which was classified as a Category A development, requiring a full EIA pursuant to Mozambique's EIA Regulations of 2004. The scoping study was subsequently approved in January 2008, and a full environmental and social impact assessment study was undertaken in 2009 for the African Development Bank, which funded the project. The last two decades have seen environmental and social assessments form part of funding decisions[81] and the creation of frameworks such as the Equator Principles, which have guided the thinking around financing towards a more ecologically sustainable framework[82].

Cox and Hope (2015) argue that the political buy-in to a low carbon strategy paired with the will and the capability to implement and enforce it are necessary in ensuring the reduction of the environmental impact of any infrastructural development or upgrade pursuant to a corridor initiative. Indeed, the MDC – which was publicly supported by the presidents of both Mozambique and South Africa, and championed by some provincial leaders – is exemplary of the success that political support can attain (Söderbaum 2001; Mtegha *et al*. 2012). However, at the time of the MDC, the low carbon agenda was not predominant and was not a feature of political support for the MDC. The MDC does have some minor environmental successes; for example, the upgrading of the N4 toll saw a greatly improved vertical and horizontal alignment of the road and the construction of either dual carriageways or overtaking lanes. These allow passing of slower vehicles, which results in less fuel and lower emissions (Cox and Hope 2015).

The current legislative framework, guided by international soft law principles of environmental sustainability, is vastly different from that of 1996. An important takeaway from the MDC is that, before a corridor project is launched, there must be an effective national environmental legislative framework and a regulator with teeth to ensure sustainable outcomes or, at the very least, to ensure that the full impacts have been evaluated and considered. A further takeaway is that, although the SDI process is characterized by its short-term and targeted approaches to growth, there must be a balance between fast-tracking and streamlining processes and ensuring a thorough holistic analysis of the entire corridor, as opposed to a project-based approach.

At the early planning and implementation stages of the MDC, the holistic and environmentally sustainable approach to the MDC was undermined by the requirement to achieve the rapid implementation of development projects (Mitchell 1998). The social environmental assessment for the electricity grid infrastructure and gas pipeline extension programme, a major gas transmission route that is currently undergoing an assessment process in South Africa, states that it takes on average between one to two years for an EIA to be completed, in terms of the NEMA. This period is long and there must be a balance struck between thorough environmental analysis and allowing for public consultation and appeal processes, as well as providing for a shortened timeframe, in keeping with the streamlined SDI methodology. Setting

80 In 1996, the environmental impact process was largely regulated in South Africa by the Environment Conservation Act (No. 73 of 1989) and there were EIA Regulations (GN R 1182 – 1184 in GG 18261 of 5 September 1997) published pursuant to this Act in 1997. The National Environmental Management Act (No.107 of 1998) (NEMA) was then promulgated in 1998 (with effect from 1 January 1999) and espoused the concept of sustainable development. There have been a series of EIA Regulations which have since been published pursuant to NEMA with far more stringent EIA requirements related to activities such as roads and railways. In Mozambique, Law Decree No 20/97: Environment Law was published in October 1997. With respect to roads, the Mozambiquan Environmental Guidelines for the Road Sector were prepared in January 2002.

81 See for example the Environmental and Social Assessment Procedures, 2015 (revised from 2001 version) of the African Development Bank. A copy of which can be obtained at https://www.afdb.org/en/news-and-events/afdb-launches-revised-version-of-its-environmental-and-social-assessment-procedures-for-2015-15013.

82 FirstRand Bank included its financing of the Nacala Railway and Port Corridor in its 2018-2019 Equator Principles Report. See https://equator-principles.com/reporting-firstrand-limited-2017-2018/.

realistic and manageable timeframes as well as specific task teams for corridor projects could assist with this.

15.3.2 The social link

The speed of the SDI process could be said to be contradictory to a consultative and bottom-up approach (Bek and Taylor 2001). The MDC has been said to have had a deficiency in community engagement at the planning stage and a lack of will in creating local capacity to manage the MDC process, or to involve the broader community and local levels of governance (Roodt 2008). A national-provincial relationship characterizes the MDC with a governance deficit of actors at the local level.

In Mpumalanga, there has been limited communication about the MDC between the provincial government and local government, communities, the private sector and organized labour. In some part caused by changes in political leadership, with the previous premier of Mpumalanga being a political champion for the MDC, and future leaders not sharing this view (Roodt 2008). Many local communities, which have been directly affected by it, have very little information on the project (Mitchell 1998).

There also existed the creation of unrealistic expectations to the local community in the marketing of the MDC (Bek and Taylor 2001). There was also no genuine debate on the MDC prior to its public launch (Bek and Taylor 2001), which added to the high expectations of local benefits, as there was no opportunity for the project to be critiqued and discussed.

The SDI programme underlying the MDC was heavily centralized, with a focus on speed and large infrastructure projects. This situation was heightened by the nature of the process of engagement with the local community (Bek and Taylor 2001). This inadequate involvement of the affected local communities was not only on the South African side, illustrated by residents in the Matola area having lodged grievances regarding the lack of consultation by the government in respect of the N4 toll road (Mtegha *et al.* 2012). Some of the grievances by the local South African populations have been that certain taxi associations were not invited to consultations regarding tolls, despite the direct effect that it would have on this industry, which conveys a large part of the informal economy. There was also a general perception by Mozambiquans that the MDC created a shortage of water and energy (Bek and Taylor 2001). This is not to say that there was no community engagement. There were bodies set up that were mandated to conduct some engagement at different levels. Indeed, there have been complaints by government that the lack of consultation is also due in part to organizations not taking part in consultations and complaining in retrospect (Bek and Taylor 2001).

The takeaway is that a development corridor requires the adoption of a clear plan that is clearly communicated, the setting up of processes of meaningful community engagement, and the involvement of local government and people surrounding the proposed development corridor area at early stages of the corridor development. This requires that, at the early planning stages of corridor development, there must be an assessment made of all the relevant stakeholders and municipalities, and civil society groups should be included in such a list. There should also be a publication and public comment system. This public participation should follow the tenets of meaningful engagement and should be seen as a material part of the corridor development process, rather than a tick-box exercise, which has no real effect on the outcome of the process. A reasonable opportunity must be made available to the public and relevant stakeholders, with sufficient information provided, to know about the proposed issues and to have a say.

The MDC did have well-organized and meaningful involvement from the private sector. The South African side of the MDC has had some success in creating opportunities for small-, micro- and medium-sized entrepreneurs (SMMEs) by taking deliberate actions to create these opportunities (Mtegha *et al.* 2012). For example, the Mpumalanga Provincial Inter-departmental Technical

Committee (established early in the MDC process in 1996) developed a programme to make possible several projects aimed at maximizing development opportunities along the corridor (Roodt 2008). This was largely because of the political leadership in Mpumalanga at the time. When planning the anchor projects, linkages with provincial and local economies must be considered. There must be a consideration of how to densify and deepen the development corridor, such as through ancillary infrastructure to the anchor project. This must be done early on, as anchor projects may need to be reconfigured slightly in reaction to the modes of densification identified (Mtegha *et al.* 2012). These must be assessed through a social and environmental lens, as well as through an economic one. The MDC was not capable of generating densification activities on the Mozambican side, for a variety of reasons, including time constraints, and therefore needed supplementary efforts of the International Finance Corporation to stimulate SMMEs in the Matola area (Mtegha *et al.* 2012; Thomas 2009).

Despite the nationally driven focus on infrastructure and investment from the MDC, there has been a few efforts to integrate it with provincial and local development planning initiatives. On the South African side, the provincial government was involved on a technical level in the MDC process. In 1996, a technical unit was constituted in Mpumalanga, with the assistance of national government. The South African government also set up a joint technical committee, which was a forum allowing national departments to inform provinces about the processes and progress in relation to the MDC. Mozambique did not pursue a similar process (Roodt 2008). The establishment of the Maputo Corridor Company in mid-1997, albeit short-lived, gave additional impetus to involving local government and communities. However, the business of the corridor as an investment and infrastructure initiative continued to dominate.

The focus on anchor projects and big investments in the MDC resulted in a lack of consideration of the informal sector, in which many people, especially women, living along the corridor were involved. Rather than have this initially included in the planning stages, the company assigned the concession of the toll roads acted reactively, with some success, in building some permanent roadside stalls in a lay-by for these traders (Cox and Hope 2015).

15.3.3 The land-use planning link

In South Africa, the corridor concept is widely used as a development instrument at the national, regional and local levels of planning. For this reason, the South African Spatial Planning and Land Use Management Act 16 of 2013 (SPLUMA), which came into effect in 2015, allows the use of urban corridors as a planning tool (Dzumbira, Geyer Jr, H.S. and Geyer, H.S. 2017). The Constitution of the Republic of South Africa, 1996 coupled with the local elections in 2000, saw the creation of wall-to-wall municipalities, so that all land in the country falls within the jurisdiction of a municipality and must be included in its spatial development plan. This regulatory shift also strengthens the public consultation and local community requirements, as many changes in land use are subject to a rezoning requirement.

SPLUMA was not promulgated at the time of the MDC, rather a more fragmented land-use system was in place. To promote sustainability, however, a thorough conceptualization for the structural and content classification of development corridors should be incorporated into national, provincial and local planning process to ensure that the correct type of development corridor is planned according to different areas' properties to ensure maximum socioeconomic benefits for the proposed corridor development area (Dzumbira, Geyer Jr, H.S. and Geyer, H.S. 2017). Given that SPLUMA provides for each municipality to have a spatial development framework (which is reviewed every five years) and that provision is made for a National Spatial Development

Framework[83], this has provided the national government with a document that it can consult at the very early planning stages to ascertain the spatial makeup of any municipal area, including the dominant industries. This can assist in creating very high-level ideas for synergies with anchor projects.

The sustainability of the public-private partnership arrangement underpinning the MDC has been challenged by the lack of responsiveness of the Mozambiquan authorities to locate land for the expansion of the highway road. Long-term planning for different phases of a corridor must be considered and having a holistic plan, which feeds into a national spatial framework while being alive to the position locally, is a way of ensuring the longevity and sustainability of a corridor.

15.4 Conclusion

As the MDC was the first SDI process in southern Africa, it is worthwhile to reflect on its evolution over the past almost three decades and learn from its achievements and apparent shortcomings. The following lessons can be learned from the MDC to create truly sustainable development corridors, rather than mere transport or infrastructure corridors focused on infrastructure and economics (see Chapter 1 for these definitions).

There must be engagement at a national, provincial and local level at the early planning stages of a corridor development. This should include:

1. Ascertaining the relevant stakeholders and local governance structures, including municipalities and civil society groups.
2. The adoption of a plan that is clearly communicated and setting up processes of meaningful community engagement.
3. The importance of political champions but also creating sustainable institutions and bodies so that a change in leadership or weak leadership will not have the effect of dismantling these institutions.
4. A consideration at the very early planning stages of how to densify and deepen the development corridor, such as through ancillary infrastructure to the anchor project.
5. Consideration of how to incorporate current informal trades into the corridor design so that the corridor can assist in the growth of these jobs.

In terms of environmental impacts, the most notable lesson from the MDC is that a strong legislative environmental framework must exist prior to corridor development. Planning a corridor before this being in place can lead to a lack of focus on environmental assessments. The requirement to achieve the rapid implementation of development projects must be balanced with the need to have thorough EIA processes. Importantly, there must be a holistic EIA process undertaken, rather than on a project-by-project basis (although individual projects may still require separate environmental processes and authorizations). This will allow for the holistic effect of the anchor projects and the corridor to be assessed. Political buy-in to a low carbon strategy is necessary and this message must be clearly articulated and marketed. The importance of political champions is demonstrated by the MDC.

A strong legislative land-use planning framework that considers land uses at all levels of governance will assist in creating socioeconomic linkages and in the involvement of communities in land-use planning. It will also allow for long-term planning and for a sustainable vision for the corridor, taking in to account current land uses.

83 A draft 2019 National Spatial Development Framework has been published for comment.

In conclusion, corridor development must be holistic, considering a variety of factors and placing issues of local participation and environment at the same level as infrastructure development and investment. While SDI's are short term, corridors have long-term effects, and this long-term thinking must be adopted from the very outset of corridor development. Fragmented approaches to any area of corridor development cause deficits in the environmental and social effects of the corridor.

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Asian Case Studies

16

Environmental Safeguards for the Belt and Road Initiative: Current Status and Future Prospects

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ABSTRACT

Encompassing eight transcontinental corridors that span 71 countries, China's Belt and Road Initiative (BRI) has been dubbed the largest infrastructure development programme in history. While China's five cooperation priorities for the initiative, namely, "policy coordination, facilities connectivity, unimpeded trade, financial integration and people-to-people bonds" go well beyond mere infrastructure building, whether BRI's corridors will emerge as true development corridors will depend on the quality of environmental and social safeguards in place. This chapter makes an inquiry into the potential environmental impacts of BRI projects and the safeguards used to manage those impacts. The environmental impacts typical of infrastructure development are likely to be more pronounced in the case of BRI, given its scale and proximity to ecologically-sensitive areas. Environmental safeguards with requirements for impact assessment and mitigation for BRI can be brought to the table by various actors including Chinese regulators, host country governments, international bodies, projects developers and financiers. Content analysis reveals that, while the policies issued by regulators, industry associations and international multi-stakeholder bodies include broad plans on environmental protection and some even project-level guidelines, none offer binding operational requirements, something that can go a long way in making project outcomes sustainable. Fine-tuned through decades of international application and regular stakeholder consultations, the safeguard standards of multilateral development banks (MDBs) can act as useful templates for improving environmental standards for the BRI.

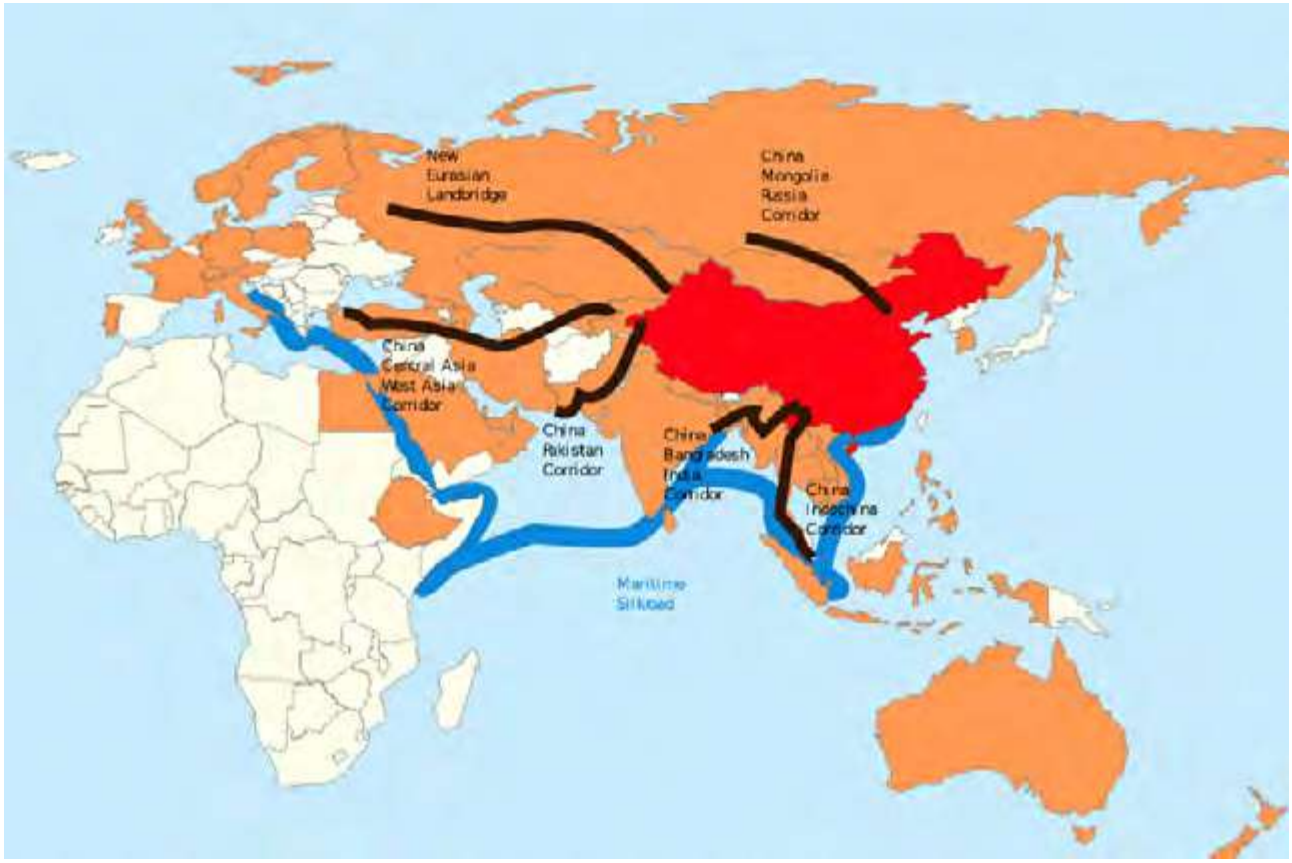
16.1 Belt and Road Initiative: scale and scope

China's BRI envisages eight economic corridors connecting population centres across 71 countries (referred to as corridor countries) in Asia, Europe and Africa (Kenderdine 2017; National Development and Reform Commission 2015). Among the corridors are six overland ones, that connect China to Central Asia, Southeast Asia and Europe (together called the Silk Road Economic Belt), and one maritime corridor that connects China to Africa via the South China Sea and the Indian Ocean (referred to as the 21st-century

maritime silk road) (Fig. 16.1). Another recent addition is the 'polar silk road', which would involve developing new shipping lanes along the Northern sea route (connecting China to Northern Europe) that is likely to open up with the rapidly melting Arctic. More than 12,000km of roads and 31,000km of railways (both new and upgrades) along the overland corridors (Losos *et al*. 2019) and 70 ports along the maritime corridor (Turschwell *et al*. 2020) are already underway. These transport infrastructure projects being built along BRI's corridors are acting as axes of future economic growth, catalyzing hundreds of energy, industrial and resource extraction projects around them (Teo *et al*. 2019).

Figure 16.1 Corridor countries along six overland, and one maritime corridor

The overland corridors include the Bangladesh-China-India-Myanmar economic corridor (BCIM), the China-Central Asia-West Asia economic corridor (CCWAEC), the China-Indochina Peninsula Economic Corridor (CICPEC), the China-Mongolia-Russia Economic Corridor (CMREC), the China-Pakistan Economic Corridor (CPEC) and the New Eurasian Land Bridge (NLB).



Source: Wikimedia Commons.

Since BRI was announced in 2013, China has signed Memorandums of Understanding (MoUs) with 144 countries (including most of the 71 corridor countries) and 30 international organizations to participate in the initiative (Belt and Road Portal 2020; Coenen *et al*. 2020). According to the World Bank, BRI investment is already worth US$ 575 billion, with 75 per cent of it having gone into the high-environmental-footprint sectors of energy and electric power (46 per cent), transportation and shipping (25 per cent), and mining sinfrastructure (4 per cent) (Ruta *et al*. 2019).

Some commentators have interpreted BRI as China's attempt to boost regional connectivity, promote energy security and stimulate local industrialization, with a view to lifting host country populations out of poverty and isolation (Chan 2018; Zhao et al. 2019). Others have dubbed it China's attempt to cement its regional influence in Central and Southeast Asia, invest its surplus capital, internationalize its currency (the renminbi), deploy its excess

manufacturing capacity, find business for its state-owned enterprises (SOEs), access new reserves of energy and natural resources, and even to relocate its polluting industries to pollution havens (Bradshaw *et al*. 2009; Tracy *et al*. 2017; Cai 2018; Coenen *et al*. 2020; Liang 2020; Tracy *et al*. 2017). While the geopolitical and geoeconomic drivers of BRI remain open to interpretation, what is incontrovertible is its sheer scale and potential for social and ecological transformation. In its vision statement for the BRI, China outlines five cooperation priorities for the initiative: promotion of "policy coordination, facilities connectivity, unimpeded trade, financial integration and people to people bonds" (National Development and Reform Commission 2015). While these priorities go well beyond infrastructure building, whether BRI's corridors will emerge as true development corridors will depend on the extent to which environmental and social considerations are taken on board. This chapter makes an inquiry into the potential environmental impacts of BRI and the safeguards in place to manage them.

16.2 Environmental impact of infrastructure development

Construction of infrastructure can have a range of environmental externalities, including air and water pollution, hydrological and topographical damage, soil contamination and erosion, and destruction of wildlife and its habitat (Coffin 2007; Silde, Stokes and Ghesthem 2014; Laurance *et al*. 2015). Infrastructure categories – nodal versus linear, roads versus rail, new versus upgrades – vary in terms of the extent, intensity and type of impact they cause (Losos *et al*. 2019).

Nodal infrastructure, such as dams, mines and oil rigs, have ecosystem impacts resulting from pressures such as deforestation and submergence (Butt *et al*. 2013; Lees *et al*. 2016). However, potentially more deleterious are linear infrastructure such as roads, railway lines and transmission lines, as they can lead to cascading landscape-scale impacts of fragmentation and edge effects, isolating species populations and exposing forest edges to the risk of droughts and fires (Coffin 2007; Bruschi *et al*. 2015; Alamgir *et al*. 2019). Shipping routes can be equally damaging. As marine roads, concentrating the movement of vessels between multiple locations, new shipping routes increase the risk of vessel collisions with marine animals, the impact of low-frequency underwater shipping noise (causing behavioural modifications in animals), chemical pollution from emissions/discharges, and spread of invasive species through ballast water (Pirotta *et al*. 2018).

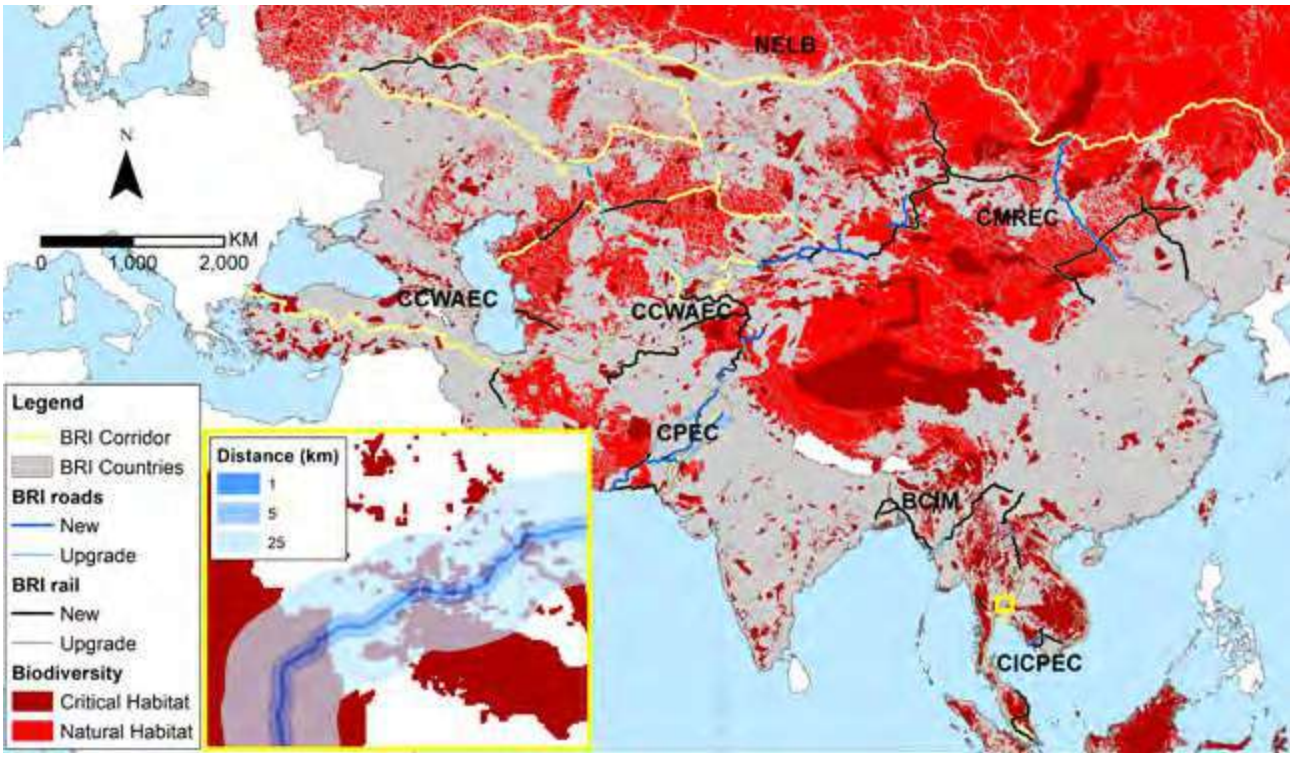
The impact of new infrastructure is considered to be higher than that of upgrade/expansion of existing infrastructure, as the former may make the first cut into intact landscapes, exposing them to a slew of secondary pressures such as poaching, illegal logging, wildlife trafficking, encroachment and land speculation (Laurance et al. 2014). Impact also varies with the type of infrastructure. For instance, with their narrower, straighter paths, rail lines tend to have a lower environmental footprint than roads (Losos et al. 2019), although this also means that there are fewer options for alternative routing around sensitive areas.

While the construction-induced impacts of infrastructure can in themselves be very substantial, often more profound are the growth-induced impacts resulting from the increased industrialization, agricultural expansion, urbanization, trade and better access to markets that are triggered after the infrastructure becomes operational. These impacts manifest in the form of increased consumption, emissions and waste generation (Losos *et al*. 2019; Johnson *et al*. 2020).

16.3 Environmental impact of BRI

The environmental impacts typical of infrastructure development are likely to be more pronounced in the case of BRI, given its extensive geographical scale and the proximity of its corridors to some of the world's most ecologically-sensitive areas (World Wide Fund for Nature 2017). An analysis by Hughes (2019) found that several areas of conservation priority, such as key biodiversity areas and protected areas, as well as hotspots of particularly threatened taxa, existed in close proximity with the proposed rail and road routes. Another recent study by Narain *et al.* (2020) found that more than 6,000km^2 of critical habitat (as defined by the International Finance Corporation) occurred within 1km of BRI's road and rail infrastructure (Fig. 16.2). Turschwell *et al.* (2020) assessed the intersection of marine species ranges with ports being built along the 21st-century maritime silk road (using different buffer distances for different types of impacts), and found that over 400 threatened species are imperilled by the impacts of construction and dredging, while over 200 are affected by an increase in shipping traffic and noise pollution.

Figure 16.2 Spatial overlap of BRI's road and rail routes (within three buffer zones of 1km, 5km and 25km, respectively) with critical and natural habitats at the global scale



Source: Narain et al. (2020).

In addition to the typical construction-induced impacts on species and their habitats, a number of secondary pressures are expected to be created by BRI's projects. The new trade and transport routes are likely to intensify the risk of biological invasion. Several such invasion hotspots have been identified along the overland corridors by Liu *et al.* (2019). Likewise, BRI is also expected to exacerbate illegal wildlife trade by opening up new supply routes in West and Central Asia through the China-Pakistan economic corridor (CPEC) corridor (Farhadinia *et al.* 2019) and by increasing the demand for wildlife-based ingredients of traditional Chinese medicine, promoting which is an objective of the initiative *(*Hinsley *et al.* 2019).

BRI's growth-induced impacts triggered by the increase in trade, transport, manufacturing and higher disposable income are likely to be more enduring and significant than the immediate impacts of infrastructure building. According to the World Bank, the transport infrastructure being built under the BRI is likely to increase the trade flows among BRI countries (including China) by 4.1 per cent (Baniya, Rocha and Ruta 2019). The infrastructure-induced economic growth in host countries could drive up greenhouse gas (GHG) emissions, jeopardizing their Paris Agreement targets (Zhou *et al.* 2018). According to a 2019 Tsinghua University study (Ma and Zadek 2019), commensurate with the growth in their gross domestic products (GDPs) (attributable in part to BRI investments), host countries could account for 66 per cent of global GHG emissions by 2050, which alone could catapult the world on a 2.7-degree rise pathway (Ma and Zadek 2019). On the other hand, future -appropriate energy investments in these countries could present an opportunity to set them on a low-carbon course.

Conversely, there are certain factors that may contribute to reduction of these potential negative impacts. For example, fewer road projects (by length) are being built than rail projects, and there is a significant proportion of upgrades among the projects rather than new roads. Therefore, the amount of habitat

that is impacted likely to be smaller (Losos *et al*. 2019, Narain *et al*. 2020). Another factor for a potentially diminished impact is that BRI road and rail routes (except for a few projects in China-Mongolia-Russia economic corridor [CMREC], the China-Indochina Peninsula economic Corridor (CICPEC) and the polar silk road corridors) are not located in the proximity of intact forest landscapes (seamless stretches of natural areas [>500km^2] devoid of any human disturbance [Potapov *et al*. 2017]) as they are designed to connect population centres (Losos *et al*. 2019).

16.4 Environmental impact-related risks of BRI projects

Failure to pre-empt and address environmental impacts of projects can result in a range of physical, regulatory, financial and reputational risks for project developers that often spill over to project financiers (Bauer and Hann 2010). These risks usually begin with pushback from environmental groups or local communities, often translating into litigation or regulatory action that leads to project delays, cost-overruns, asset devaluation and even project closure. Consequently, developers are confronted with reduced stock value and credit ratings and financiers with loan defaults (World Resources Institute 2013; World Economic Forum 2019). In case of overseas investments, such risks can arise both in the host (investee) and the home (investor) countries (Table 16.1). Some of these eventualities are already playing out in the case of BRI. According to a 2018 study, 14 per cent of BRI projects in 66 countries have faced some kind of local opposition (RWR Advisory 2018).

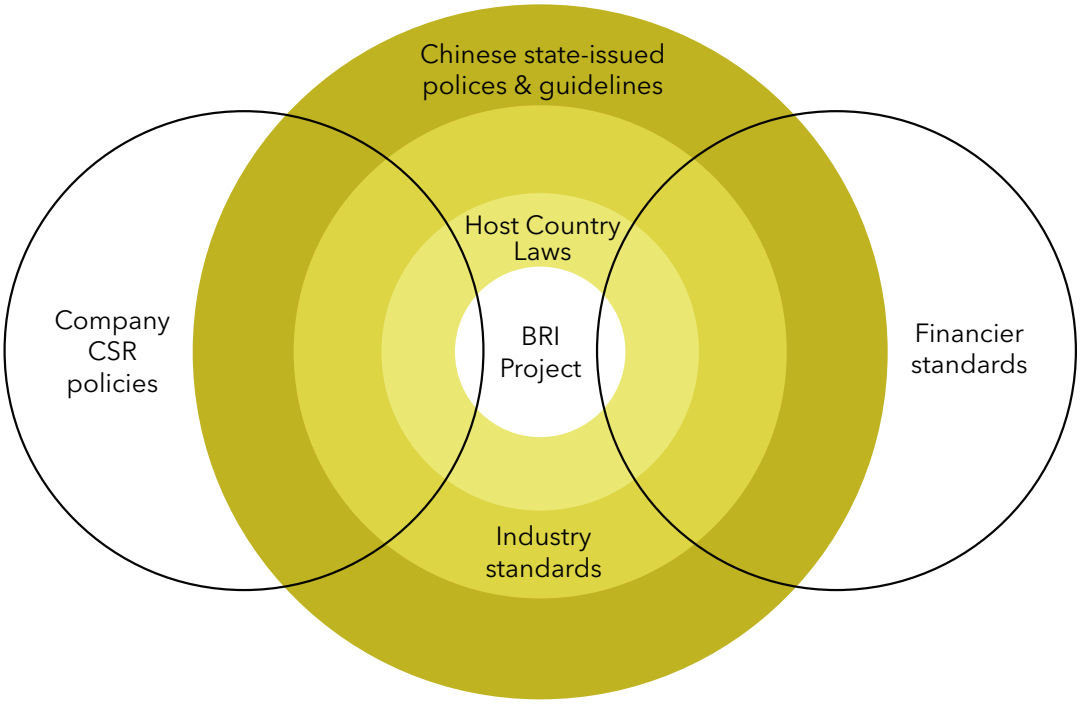
Myanmar's Myitsone hydropower project is a prominent case, wherein a BRI project was suspended mid-construction due to its potential environmental impact, locking-in investor funds indefinitely. The project is slated to be the largest in the region and the 15th largest in the world (Hadfield 2014). The dam was feared to have inhibited upstream migration of fish to spawning areas and enrichment of downstream agricultural deltas, thus threatening the livelihoods of vulnerable fishing and agricultural communities in the Burmese state of Kachin (International Rivers 2011). With construction starting in 2009, several villages were already displaced before the dam was suspended by the government, following sustained opposition from local Kachin leaders, as well as Burmese and international NGOs. The project developers were the China Power Investment Corporation (CPI) (a major Chinese state-owned hydropower developer) and the investor China EXIM bank (one of the two Chinese state-owned policy banks). While CPI's Environmental Impact Assessment (EIA) report was found by independent experts to have underestimated the damage (International Rivers nd), the real clincher is believed to have been the government-commissioned Strategic Environmental Assessment (SEA) of the overarching impact of hydropower projects on Myanmar's major rivers, which warned against the Myitsone dam: "if constructed, Myitsone dam would break river connectivity, trap sediment, and alter the river flow on a wide scale" (Fawthrop 2019). Myitsone dam is not the only BRI project to have faced environmental impact-related risks. Kenya's Lamu coalmine and port project, proposed on an ecologically-fragile island, was halted by a court ruling amid protests from land defenders (Ullman 2019). Another example is that of a hydroelectric dam in the Batang Toru ecosystem of the Indonesian island of Sumatra, funded by the Bank of China. The dam threatens the only habitat of the rare and critically endangered Tapanuli orangutan (one among eight extant species of great apes) and has faced protests and litigation (Leahy 2019). These examples point to a need for robust risk management frameworks incorporating environmental safeguards to be put in place for BRI projects.

16.5 Environmental safeguards for BRI

While the environmental impacts of BRI can be considerable, their early assessment and effective mitigation can limit both their probability of occurrence and their magnitude (Sánchez and Gallardo 2005), resulting in sustainable outcomes for BRI projects. President Xi Jinping emphasized this in his address during the April 2019 Belt and Road Forum, when he called for "building high-quality, sustainable, risk-resistant, reasonably priced, and inclusive infrastructure" (Goh and Cadell 2019). The Mitigation Hierarchy (MH) offers a best-practice approach for managing environmental impacts. Application of the MH involves sequentially avoiding, minimizing and offsetting of environmental impacts (see Chapter 4 and Chapter 8 for more details). Integral to and intertwined with the application of the MH is EIA, a tool that allows for incorporating environmental considerations into project decision-making and entails identification of direct, indirect and cumulative impacts of the proposed project (and its alternatives) on the environment (Ekstrom, Bennun and Mitchell 2015). Due to the multi-jurisdictional nature of BRI projects, transboundary EIAs become relevant, requiring putting in place bilateral/multilateral reciprocal legal frameworks for transboundary information exchange and consultation (Schrage and Bonvoisin 2008). Another approach relevant to a multi-project programme like BRI is SEA, which involves impact assessment at the broader scales of plans, programmes and policies (Fischer 2003).

Environmental safeguards encompassing requirements on EIA and impacting mitigation in the context of the BRI can be brought to the table by: (1) Chinese regulators through state-issued policies and guidelines for BRI projects; (2) host country governments through national EIA regulations; (3) financiers through their investment requirements; (4) project developers (primarily SOEs) through their environmental policies; and/or (5) industry associations through their industry-specific guidelines (Fig. 16.3) (World Resources Institute 2013; Skinner and Haas 2014).

Figure 16.3 Regulatory landscape governing BRI projects



China's overseas investments take three forms: (1) projects funded by governmental agencies using fiscal revenue and routed through foreign aid programmes (grants, zero-interest loans or concessional loans); (2) projects funded through trade finance loans (non-concessional loans, commercial loans and export credits) provided by Chinese banks, primarily its two policy banks, China Development Bank (CDB) and China Exim (CHEXIM); and (3) projects sponsored by China's SOEs (Hale *et al*. 2020). The type of project determines the involvement of each actor and, by extension, the influence they can exert on project environmental performance (Hale *et al*. 2020). For example, safeguards brought to the table by Chinese policy banks and SOEs are likely to be more relevant for trade finance loan-funded projects, which constitute the bulk of Chinese overseas development projects, while Chinese state-issued guidelines would be more relevant for foreign aid-funded projects. Similarly, when an SOE is involved as a project sponsor (Joy-Perez and Scissors 2018), it is likely to have a greater control over what EIA and mitigation measures are applied to the project than when it is involved as a contractor (International Rivers 2012).

16.6 MDB safeguards as a benchmark

Environmental safeguards of MDBs provide a useful benchmark for assessing the safeguards in place for BRI projects, as they have been fine-tuned through decades of international application and regular updating, often after extensive stakeholder consultations. Safeguards of MDBs such as the World Bank Group specify operational requirements on conducting EIA and application of the MH. A key example is the International Finance Corporation (IFC)'s Performance Standards, which are regarded as international best practice. Several other financial institutions (e.g. European Bank for Reconstruction and Development, European Investment Bank, Inter-American Development Bank, US Exim, Caribbean Development Bank, Kreditanstalt Für Wiederaufbau, Agence Française De Development) have aligned their safeguards to IFC's Performance Standards, with only subtle adjustments (Gallagher and Yuan 2017).

Applicable to all projects financed by IFC, Performance Standard 1 (PS1) requires clients (as a pre-condition to investment) to carry out an EIA and apply the MH. Other Performance Standards are triggered based on the impacts identified. IFC's Performance Standard 6 (PS6): Biodiversity Conservation and Sustainable Management of Living Natural Resources, for example, has to be applied if the proposed project potentially impacts certain elements of biodiversity such as critical habitat or natural habitat (see Chapter 4 for more details on IFC Performance Standard 6). Accordingly, IFC PS6 has specified biodiversity impact mitigation requirements. For example, it requires clients to achieve a net gain of biodiversity in impacted critical habitat (International Finance Corporation 2012b). To demonstrate how they will mitigate (i.e. avoid, minimize, restore and offset) the identified impacts, clients are required to prepare environmental management plans and to implement them through the establishment of environmental and social management systems and put in place procedures for its monitoring and review (International Finance Corporation 2012a).

Image credits: Rob Marchant

16.7 Assessing BRI safeguards

Here, we examine whether the various regulatory frameworks applicable to BRI offer operational environmental safeguards with project-level requirements in line with MDB safeguards.

Policies and guidelines that set the overall vision and principles for environmental protection under the BRI are available. Table 16.2 lists these various applicable policies and guidelines in three ways: (1) BRI-specific policies and guidelines; (2) policies on overseas investment focused on environmental protection and (3) green credit guidelines as well as policies on overseas investment focused on environmental protection; and industry-specific guidelines issued by industry associations. The content analysis of these policies and guidelines shows that, while most of them include broad vision/plans for environmental protection and even project-level guidelines, none offer binding requirements. The various guidelines for overseas investments and green credit policies make the case for green lending and encourage environmental risk management, but they do not make specific project-level provisions (Table 16. 2). A study by Gallagher and Qi (2018) of China's policies encouraging responsible overseas investment concludes that all such guidelines are voluntary, with little explicit accountability and no penalties for non-compliance.

Ultimately, BRI policies defer to host countries on the issue of environmental safeguards (Coenen *et al.* 2020). For example, the Guidance on Promoting Green Belt and Road urges "businesses to observe international regulations on economy and trade and the laws, regulations, policies and standards of the host countries on eco-environment protection" (Belt and Road Portal 2017). However, scholars point to the weak institutional capacities and poor regulatory climate in many BRI host countries, arguing that they are often ill-equipped to offer adequate safeguards (Tracy *et al.* 2017; Masood 2019; Coenen *et al.* 2020). A similar pilot attempt by the World Bank, dubbed the 'country systems' approach, which involved using a country's own environmental

and social safeguard systems, where they were assessed as being equivalent to the Bank's systems, received limited acceptance (Larsen and Ballesteros 2013). Recent assessments of the EIAs of 65 BRI countries (including China) show that, while all countries have legal frameworks for EIA in place, they are at various stages of evolution. Only four countries, namely, Lithuania, Moldova, Hungary and Latvia, rank better than China on a composite indicator of EIA legislation, administration, procedure, decision-making and support. SEA has been institutionalized in several of the BRI countries (e.g. in several European BRI partners through the EU SEA directive and in the Middle Eastern partners through the Mediterranean Environmental Technical Assistance Program), while it is driven by donor requirements in many others (e.g. several SEAs have been supported by the World Bank in Southeast Asia). However, only a few European BRI partners have signed up to the United Nations' Espoo Convention and have put in place legislation requiring transboundary EIAs (Aung and Fischer 2020).

Principles and guidelines for greening the BRI have also been developed jointly by international stakeholders (Table 16.3). Even though they have been widely accepted, these policies and guidelines remain non-specific, conveying a broader vision on environmental protection. Another set of actors that can offer safeguards for BRI projects are companies that implement the projects. China's overseas investment space is dominated by centrally-owned SOEs that act not only as project developers or construction contractors, but also as project sponsors (non-financial sources of FDI[84]) (International Rivers 2012). Many Chinese SOEs are involved in project design (when engaged as Engineering Procurement Construction/ Built Operate Transfer contractors, rather than only as construction contractors) and can potentially influence project environmental performance by requiring Environmental Impact Assessment and mitigation as a part of their Corporate Social Responsibility policies (International Rivers 2012). However, reviews of such policies of Chinese SOEs investing abroad have found them (especially those focused on environmental protection) to be not at par with global standards, with their implementation marked by *ad-hocism* and inconsistencies (Tan-Mullins and Mohan 2013).

In the absence of operational project-level safeguards from Chinese regulators and SOEs, project financiers can mandate Environmental Impact Assessment and mitigation. The Asian Infrastructure Investment Bank (AIIB), a MDB that was initially conceived to fund the BRI (NDRC 2015) has an environmental and social framework that shares many features with that of the World Bank (Gransow and Price 2019). Although AIIB has specific requirements on EIA and mitigation, it has been a marginal investor until now, having invested only about US$ 1 billion in BRI-related projects (Hameiri and Jones 2018). China's two policy banks CDB and CHEXIM, the key financiers of BRI projects do require ex ante and ex post EIAs (Hale *et al*. 2020). However, a recent examination of biodiversity-specific safeguards of 65 key financiers of BRI (35 led by China and 30 international) found that 26 had published environmental policies and, of those, 17 had project-level requirements for biodiversity impact mitigation. While 16 of the 30 international financiers had biodiversity impact mitigation requirements, only one (China-ASEAN Investment Cooperation Fund) of the 35 Chinese/China-led financiers had such requirements (Narain *et al*. 2020). It can be argued that it is not common for national development banks of donor countries to have MDB-like evolved safeguards. However, CDB and CHEXIM, unlike other national development banks, are increasingly internationalized; overseas investments by these banks are now on a par with that of the World Bank (Gallagher and Ray 2020). An internationalization of investment to such a degree calls for a commensurate internationalization of environmental standards.

84 Foreign Direct Investment or FDI involves direct investment by a foreign company in projects implemented in a host country. This is distinct from official development financing (ODF) which involves official lending by financial institutions of a foreign company (e.g., by China's twin policy banks CDB and CHEXIM) to governments or projects in the host country.

16.8 The way forward

The BRI is likely to result in significant economic benefits for host countries. It is expected to boost the GDP of host countries by 3.4 per cent (De Soyres *et al*. 2020), lifting 7.6 million people from extreme poverty and 32 million from moderate poverty (Maliszewska and Van Der Mensbrugghe 2019). However, whether it will lead to equitable and sustainable development pathways for host countries will be determined by how its impacts on the environment and society are assessed and managed (Ascensão *et al*. 2018). Environmental safeguards are seen as an important tool for reconciling the conflict between economic development and environmental protection (Gallagher and Yuan 2017; Morgado and Taşkın 2019). Based on the evidence provided in this study, it seems the current regulatory framework for BRI seems to fall short in terms of project-level operational safeguards.

There is a need for various actors namely, Chinese state agencies, regulators, industry associations, SOEs and financial institutions to evolve their own safeguards so that they can provide multiple lines of defence against environmental impacts and risks. International safeguards systems such as those of the World Bank Group can provide a useful template for developing such safeguards for use by Chinese entities. At the same time, it is important for China to build institutional capacities and transfer good practice within host countries where possible, so that country systems can eventually be brought on a par with international standards. It is only when they are planned, implemented and managed according to the principles of sustainability that BRI's infrastructure corridors can become development corridors.

Table 16.1 Environmental impact-related risks faced by project developers

Type of risk	In host country	In home country
Regulatory approval – failure or delay of approvals	✓	✓
Regulatory/legal action – permit withdrawal, penalties, compensation liabilities, litigation tightening of requirements	✓	
Political – opposition to development projects or sectors	✓	
Financing - withdrawal or delay of financing, tightening of requirements		✓
Project construction – delays, cost overruns due to regulatory/legal action	✓	
Project operation – disruption due to regulatory/legal action	✓	
Reputational risk – impact on brand image	✓	

Table 16.2 Chinese policies and guidelines on BRI: examining the presence of operational safeguards

	Title	Year	Issuing authority	Vision/plan of environmental protection	Project-level EIA and mitigation guidelines	Project-level biodiversity impact assessment and mitigation requirements (binding)
BRI Specific						
1	Vision and Actions on Jointly Building Silk Road Economic Belt and 21st Century maritime Silk Road[85]	2015	National Development and Reform Commission (NDRC), Ministry of Foreign Affairs, and Ministry of Commerce (MOFCOM)	Yes	No	No
2	Vision for Maritime Cooperation under the Belt and Road Initiative[86]	2017	NDRC and State Oceanic Administration	Yes	No	No
3	Guidance on promoting a green Belt and Road[87]	2017	Ministry of Ecology and Environment (MEE)	Yes	No	No
4	The Belt and Road Ecological and Environmental Cooperation Plan[88]	2017	Ministry of Environmental Protection (MEP) (now MEE)	Yes	No	No
5	Building the Belt and Road: Concepts, Practices and China's Contributions[89]	2017	Office of the Leading Group for the BRI	Yes	No	No

85 http://en.ndrc.gov.cn/newsrelease/201503/t20150330_669367.html

86 http://www.china.org.cn/world/2017-06/20/content_41063286.htm

87 http://english.mee.gov.cn/Resources/Policies/policies/Frameworkp1/201706/t20170628_416864.shtml

88 https://eng.yidaiyilu.gov.cn/zchj/qwfb/13392.htm

89 https://eng.yidaiyilu.gov.cn/wcm.files/upload/CMSydylyw/201705/201705110537027.pdf

6	The Guidance for the Central Enterprises to Disclose Their Social Responsibility[90]	2017	The State-owned Assets Supervision and Administration Commission of the State Council (SASAC)	No	No	No
Guidelines on overseas investment focused on environmental protection and guidelines on green credit applicable to overseas investments						
1	Green Credit Guidelines (and related KPIs)[91]	2012	China Banking Regulatory Commission (CBRC)	Yes	No	No
2	Guidelines on Environmental Protection for Overseas Investment and Cooperation[92]	2013	MOFCOM and MEP	Yes	Yes	No
3	Guidelines for Establishing the Green Financial System[93]	2016	People's Bank of China (PBOC) with NDRC, CBRC, MEE, the Ministry of Finance (MOF), China Securities Regulatory Commission, and China Insurance Regulatory Commission	Yes	No	No
4	Measures for the Administration of Overseas Investment of Enterprises[94]	2017	NDRC	No	No	No
5	Guidelines to Chinese state-owned enterprises on fulfilling corporate social responsibilities[95]	2008	State-Owned Assets Supervision and Administration Commission of the State Council	No	No	No

90 "http://www.gov.cn/zwgk/2008-01/04/content_850589.htm"

91 http://www.cbrc.gov.cn/EngdocView.do?docID=3CE646AB629B46B9B533B1D8D9FF8C4A

92 http://english.mofcom.gov.cn/article/policyrelease/bbb/201303/20130300043226.shtml

93 http://www.chinadaily.com.cn/business/2016hangzhoug20/2016-09/04/content_26692931.htm

94 http://www.gov.cn/gongbao/content/2018/content_5280579.htm

95 http://www.sasac.gov.cn/n2588030/n2588939/c4297449/content.html

6	Regulations on Outbound Investment and Business Activities of Private Enterprises[96]	2017	NDRC and MOFCOM	No	No	No
7	Guide to Strengthen Risk Prevention and Control[97]	2017	CBRC	No	No	No
Guidelines issued by industry associations						
1	Environmental Risk Management for China's Overseas Investment guidelines[98]	2017	Green Finance Committee (GFC) of China Society for Finance and Banking, Investment Association of China, China Banking Association	Yes	No	No
2	Guidelines of Sustainable Infrastructure for Chinese International Contractors[99]	2017	China International Contractors Association	Yes	Yes	No
3	Guidelines on the Corporate Social Responsibility of Banking Institutions of China[100]	2009	China Banking Association	Yes	No	No

Source: List of policies compiled using Coenen et al., (2020) and Gallagher and Qi (2018); Sector-specific guidelines not included

96 https://www.ndrc.gov.cn/fggz/lywzjw/zcfg/201404/W020190909440616023780.pdf

97 https://www.mee.gov.cn/gkml/zj/wj/200910/t20091022_172469.htm

98 https://www.ghub.org/en/environmental-risk-management-manual-for-china-overseas-investment/

99 http://images.mofcom.gov.cn/csr2/201707/20170713103213247.pdf

100 http://www.lawinfochina.com/display.aspx?lib=law&id=7296&CGid=

Table 16.3 International multistakeholder guidelines on BRI

	Title	Year	Developed by	Vision/plan of environmental protection	Project-level EIA and mitigation guidelines	Project-level biodiversity impact assessment and mitigation requirements (binding)
1	Guiding Principles on Financing the Belt and Road[101]	2019	Chinese Ministry of Finance and its counterparts in 27 countries	Yes	No	No
2	Green Investment Principles[102]	2017	Developed by Green Finance Committee of China Society for Finance and Banking and the City of London Corporation's Green Finance Initiative; the World Economic Forum, UNPRI, Belt & Road Bankers Roundtable, the Green Belt and Road Investor Alliance and the Paulson Institute; Signed by all major Chinese banks and financial institutions	Yes	No	No

Source: [List of policies compiled using] Gallagher and Qi (2018); Coenen et al. (2020). Sector-specific guidelines not included.

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101 https://en.imsilkroad.com/p/314204.html

102 https://green-bri.org/green-investment-principle-gip-belt-and-road-initiative/

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17

Sensitive Planning and Design of Transportation Corridors: Vital Elements for Protecting India's Wildlife

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ABSTRACT

India's exceptionally rich biodiversity is being increasingly threatened by expanding transport networks. Roads and railways that are considered the largest enablers of economic growth are also widely recognized as drivers of habitat reduction and fragmentation, and population decline of rare endangered and threatened species. This chapter shares examples of how sensitive planning and design of mitigation structures can improve or impair the conservation prospects for wildlife species in their natural habitats. Science-driven planning for mitigation solutions and collaboration among all stakeholders in development of transport corridors are vital factors that can influence the efficacy of crossing structures for animal movements across their habitats. Strategic environmental assessment (SEA)-driven assessments can provide inputs during the planning stage of the transportation development sector, inform decisions and reform policies to prioritize areas within landscapes that can be developed, and those that need to be safeguarded as habitat networks for enhancing conservation prospects.

17.1 Introduction

Growth theories that universally acknowledge the importance of infrastructure for regional development also invariably recognize that transportation corridors are the biggest enablers of growth and development. The development is mostly manifested in the form of urban sprawls that may have a central core or multiple nuclei and ribbon developments along the roads and highways (Verbeek, Kobe and Pisman 2014). Most transport corridors that begin with physical connectivity facilitated by a road, highway or a railway track connecting two or more nodes ultimately transform into major economic corridors. The transport sector, which is undoubtedly central to propelling India's overall economic development, is experiencing the most explosive era of road and rail infrastructure expansion in human history. India's transport system is already one of the largest in the world, serving a

landmass of 3.3 million km^2 and a population of over 1 billion (Kapoor 2002, p. 3). Roads alone, with a network of over 5.8 million km, form the second-largest road network in the world.

Often, with much of the road proliferation being chaotic or poorly planned at a rapid pace, the development of other infrastructure within the larger economic corridor offers complex challenges that overwhelm the capacity of environmental planners, engineers and managers in implementing such projects. Integrative environmental assessments undertaken earlier in the planning process can provide a key solution in achieving balanced and inclusive growth.

Roads and highways that cut across a geographical space, connecting urban areas, generate economic agglomerations, while reducing transportation costs and travel time to reach such agglomerations. The same road corridors permeating natural areas that are vital for connecting natural habitats become the primary drivers of increased access to pristine landscapes, deforestation, fragmentation, illegal hunting and trade in animal parts (Clements Lynam and Gaveau 2014). Indirect impacts may include those from borrow pits, associated soil erosion, alteration of water channels, transportation of chemicals to water bodies and changes in land use. Road, particularly highway, development can attract large numbers of people, leading to increased commerce and shops, ultimately creating zones of urbanization (Rajvanshi *et al*. 2001)

With the impetus for economic expansion, new roads are being made and older ones widened, shrinking wildlife areas, including national parks and wildlife sanctuaries. It is estimated that nearly 24,000km of new roads will be built in tiger conservation landscapes in Asia by 2050 (Carter *et al*. 2020). India, which is potentially the most important foci for the global tiger conservation initiatives in Asia, will have approximately 14,500km of roads pass through its tiger habitats: a 32 per cent increase from current levels (Carter *et al*. 2020). Many of the roads would also traverse other natural areas that sustain exceptional biodiversity and provide vital ecosystem services.

17.2 Conservation challenges associated with transportation corridors traversing natural landscapes

The intrusion of roads through prime wilderness areas often extends into surrounding landscapes, transforming contiguous and integrated habitats into disconnected patches that no longer remain viable for supporting and promoting biodiversity conservation. Roads aligned through wildlife corridors can threaten forest integrity and pose barriers for animal movements and consequent population declines or localized extinctions (Laurance, W. F., Goosem and Laurance S.G.W 2009). Fahrig (2003) recognizes that the creation of isolated pockets of habitat that cannot support viable populations in the long term is one of the most serious consequences of habitat loss due to road construction. Increased mortality (Seiler and Helldin 2006) and avoidance of a zone around the infrastructure are other significant impacts (Forman *et al.* 2003; Van Der Ree, Smith and Grilo 2015; Tulloch *et al.* 2019). Although the ecological impacts of railway projects are similar in characteristic to those induced by roads, these have been less studied (Popp and Boyle 2017). Specific insights into ecological aspects of railway projects (Agua *et al.* 2017) have provided enhanced understanding of rail-induced impacts and mitigation options.

Notwithstanding these distinctions in the array of impacts from different forms of transportation infrastructure, integrating ecological considerations into all phases of road and rail development – from planning to construction to operation – becomes a formidable challenge that needs to be urgently addressed (Asian Development Bank 2019; Wildlife Institute of India 2016). Enabling legislation and decision-making processes regulating the development of infrastructure projects provides the first step for inclusive development. In view of significant environmental implications of roads and highway projects on account of their location, route alignment and associated activities stipulatory enforcements regulate their development in most countries.

17.3 Environmental legislation for regulating transportation projects in India

In India, EIA Notification (2006) and its subsequent amendments stipulates environmental clearance needs to be obtained by the executing agency before commencing the actual work or executing the proposed project based on the review of Environmental Impact Assessment (EIA) reports undertaken by recommendatory bodies such as Expert Appraisal Committee at the federal level and the State Environment Impact Assessment Authority (SEIAA) at the state level (Indian Roads Congress 2017).

The legislation mandates that all Category 'A' projects require environmental clearance from the federal nodal agency, the Ministry of Environment Forest and Climate Change (MoEFCC). These projects include all new highways and expansion of national highways greater than 100km in length, involving additional right-of-way or land acquisition greater than 40m on existing alignment and 60m on re-alignments or bypasses, and passing through more than one state. For Category 'B' projects that include all new State highway projects and expansion projects in hilly terrain (above 1000m above mean sea level) and ecologically sensitive areas, clearance needs to be obtained from the SEIAA. Roads and highway projects also require clearances under the Forest Conservation Act (1980) for roads requiring diversion of forest lands across various forest categories; and from Standing Committee of the National Board for Wildlife under the Wildlife (Protection) Act (1972) for projects aligned through or along the protected areas, wildlife corridors and within notified ecologically sensitive zones.

The impact assessment approach is generally adopted to appraise individual projects often representing sub-sections of road or highway proposed by the development agency for ease of execution. Such a piecemeal approach assigns the highest priority to EIAs of individual projects that is mandated by law. It seldom provides opportunity to assess the cumulative impacts of the entire road length spanning across different states or provinces. Clearly, the need for conducting SEA to provide significant inputs in planning of road transportation projects amidst other forms of development in a landscape is lacking in the existing decision-making frame.

The railway projects in India enjoy supremacy over all other infrastructure projects in terms of exemptions granted for their approval. Railway projects are exempted from the requirement to seeking environmental clearance, as the Indian Railways Act provides special dispensation for the railway to be exempted from seeking clearances under other statutes (MoEFCC letter dated 28 May 2020). In many sections of the Indian landscape, the ownership of land prior to the enactment of the Forest Conservation Act (1980) rested with the Indian Railways. This further exempted railway projects from seeking clearance under the provisions of the relevant legislations for protection and conservation of forest and wildlife.

17.4 Structural mitigation measures for connecting fragmented habitats: prospects and challenges

Wildlife-crossing structures are intended to improve habitat connectivity and increase permeability (the extent to which there are obstacles) for animal movement across roads. Connectivity conservation science has been addressing the crucial concerns of where and how to maintain linkages for wildlife between isolated habitat patches to help maintain gene flow and sustain population viability of target species (Forman and Alexander 1998). Literature and strategies employed in road and rail construction and improvement projects suggest that solutions exist to avoid, restore and even enhance connectivity through bridges, underpasses and overpasses for wildlife (Clevenger and Waltho 2005). The ability to successfully implement road and rail projects in high-biodiversity areas hinges on the commitment to pursue comprehensive transportation and conservation strategies that employ a range of measures, from environmentally sensitive road design to passage structures and management of on-site activities. Pursuing the twin goals of sound development and conservation would require adopting the principles of transportation ecology in planning, implementation and post-construction monitoring of transportation projects. Such an approach can encourage economically viable, ecologically responsive and technologically justifiable projects and prevent costly mistakes that may not even allow retrofitting later.

Very little experience has accumulated over time to demonstrate the success of measures to promote connectivity of habitats for wild animals in landscapes that contain roads. Few mitigation efforts demonstrate the success of ecological connectivity based on evaluation of efficacy based on the extent to which the barrier effect of roads and road-related mortalities is reduced (Lehnert and Bissonette 1997; Dodd, Barichivich and Smith 2004; Rytwinski *et al*. 2016) or gene flow between populations is enhanced (Corlatti, Hackländer and Frey-Roos 2009). The efficacy of crossing structures for wildlife appears to be significantly influenced by several factors, such as locations in relation to natural paths, size, design sensitivity, appropriateness in terms of ecological considerations, behavioural responses of species and visual appearance (Jackson and Griffin 2000; Clevenger and Waltho 2000). It is, therefore, critical that once the mitigation structures (tunnels, bridges and overpasses) are constructed to meet the mitigation compliance requirements for obtaining environmental clearance, science-driven monitoring of the uses of such structures is undertaken to establish their success. Studies from many different regions of the world also reiterate that evidence-based mitigation success provides opportunities for reconciling economic and social development and species conservation with environmental stewardship (Arcus Foundation 2017).

17.5 Structural mitigation measures applied to transportation projects in India

Case examples presented in this section highlight the strategies that could successfully restore the connectivity of habitats fragmented by roads and railways in India. At the same time, some examples also illustrate that the lack of integration of factors that are critical for ecological connectivity can jeopardize the prospects of conserving several targeted species.

17.5.1 Case example 1: canopy bridge construction for lion-tailed macaque in Western Ghats hotspot in India

17.5.1.1 Conservation risks for lion-tailed macaque in rainforest fragments of Western Ghats

The lion-tailed macaque (LTM; *Macaca silenus)* is the iconic symbol of the endemic and endangered primates of the Western Ghats hotspot (India). It inhabits numerous rainforest fragments of the Valparai plateau (220km^2) in the southern region of the Western Ghats. Forest clearance for tea, coffee, cardamom and eucalyptus plantations, and the associated infrastructural development (Joseph *et al*. 2009) including road-building and widening has resulted in extensive fragmentation from the early 1900s (Anitha *et al*. 2013). About nine troops of around 200 LTMs have been reported to live in fragmented rainforests in the Valparai plateau (Sridaran 2019).

One such forest fragment is the Puthuthottam forest (Fig. 17.1a), which harbours the largest population (Umapathy, Hussain and Shivaji 2011; Jeganathan *et al*. 2018), of LTMs (approximately 150 individuals) in three groups (Sridharan 2019). The main highway connecting the towns of Pollachi and Valparai, aligned through this fragment, further bisects the LTMs' habitat (Fig. 17.1a). This highway has destroyed the contiguity of the canopy cover that was vital for movement of LTMs between the forest patches. In the absence of connectedness of the tree canopy, LTMs climb down the trees to cross the road and then become victims of road-related injury and mortality. In the last 10 years, at least 10 LTMs have been killed on the road through Puthuthottam, as they were forced to cross on the ground due to gaps in the tree canopy (Jeganathan *et al*. 2018).

17.5.1.2 Construction of canopy bridges for restoring canopy connectivity

The Nature Conservation Foundation (NCF), a civil society organization of international repute conducted long-term research studies on LTM to identify the critical crossing points of animals and assess the gaps in canopy contiguity. Based on the findings of the research, NCF installed four canopy bridges in strategic locations in the Puthuthottam fragment wherein road widening led to canopy breakage, and in locations where LTMs and other arboreal animals such as the Nilgiri langur, and the Indian giant squirrel were frequently observed crossing the road.

The bridges are primarily made using the material that is used by firefighters for making high-pressure hoses. Two rolls of these are woven with each other, using cables/binding wires with PVC pipes in between, giving it a ladder-like appearance. These materials require limited maintenance, as opposed to use of bamboo in such high rainfall areas. These ladder-like bridges were tied using cables or ropes to trees on either side of the road at locations where the canopy gap is wide (Fig. 17.1 b).

The bridges were initially installed on a trial basis and, later on, more were installed after observing that LTMs (Fig. 17.1c) and even giant squirrels started using such bridges to cross over to the other side of the road (Pardikar n.d.). After the successful outcome of restoring canopy connectivity in the Valparai-Pollachi road corridor, a similar initiative was also undertaken in Chinnar Wildlife Sanctuary in Kerala.

17.5.1.3 Key lessons

» **Rigorous and long-term scientific research to identify the specific threats and their spatial characteristics is integral for designing mitigation measures for conservation of endemic and endangered species such as the LTM, which is threatened by the widening of the road corridor.**

» Understanding of the behavioural traits of LTM is critical for successful installation of canopy bridges in crossing zones and their subsequent use by the LTM.

» The canopy bridges erected by wildlife experts could better integrate the design sensitivity (suitability surface; height from ground; width of the bridge for movement of animals and their easy use).

Figure 17.1

17a State Highway 18 bisecting the Puthuthottam Reserved Forest. Illustration by: Roshni Arora

17b Canopy bridge connected to the trees on both sides of the Highway. Photo credit: Ganesh Raghunathan

17c LTM using one of the canopy bridges installed across the Valparai-Pollachi Highway. Photo credit: Ganesh Raghunathan

17.5.2 Case example 2: construction of canopy bridge across a rail corridor for hoolock gibbons in Hoollongapar Gibbon Wildlife Sanctuary, Assam State, India

17.5.2.1 Conservation values of hoolock gibbon

Hollongapar Gibbon Wildlife Sanctuary, which spreads over an area of 20.98km^2 in the tropical rain forest of Jorhat district in upper Assam, was initially set up in 1981 as a forest reserve. It was named Gibbon Wildlife Sanctuary in 1997 and Hoollongapar Gibbon Sanctuary in 2004 (Fig. 17.2a). This sanctuary holds the distinction of harbouring seven primate species, including the densest populations of gibbons (*Hoolock hoolock*), the only ape in India. Around 100 individuals belonging to 26 families are residing in this sanctuary (Chetiapator 2019). Hoolock gibbon (Fig. 17.2b) has been categorized as endangered in the International Union for Conservation of Nature Red List. It is also a protected species listed under Schedule-I of the Indian Wildlife (Protection) Act, 1972. Hoolok gibbon is an exclusively arboreal species that requires contiguous closed-canopy forests for moving between trees by swinging along the branches on the canopy of the forest.

17.5.2.2 Conservation challenge posed by the railway track

Extensive railway lines were laid in the 1980s, including the Meleng railway, which runs through the 20.98 km^2 Hoollongapar Gibbon Wildlife Sanctuary to connect the major towns Guwahati and Dibrugarh. The chopping off of the branches were chopped off the high canopy interlinking trees to clear out area for track alignment and maximise the visibility of passing trains. This fragmented the habitat into two havles. The gaps in the canopy severely impacted the dispersal, foraging and breeding opportunities of the gibbons and the groups were split on either side of the railway line. Consequently, the gibbons have been restricted to small areas, and are forced to compete for the limited resources within the available space.

17.5.2.3 Structural solution for restoring canopy connectivity

There is growing evidence that constructing canopy bridges for canopy-dependent species is critical for maintaining movement of arboreal mammal species (Donaldson and Cunneyworth 2015; Smith, Van Der Ree and Rosell 2015; Balbuena *et al*. 2019). Accordingly, the Assam Forest Department, with the help of the Northeast Frontier Railways, constructed a canopy bridge across the railway track to facilitate the movement of gibbons and other primate species in October 2015. This structure is in the form of an iron bridge, 10.5m in height and 9.5m in width, straddling the railway track. Iron ropes were tied on both sides of the green-coloured bridge and fixed to trees on either side of the track to serve as approachway to the bridge (Fig. 17.2d). This bridge is perhaps the country's first crossing structure to mitigate the impact of a railway track on arboreal species and its habitat.

The forest staff entrusted with manning the bridge, to observe whether the gibbons had started using it, confirmed that "the gibbons never came anywhere near the bridge" (Bhattacharya 2019). The challenge for the gibbons to use the canopy bridge to cross over between eastern and western parts of their habitat is compounded by the following factors.

» The gibbons that are high-canopy tree (25m high) dwellers are extremely shy. As the height of the iron bridge is mere 10.5m, it needs to be camouflaged by natural climbers to encourage gibbons to use it.
» Gibbons are reluctant to climb on thin wires attached to the canopy bridge from the two edges of the bridge overhanging the rail corridor.
» The nearest tree is almost 50-80m away from the two ends of the bridge, which further discourages the shy gibbons to walk on the ropes to access the bridge.
» Villagers, who often throng the area for firewood collection, indulged in cutting and removing ropes attached to the canopy bridge.

17.5.2.4 Exploring the prospects of erecting a natural bridge versus a metal bridge

Aaranyak, a biodiversity conservation group, under its Hoolock Gibbon Conservation Programme, which was launched in 2004-2006, initiated the development of a natural canopy through a plantation drive along the 1km long railway track with the help of the local community. The work was led by a primatologist, who provided insights about the different species of food and cover for the gibbon to be planted on either side of the railway track. After sustained efforts spread over thirteen years, a natural canopy started forming just above the track that is now used by hoolock gibbons to cross over between the fragmented forests on each side of the railway track (https://www.guwahatiplus.com/daily-news/assam-after-100-years-hoolock-gibbons-reunite-following-construction-of-natural-bridge).

17.5.2.5 Key lessons

The use of even the best-designed structures may be limited or even precluded if the ecological requirements and behavioural aspects of the species are not adequately integrated in the design.

Inputs from primatologists and wildlife ecologists can be critical at the design stage in sensitive planning for the efficient use of mitigation infrastructure.

Coordination and synergies among railway authorities, building agencies and conservation groups assumes importance for restoring the canopy contiguity for the hoolock gibbons, which command prime importance as the only ape species found in India.

While canopy bridges are no replacement for protecting intact habitats, they can play an important role in helping species survive in fragmented habitats.

» **Natural bridges created by planting plant species providing food and cover for gibbons have greater prospects of success as crossing structures.**

Figure 17.2

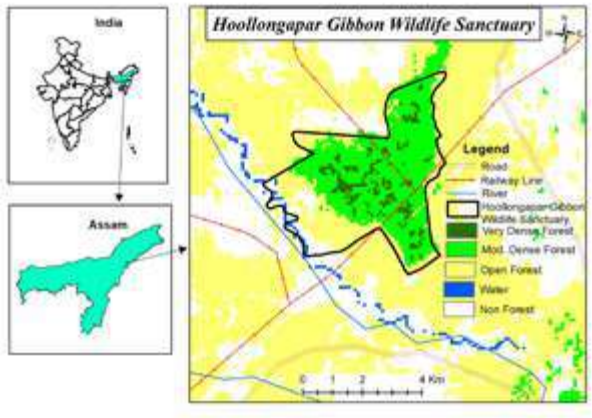

Figure 17.2a. Map of Hoollongapar Gibbon Sanctuary in Assam. Illustration by Panna Lal

Figure 17.2b. Hoolock gibbon. Source: Creative Commons

Figure 17.2c. Iron bridge constructed over the train track in Hoollongapar Gibbon Sanctuary to serve as a canopy bridge for movement of hoolock Gibbons. Photo credit: Sonali Ghosh

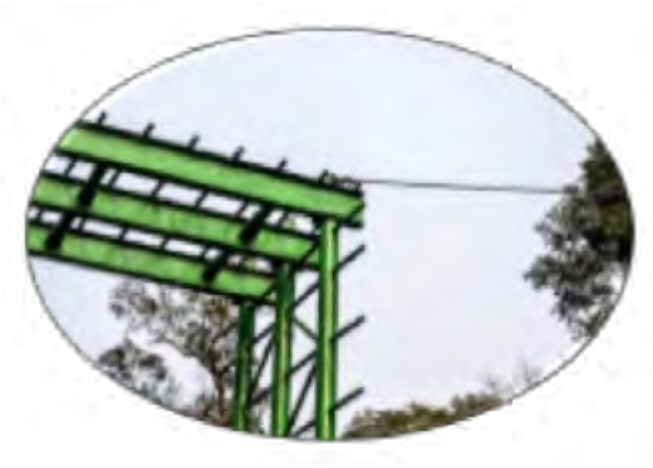

Figure 17.2d. Iron ropes providing approach way to the bridge. Photo credit: Sonali Ghosh

17.5.3 Case example 3: construction of crossing structures to improve animal movements across national highway running through Pench Tiger Reserve, Maharashtra State

17.5.3.1 Conservation values of the landscape

The central Indian landscape, consisting of parts of Maharashtra, Madhya Pradesh and Chhattisgarh States, has been a stronghold for several long-ranging wild mammals. Since tigers are an iconic feature of the landscape, these areas are also highly important as a tiger conservation landscape, with high potential for long-term tiger conservation (Jhala, Qureshi and Gopal 2015).

17.5.3.2 Conservation challenge posed by national highway 44 and its proposed upgrade

The central Indian landscape that was once characterized by a contiguous expanse of dense forests and rolling grasslands is being increasingly fragmented by expanding road and rail networks. National highway (NH) 44 – which runs along 3,806km of the north-south corridor, and is the longest national highway in India – traverses this landscape. About 232km of this highway, routed

through Maharashtra, cuts through the Kanha-Pench and Pench-Navegaon-Nagzira wildlife corridors that are critical for connecting tigers, co-predators and their prey in the central Indian landscape (Fig. 17.3a). As part of the National Highway Development Project, it was proposed that this highway should be upgraded from a two-lane to a four-lane highway. The widening of the NH 44 would invariably affect the dispersal and movement (ecological) corridors of long-ranging mammals, leading to isolation of their natural population into small island populations. Approval for road upgrade was granted, with the condition of provisioning animal crossing structures to reduce animal/vehicle collisions/mortality and also to ensure habitat contiguity in the landscape. The Wildlife Institute of India (WII) (www.wii.gov.in) was assigned the task of providing technical guidance for planning animal-friendly crossing structures as a standalone study that had the benefit of information on extensive use of the area that was generated from the earlier EIA that was also conducted by WII.

17.5.3.3 Mitigation structures for securing the connectivity of fragmented habitats

Based on extensive research, which aims to ascertain the pathways of animal movements and observations or evidence of habitat use along the highway in Pench Tiger Reserve, Maharashtra, a 16.1km section of the highway cutting across the tiger reserve and adjoining forests in three forest segments was identified for planning wildlife crossings to secure connectivity of habitats for permeability of animals.

Several global studies (Van Der Ree, Smith and Grilo 2015) have established that the body size of the animal and its behaviour (e.g. solitary or group living, diurnal or nocturnal), size and openness of the structures influence the design and use of the mitigation structures. Insights from these earlier studies and the outcome of field-based studies conducted by the team from WII guided the planning of underpasses at nine different locations (Habib *et al*. 2015). Four minor bridges and five animal underpasses were constructed. The spans of the underpasses on NH 44 range from 50m to 750m. Actions for habitat improvement (e.g. land levelling, habitat enrichment, raising shrub/herbaceous cover, constructing solar-powered water holes, camouflaging the concrete walls) and regular monitoring and patrolling were taken to enhance the use of underpasses (Fig. 17.3b and c). These animal underpasses on the NH 44 are the first of their kind in India, and perhaps the largest in the world.

17.5.3.4 Functional efficacy of the crossing structures constructed on NH 44

A camera-trapping effort (23,628 camera days) between 2018 and 2020 was made, to conduct evidence-based monitoring of the use of all nine crossing structures (Habib *et al*. 2020). A total of 89 tiger crossings by 11 individual tigers were recorded from six of the nine structures. A total of 18 species of wild animals, including wild ungulates *viz*., spotted deer, sambar, gaur, nilgai and wild pig, large and medium-sized carnivores *viz*., tiger, leopard, sloth bear, jackal and wild dog, small mammals *viz.,* hare, jungle cat, mongoose, common palm civet, porcupine, rusty spotted cat and small Indian civet was recorded. The rates at which animals crossed and used the underpasses varied between species and the dimensions of the underpasses.

17.5.3.5 Key lessons

- **Animal crossings should be designed and implemented to meet the varying needs of movement of all target taxa.**
- **Designing animal crossings for the biggest or most demanding species will invariably ensure that the needs of other species are also simultaneously met.**
- **The degree of use of underpasses varies with species, its behaviour, adaptability to the new structures and the neighbourhood characteristics (e.g. anthropogenic**

factors; habitat suitability; water availability; disturbance from light and noise).

» The dimensions of the crossing structures that influence openness of the structure influence use by animals. In landscapes where sambar, gaur and tiger are present, a minimum underpass height of 5m would be appropriate if the underpass is 300m long and has a span of 28-30m.

» Results of continuous monitoring of wildlife movements through these underpasses have established that the design and location of the structure is effectively facilitating the movement of a range of animals.

Figure 17.3

Figure 17.3a Aerial View of the Elevated Stretch of NH 44 through Pench Tiger Reserve. Source: Creative Commons

Figure 17.3b. Sloth bear crossing through the underpass beneath NH-44. Source_ Maharashtra Forest Department. Photo credit: WII Road Ecology Project 2020, Bilal Habib

Figure 17.3c. Tiger using one of the underpasses constructed beneath NH-44 in Pench Tiger Reserve. Photo credit: WII Road Ecology Project 2020, Bilal Habib

17.6 Relevance of SEA in the planning of multiple linear corridors

Experience from current planning assessments draw home the lesson that focus on transportation projects rarely integrates other land-management objectives and future utility infrastructure needs. The general lack of vision to systematically align the routes of linear infrastructures such as roads, railway lines, power lines or a transmission lines within the same landscape poses the risk of jeopardizing the connectedness of wildlife habitats. The dichotomy between project-level EIAs and regional EIAs or SEAs can be attributed to this failure in conceiving the multiple impacts of progressive developments within the same development corridor. Even in the case of a single highway project (e.g. NH 44), project proposals are developed for each of the segments or subsections of the highway aligned through different states or administrative jurisdictions. The EIAs conducted at the project level fail to capture the larger picture of cumulative impacts of total habitat loss or the spatial extent of fragmentation by a single highway.

Figure 17.4

Figure 17.4a. Unplanned developments can lead to multiple development corridors traversing the landscape Illustration by Sharmistha Singh

Figure 17.4b Planned developments can reduce the risk of large-scale fragmentation (Figure 4b) and improve the potential habitat use for wildlife species. Illustration by Sharmistha Singh.

Developing policy choices to balance mobility, economic growth, and conservation goals, though important, remain a challenging endeavour. A strategic assessment and planning approach is urgently needed for proactively zoning and prioritizing areas that can be opened up for development and those that need to be designated as no go areas for development to safeguard high-priority areas of conservation from avoidable impacts. While project-level EIAs are a legal requirement and a decision-supporting tool for individual projects, EIAs can rarely look beyond the impacts of individual corridors. SEA aids spatial planning to align multiple developments in common corridors within natural landscapes to reduce the scale of habitat fragmentation and optimize the habitat use by wildlife species in larger fragments (Fig. 17.4a and b). EIA of individual projects forming a unit of multiple developments planned in corridors can subsequently help in designing project-specific and location-specific mitigation measures.

17.7 Recommendations

Transport infrastructure that will continue to remain a pervasive element in modern landscapes for meeting the expanding demands of a growing human population for mobility and commerce, will result in far greater challenges for movement of wildlife in fragmented landscapes. Considering that transportation projects largely become economic arteries, avoidance of their ecological impacts is rarely adopted as the foremost strategy that is emphasized in the mitigation hierarchy (Wildlife Institute of India 2016). Given this situation, structural mitigation planning driven by conservation science can at least have a greater chance of success in securing connectivity of wildlife habitats fragmented by road or rail corridors. Mitigation planning must be oriented to address the concerns of most extinction-prone taxa in the landscape and species that are highly sensitive to the specific impacts of development. Insights about the ecological requirements of species, movement patterns, behaviour and response to physical disturbances associated with transport projects provide a starting point for developing animal-friendly mitigation structures. This obviously necessitates the engagement of wildlife experts early in the planning of road or rail projects to identify target taxa, ecosystems and landscapes that must command priority for conservation. Consultations with road planners at this initial stage can provide an opportunity to review alternative route alignments and discuss design alternatives that can be made sensitive to animals' need for cover and shelter; feeding and

foraging, moving and ranging.

Other ecological considerations, such as location and size of mitigation structures; adaptability of species to these and influence of neighbourhood features also need to be adequately and appropriately factored in at a fine scale of resolution in the earliest stages of planning of the context-sensitive mitigation measures. The science of road ecology and rail ecology (Van der Ree *et al*. 2011; Agua *et al*. 2017) emerged from this narrative and would be valuable in improving the understanding of the ecological implications of roads and railways and how to avoid, minimize and compensate for their negative impacts on species, habitats and landscapes ecosystems.

Planning and implementation of mitigation structures cannot be done solely by the road agency. It should be a collaborative craft that requires inputs from transport agencies, planners, builders, engineering experts, conservation scientists and wildlife ecologists to engage in research and development of sensitive and yet technically feasible designs of crossing structures for enhancing the permeability of the road for animal movement. Road building and mitigation planning should therefore be made inseparable from the earliest stages of project planning, designing, constructing and managing the road.

Continuous long-term monitoring of crossing structures will always be the key to closing the gap between planning and successful implementation of the design. Monitoring needs to be an integral part of a mitigation project to allow agencies to evaluate the performance of their mitigation investments and informed decision-making with regard to planning and design of mitigation on future projects. For conservation groups, monitoring of the use of mitigation structures would help evaluate the functional connectivity and identify winners and losers from the conservation standpoint. Evidence monitoring established that all of the six lemur species were found using canopy bridges to cross roads and pipelines around the mining area in Madagascar (Mass *et al*. 2011); Colobus monkeys effectively used the colobridges to cross transportation or service corridors in Kenya (Donaldson and Cunneyworth 2015); and artificial canopy bridges were successfully used by slender lorises, palm civets and by wide variety of birds for perching in Indonesia (Nekaris *et al*. 2020).

The success of connectivity conservation efforts requires innovative models of collaborative governance to guide sectoral development plans, in order to have a greater conservation impact than the sum of the parts. SEA-driven assessments must be encouraged to inform decisions and reform policies to promote development plans that adequately safeguard the integrity of forest and other natural landscapes where multiple development corridors are planned. The inclusion of landscape in sectoral policies is needed to identify and promote compatible developments in common corridors, to avoid and reduce the landscape-level impacts of unplanned developments.

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18

The Mekong River Corridor: A Critical Test for EIA/SEA Effectiveness

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ABSTRACT

Southeast Asia has one of the most advanced corridor programmes in the world. Since 1998, corridor development has been a flagship programme of the member countries of the Greater Mekong sub-region managed by the Asian Development Bank (AsDB). The AsDB promotes the active transitioning of transport corridors to economic corridors to (ultimately) development corridors, yet none have achieved this status yet. Three regional economic corridors are currently promoted as frameworks upon which to anchor regional development projects and attract investors.[103] However, this chapter focuses specifically on the Mekong river. This is a corridor with a difference. Unlike other corridors described in this publication, the river serves as a natural linear 'corridor' upon which developments are imposed. This is in contrast to most other corridors described in this publication's chapters, where an artificial linear development is overlayed onto an exisiting natural environment. The challenge remain the same; to create better harmony between development and environment. This case study is an illustration of the complexity of managing such a resource as a river, vital for millions of people, while it is under pressures from strong competing interests. In addition, it is a good example of a corridor that has seen pioneering applications of tools intended to address strategic choices, co-benefits, scenario planning, cumulative and transboundary effects. A partial moratorium on new dam developments on the mainstream Mekong currently presents a window of opportunity to appraise the situaiton and undertake research into the true costs and benefits of such developments and to put better systems in place to assess and manage their impacts. Lessons learned in the Mekong corridor will be important for the planning and development of other types of corridors generally.

103 The work of agencies such as the Netherland's Commission for Environmental Assessment supports capacity development in environmental and social assessment in the planning of GMR developments (Netherlands Commission for Environmental Assessment 2017).

18.1 Introduction

This chapter focuses on the recent history of hydropower planning and development based on a literature review. For ease of reference, details of selected hydropower case studies are provided in Annex 1. Substantive references are included at the end or in Table 18.1, while media sources are referenced as footnotes.

Agencies such as the Mekong River Commission (MRC) and the Core Environmental Programme of the Asian Development Bank (AsDB) have been industrious in advocating strategies, tools, training and guidelines to help decision makers identify the median line between development needs and environmental safeguards across the international boundaries of the MRC member countries. Numerous independent institutions track developments and frequently raise alarms about any concerns.

However, in spite of many initiatives, the environmental profession continues to have little significant influence on decision-making. Decisions on projects (or the policies, plans and programmes that frame them) are usually made without adequate assessment and management of their impacts. Instead ad hoc, incremental developments cumulatively threaten the sustainable future of the river. Those with vested interests in projects often remain tolerant of the prevailing laissez-faire attitude demonstrated by some decision makers to managing environmental impacts. This is compounded by a further apparent lack of political will to improve the situation. The absence of the essential components of good governance (effective rule of law and institutions to implement them, transparency and inclusiveness in decision-making, equitable distribution of benefits) is frequently evident. Such challenges are not unique to the Mekong (see Chapter 3), but it is certainly one river with pressing issues to address.

18.2 The Mekong river

If ever there were a situation requiring effective environmental planning and mangement, the Mekong is surely it. Escalating development pressures are being superimposed onto the Mekong, with poor-quality environmental and social standards threatening the systems upon which the security and livelihoods of millions of people depend. The transnational nature of the river subjects it to geopolitical pressures.

The Mekong River corridor provides the core for regional development plans in the Greater Mekong Sub-region (GMS), an economic grouping managed by the AsDB. The Mekong River (known as the *Lancang Jiang* in China) originates on the Tibetan Plateau in Qinghai province and flows for 4,350km through the eastern part of the Tibet Autonomous Region and southwestern China (mostly Yunnan) for over half its length, before either running through or along the borders of Myanmar, Thailand, Lao PDR, Cambodia and Vietnam, where it eventually enters the South China Sea via the Mekong delta. In the process, it seasonally replenishes southeast Asia's largest lake, Tonle Sap in Cambodia. In its upper reaches, the river carves its way through mountainous terrain and over many centuries this topography has helped to protect a rich biodiversity, as well as some remote ethnic communities from invasions and incursions.

It is estimated that 200 million people depend on the GMS's natural capital, and about 60 million live in the river basin itself.[104]

The Mekong River is one of the world's most productive inland fisheries. The river's productivity is dependent upon seasonal variations in flow rates that create a dynamic system of annual flooding and semi-drought conditions to which both wildlife and people have adapted. The Mekong is also considered to be the second most biologically diverse river in the world, after the Amazon. It is estimated that the Mekong provides habitat for about 850 freshwater fish species, but this climbs to more than 1,300 when saltwater species of the delta are included. Many fish species are endemic and about 135 are migratory (more than any other river) (Hortle 2009).

In addition, GMS countries harbour over 430 mammal species, over 800 reptile and amphibian species, about 1,200 bird and at least 20,000 plant species. Among the locally endangered species of the region is the Mekong/Irrawaddy River dolphin (*Orcaella brevirostris)*. While this freshwater dolphin has an extensive range, its distribution on the Mekong is limited to a 190km stretch of the Mekong between Cambodia and Lao PDR, where it is vulnerable; fewer than 100 are estimated to remain.[105]

104 Source: https://www.internationalrivers.org/asia/mekong/

105 Source: WWF Greater Mekong Programme (2020} www,greatermekong.panda.org

18.3 Development pressures

The Mekong is under multiple developments. These include flood control initiatives, canalization for navigation, unsustainable fishing practices, excessive water abstraction, deforestation and urban growth, river sand and gravel quarrying, increasing tourism, pollution and poaching.

This paper focuses on developments to harness the Mekong's hydropower energy and the assessment processes involved. The Mekong is one of the world's most active regions for hydropower development. The policy drivers include energy security, energy trade, self-sufficiency, regional integration, revenue generation, attracting foreign direct investment, power supply diversification and increased access to electricity for the region's industry and people. Energy poverty is widespread and there is a pressing need to increase energy access for the majority of people.

Estimates have suggested that the total potential for hydropower production in the Mekong basin is between 50,000 and 60,000 MW. This is roughly a 50/50 split between the upper (PR China and Myanmar) and lower Mekong (Lao PDR, Thailand, Cambodia and Vietnam). This estimate, however, does not take into account environmental and social factors that should eliminate some of the planned schemes. So far, about 3,500MW of this potential has been realized through projects built largely over the past 20 years.[106, 107]

Eleven dams have been constructed on the upper stretch of Yunnan and at least another 11 are either proposed, under construction or operational downriver on the mainstream of the Mekong. Seven hydropower projects are planned in Lao PDR, two in Cambodia (collectively known as the 'Laos cascade') and two straddling the Lao PDR/Thailand border.[108]

According to a Mekong River Commission (MRC) cost-benefit analysis (known as the 'Council Study' [See Table 18.1]) the riparian countries (excluding PR China) "could see economic gains from full hydropower development of more than $160 billion by 2040" (Mekong River Commission 2018a). Development of hydropower also creates potential synergies with other water related needs, including expanding irrigation and navigation opportunities and improving both flood and drought management. But the Council Study also pointed out that such benefits come with costs, especially natural capital loss. For example, a fisheries decline of US$ 23billion by 2040, loss of forests, wetlands and mangroves of up to US$145 billion, reduction of sediment, resulting in reduced rice production and so on. Overall, it was suggested that dam developments in the Mekong could decrease gross domestic product growth for lower Mekong countries by about US$ 29 billion (Mekong River Commission 2018a).

Proponents promote hydropower as a renewable energy source. This is not a unanimous viewpoint,[109] but it allows countries to claim diversification of their energy mix and shift emphasis in supply away from the current dominance of fossil fuels, which presently account for 70 per cent of all grid-based generation in the GMS

106 This refers to schemes on the main river course, not tributaries of which there are many more. The mainstream receives priority because it offers freshwater species mobility throughout the river basin and supports sensitive natural processes upon which sub-basin wetlands and lakes are dependent. Mainstem rivers provide basin connectivity; River basins provide primary land/water interface.

107 Source: https://www.internationalrivers.org/campaigns/mekong-mainstream-dams.

108 Source: http://www.mrcmekong.org/our-work/topics/hydropower/

109 "10 Reasons Why Climate Initiatives Should Not Include Large Hydro." A Civil Society Manifesto for the Support of Real Climate Solutions (International Rivers USA). (http://org.salsalabs.com/o/2486/p/dia/action3/common/public/?action_KEY=18739)

countries (Asian Development Bank 2008).[110,111]

Hydropower dams and their reservoirs have many and diverse potential negative environmental and social impacts.[112] They can significantly impact ecological processes and hydrological dynamics, they frequently require the displacement of many people, inundate and remove land and forest cover, degrade and destroy habitats, create barriers to wildlife (especially fish) migration, reduce sediment and nutrient supplies to downriver communities and reduce soil fertility, plant health and undermine established livelihoods.[113,114]

In addition to managing such direct impacts, planning and management of hydro power developments must consider the cumulative, secondary, transnational and interconnectivity impacts on this complex river system. According to the MRC's Monitoring Unit, Yunnan's cascade dams have reduced downriver wet season and increased dry season flow rates significantly resulting in erratic contradictions of natural systems (Basist and Williams 2020). This exacerbates the impacts of climate change.[115] In 2019, and "in spite of above normal rainfall and snowmelt in China's portion of the upper basin, nearly all run off stayed behind China's dams" (Eyler 2019). This allegedly exacerbated a drought in downriver countries, adding to *El Nino*-induced conditions. (Eyler and Weatherby 2020). However, opinions are divided on this. Chinese researchers suggest that the upriver cascade dams do not adversely impact downriver water regimes but instead, if well planned and managed, developments could reduce flooding and drought risks and create new opportunities for agriculture, aquaculture and fish farming.[116,117] The MRC were non-committal on this, stating that "more scientific evidence was necessary to conclude that the 2019 drought was in large part caused by water storage in Upper Mekong dams." It urged more open information sharing among stakeholder countries.[118]

This highlighted a critical issue: the need for better sharing of information. Without it, there will be a lack of trust of, inter alia, flow rate data that makes verification of claims and counter-claims very difficult. In 2020, Chinese Premier Li Keqiang pledged that China would start to share year-round hydrological data with the MRC.[119] Meanwhile, a Mekong Dam Monitor was established in the USA (run by Eyes on Earth and the Stimson Centre). It will use satellite imagery to provide "a near-real time picture of how major dams and the climate change impact the Mekong's hydrological conditions."[120]

Dam building often requires access to remote areas (using roads, railways, bridges, tunnels, canals, conveyors, transmission lines, pipelines, etc). This will include direct clearance of vegetation and access to borrow areas for construction materials and may create secondary impacts when forestry or mineral resources become more viable, not all of which may be legally acquired.

It is currently not possible for commercial vessels to navigate the length of the Mekong. Rapids and other physical obstacles occur

110 The GMS countries have diverse energy resources that are unevenly distributed. Most of the fossil fuel resources are in Yunnan and Vietnam. Myanmar and Cambodia have gas fields, mainly offshore, Thailand has limited domestic gas and oil reserves and relies on imports (Asian Development Bank 2008).

111 Although on a downward trajectory, China is the world's largest user, producer and consumer of coal. https://phys.org/news/2015-11-coal-anytime-renewables.html

112 For list of hydro power's negative impacts in the Mekong see: https://www.scientists4mekong.com/list-of-damages-by-hydropower-dams-in-the-mekong-basin/.

113 The Consultative Group on International Agricultural Research monitors the development of dams in the Mekong Region and their impacts on health and food security.

114 In other parts of the world, fish ladders have been employed to aid fish migration. Such innovations are not considered suitable for the Lower Mekong River because of the diversity of species and their behaviours and large numbers of migrating fish.

115 Source: Scientists4Mekong.com

116 Li Xiang of the China Institute of Water Resources and Hydropower Research Institute, Beijing Speaking in 2019 at the 8th MRC Regional Stakeholder Forum (Vientiane PDR Lao).

117 Source: Global Times: "River dams in China helped alleviate drought along Lancang-Mekong, research finds" 2020/7/15.

118 Source: "US govt funded study found that China could have choked off the Mekong, threatening the lifeline of millions in Asia" Pan Pacific Agency News and Analytical Agency. New York, 28 April 2020, CNBC.

119 Speaking at the Third Lancang-Mekong Cooperation Leaders' Meeting, Beijing, 24 August 2020.

120 Source: https://www.theedgemarkets.com/article/us-steps-scrutiny-chinesebuilt-dams-mekong-basin.

in several places. Removal of these is part of the agenda for increasing the Mekong corridor's accessibility for trade. For two decades, the controversial "Mekong rapids-blasting" or "Canalisation Project" has been promoted. The plan is to create a navigable channel for safe, year-round commercial navigation by large vessels along the river, especially between Yunnan (PR China) and Luang Prabang (Lao PDR). In 2000, China, Myanmar, Lao PDR and Thailand signed an "Agreement on Commercial Navigation on the Lancang - Mekong River". However, it has had a stop-start history and work has only been partially implemented to date in China, Myanmar and Lao PDR.

Of concern is that such developments have proceeded without much evidence of adequate consideration of their environmental and social impacts or engagement with affected communities. The consequences of further blasting and disposal of excavated rock in pools will impact important fish habitats, as well as potentially influence river velocity. Thailand has also raised national security concerns. After a recent lull, interest in the project was revived in 2016 at the Lancang-Mekong Cooperation Framework (LMC) (see below). However, yet again, late in 2017, China suspended plans for the project. Nonetheless, as is quite often the case in the Mekong experience, consultations and preparatory work reportedly continued during 2018, again undermining trust and creating uncertainty. In 2020, Thailand's government formally cancelled their commitment to the project in their part of the river, and this has stopped further developments (for now) (Deetes 2020).

18.4 Governance

Governance of the Mekong is complicated by the transnational, multiple and diverse administrations and stakeholders with an interest in the river. More than four overlapping regional programmes provide support to the Mekong region countries on, inter alia, environmental planning and management strategies (the GMS, MRC, LMC and Lower Mekong Initiative [LMI]). These connectivity initiatives cover a wide range of mechanisms aimed at linking hard infrastructure, policies and peoples within the Mekong region. One reason for this apparent duplication of effort is "the competition (between) regional powers, such as China, the US and Japan that want to exert their respective influence through their own proposed mechanisms, and, to a certain degree, to undermine the influence of their rival powers" (Leng 2019). However, it also gives the Mekong countries more opportunities to access new sources of funding for their infrastructure development.

18.5 The Greater Mekong Sub Region (GMS)

The GMS is an intergovernmental economic grouping established by the AsDB in 1992. The GMS comprises six countries: Myanmar, Thailand, Lao PDR, Cambodia, PR China (specifically Yunnan province and Guangxi Zhuang autonomous region) and Vietnam. It sets the development framework for the region by promoting cooperation, integration and connectivity. It also helps mobilize donors' and investors' interests in priority infrastructure projects. The Environment Operations Centre serves as a knowledge hub and provides technical support to the Ministerial GMS Working Group on Environment, which is responsible for regional cooperation in implementing a Core Environmental Programme.

Since 1998, development corridors[121] (DCs) have been key to GMS's strategy, guided by three principles: "environmental resilience, integration and inclusivity". The DCs are intended to further catalyse investments, encourage co-benefits, promote public-private partnerships and, ultimately, facilitate economic growth as a means to reduce poverty across the region (Srivastava 2011). They are the conduits for transforming ad hoc, uncoordinated infrastructure projects into better integrated economic development that links production, trade and markets, while improving the efficiency and effectiveness of the movement of goods, services, labour and capital within the region.

The Chinese-led Belt and Road Initiative BRI has been increasingly superimposed on to the AsDB's economic corridor strategy, providing further regional interconnectivity and raising concerns about the need for more rigorous environmental assessment procedures[122] (see Chapter 16; Baird and Thomas 2020). While the DCs are fundamentally linear in nature, they also include the development of new nodes, special economic zones (SEZ), that are promoted as intensive investment hubs in key places along corridors.

18.6 The Mekong River Commission (MRC)

Within the broad-based GMS, another intergovernmental agency, the MRC (established 1995) provides a river basin-specific institutional framework and technical support. Its mandate is to implement the 'Mekong Agreement for Regional Cooperation' between Lao PDR, Thailand, Cambodia and Vietnam (the founding members). The MRC sees itself as an honest broker, developing plans and collecting data to inform evolving strategies for the sustainable management of the river basin within an Integrated Water Resources Management (IWRM) framework.[123] The MRC has been industrious in its production of strategies and guidelines (see Table 18.1).

121 Three economic corridors are being developed: the North-South Economic Corridor (linking Yunnan with Bangkok via Lao PDR as well as Nanning with Vietnam), the Southern Economic Corridor (linking Cambodia with Thailand, Vietnam and Lao PDR and Myanmar) and the East West Economic Corridor (linking Da Nang in Vietnam, through Lao PDR, Thailand with Myanmar, it intersects the North-South Economic Corridor in Thailand) (Srivastava 2011).

122 For example, in 2018 Myanmar and China signed an agreement to establish the China-Myanmar Economic Corridor (CMEC), as part of the BRI. Stretching 1,700km, the CMEC's network of new railways, communications, SEZs and other major infrastructure projects are intended to link Myanmar (eventually to Yangon) with landlocked Yunnan.

123 IWRM is based on the four 'Dublin principles' formulated at the International Conference on Water and the Environment (1992). It is a process promoting coordinated development and management of water and land resources, in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

Table 18.1 Key assessments, guidelines, tools developed by the MRC to assist the Member Countries achieve a balance between hydropower development and transboundary environment protection

	Title	Date	Notes
Strategic and Planning Assessments			
Strategic environmental assessment (SEA) of Mekong Hydropower	A pioneering Strategic Environmental Assessment of hydropower	2010	Reviewed opportunities and threats of 12 proposed main river hydropower schemes to project their cumulative, long-term implications. The SEA informed subsequent MRC strategies 2011-2015 and 2016-2020; it recommended a 10-year moratorium, called a 'hiatus' by dam proponents, and largely ignored
River Basin Development Plan (BDP)	Assessment of Basin-wide Development Scenarios	BDP1 2001/06, BDP2 2007/10 BDP3 2011/15	Basin development planning provides basin-wide perspectives and creates a transboundary management framework to ensure that nationally planned developments are well coordinated Assessment of cumulative Impacts based on basin-wide scenarios resulting from existing and planned water resource developments (including, but not limited to hydropower); it assessed national water resource development plans against economic, environmental and social assessment indicators
Basin Development Strategy (BDS)	Identifies priorities	Current: 2021/30.	The BDS sets strategic priorities up to 2030 related to development, environmental protection and institutional cooperation, guiding Mekong stakeholders towards achieving improvements in the environmental, social and economic state of the River Basin; it uses national indicator plans and the MRC indicator framework for setting planning, assessment and reporting requirements; it identifies opportunities to strengthen management, increase regional and national benefits to achieve this
Sustainable Development Plan	"The Council Study"; Study of the Sustainable Management of Mekong basin	Updated 2018	Cost–benefit analysis assessing investments in hydropower, irrigation, agriculture and navigation sectors detailing their combined effects (including synergies); an indicator framework comprising social, environment, economic, climate change and cooperation dimensions used to establish the risks and benefits of existing and planned hydropower developments and their impacts on other sectors
MRC Environmental Management Strategy	The Mekong Strategy for Basin-wide Management of Environmental Assets of Regional Importance	2020 (2021-2025)	The first of its kind that covers the whole Lower Mekong Basin; it seeks to restore, protect and manage environmental assets of regional importance
Guidelines and Tools			
Assessment of Basin-wide development scenarios (to support Basin Development Planning)		2010	Tech Guides: 1. Scoping and planning of the assessment of development scenarios; 2. Assessment Methodologies; 3. Assessment of Flow changes; 4. Impacts on river morphology; 5 Impacts on Water Quality; 6. Power Benefits; 7. Agricultural impacts; 8. Salinity intrusion; 9. Impacts on wetlands and Biodiversity; 10. Impacts on Tonle Sap; 11. Impacts on Fisheries; 12. Social Impacts; 13. Economic Benefits and Costs
Design Guidance for Proposed Mainstream Dams in the Lower Mekong Basin		Updated 2018	Tool to help stakeholders better participate in regional fora and Procedures for notification prior consultation and agreement (PNPCAs); provides guidance for dam design and operations founded on the principles of IWRM and the mitigation hierarchy
Rapid Basin-wide Hydropower Sustainability Assessment Tool (RSAT)		Updated 2016	Framework and methodology to support governments to achieve their strategic priorities at basin-wide level. It is based on the Mekong Basin Development Strategy 2011, the IWRM principles and the Hydropower Sustainability Assessment Protocol; it highlights 10 topics /27 sub-topics. Topics: 1: Institutional capacity; 2. Options assessment, siting and design; 3. Economic contribution; 4. Equitable sharing of costs and benefits; 5. Social issues/stakeholder consultation; 6. Environmental management and ecosystem integrity; 7. Flows and reservoir management; 8. Erosion, sediment transport and geomorphological impacts; 9. Fisheries; 10. Safety The Four criteria used to analyse the topics and sub-topics are: 1. River basin planning and management; 2. Energy sector planning and regulation; 3. Hydropower projects; 4. Regulations and governance

Guidelines for Evaluation of hydropower and multipurpose portfolios	2015	Multipurpose uses of dams need to be considered at the outset of project and basin planning; these guidelines consider a project's wider social, economic and environmental implications during development of hydropower strategies (a portfolio process) and to internalize all costs and benefits in economic evaluations used to compare hydropower and other multipurpose options to assist basin planning
Guidance on (1) National to Local benefit and cost sharing options on Mekong Tributaries and Scoping Paper of (2) Regional Benefit Sharing	2014	The MRC Basin Development Strategy required members to report on benefit-sharing options for Mekong tributary hydropower; these guidelines identify priority issues for equitable benefit sharing (monetary and non-monetary); optimizing additional and indirect benefits
Pilot testing (in the Sre Pok sub basin) of the identification of ecologically sensitive sub-basins for sustainable development of hydropower on tributaries	2015	Risk-based guidance to identify ecologically sensitive areas to be protected and those where hydropower can be developed with manageable environmental impacts; makes recommendations for up-scaling the identification of Ecologically Sensitive Areas based on a pilot exercise of the Sre Pok river (Vietnam and Cambodia)
'The Hydropower *Mitigation* Guidelines': for Hydropower Environmental Impact Mitigation and Risk Management in the Lower Mekong Mainstream and Tributaries (Vol 3)	2019	Based on case studies of the Laos cascade, the effectiveness of good practice planning and design mitigation measures are assessed including revenue implications; the indicators included are energy revenues, value of fish products, sediment transfer, nutrient transport, catchment connectivity for fish and overall biodiversity loss; the impacts of the dams were assessed against a series of scenarios
Guidelines for Transboundary Environmental Impact Assessment in the Lower Mekong Basin	Update 2018	A common framework of transboundary assessment that builds on and complements national EIA systems; outlines the mode of cooperation between members to prevent, minimize and manage transboundary impacts
Procedures and Protocols		
Procedures for Notification and Prior Notification Consultation and Agreement (PNPCA)	Ongoing	The PNPCA is the MRC's main procedural tool for encouraging cooperation and dialogue on hydropower plans
Stakeholder Engagement Principles and Statement	Updated 2017	Stakeholder engagement is stated as important in all MRC's key documents (including the 1995 Mekong Agreement) and its Procedures, Basin Development Strategy and Plan etc. A Statement on Public Participation
Other Guidelines/Reviews		
Basin-wide assessment of climate change impacts on hydropower production		2018
Review of existing knowledge on the effectiveness and economics of fish friendly turbines		2015
Review of existing research on fish passages of large dams. and applicability to mainstream Mekong		2015
Guiding considerations of transboundary impacts for hydropower planning and management		2014
Assessment of basin-wide development scenarios (an assessment framework)		2011

One of the MRC's most innovative exercises was the 2010 SEA. Although it has never been accepted as an official MRC report, it advocated for the adoption of an IWRM framework for the Mekong. This meant the adoption of the three main principles of the IWRM, which are:

1. Multi-sectoral approaches;
2. Participation of stakeholders throughout planning and implementation;
   and
3. Consideration of all options for power supply, including enhancement of the role of demand-side management, loss-reduction measures and alternative supply options to ease pressure on natural and other resources (United Nations Environment Programme 2012).

In postulating the future development path, the 2010 SEA considered four scenarios for the main-river Mekong dam programme:

1. No new main-river dams;
2. Deferred decisions on all main-river dams for a set period;
3. Gradual development of main-river power; and
4. Market driven development of main-river projects.

The SEA recommended option two, stating that; "Decisions on mainstream dams should be deferred for a period of ten years with reviews every three years to ensure that essential activities during this period are being conducted effectively" (Mekong River Commission 2010a). The deferment activities included **"**comprehensive feasibility studies of partial in-channel, diversion and other innovative systems […] which do not require dams across the full extent of the river channel, comprehensive assessment and fast tracking of tributary projects that are considered feasible and ecologically sustainable according to current international good practice". The SEA also called for "assurances that the Mekong main-river will never (again) be used […] for *proving* full dam hydropower technologies" (Mekong River Commission 2010).

In spite of how industrious it has been in producing reports, the MRC has been criticized as being weak in its practical dealings with the powerful pro-dam lobby. National interests continue to dominate regional cooperation agendas and the MRC's ability to broker deals between its members is limited (as will be seen in the contentious Don Sahong, Xayaburi cases in Annex 1). It has been suggested that the member states prefer the MRC to be a toothless organization – acting as a facilitator, rather than imposing conditions on its members (Dore 2003). While its members want it to mobilize funds, rather than control their developments, for a variety of reasons, donor funding has been substantially reduced in recent years.[124]

The MRC's weakness is evident in the application of the Procedures for Notification and Prior Consultation and Agreement (PNPCA), on which it relies heavily to exercise influence. According to Article 7 of the 1995 Mekong Agreement, proposing governments are required to hold prior consultations with the other MRC members to discuss the potential transboundary impacts of mainstream dam developments on neighbouring countries. Tributary projects are excluded, only requiring notification. The intention of the PNPCA is to create a platform for stakeholders to engage in assessments of new developments and present technical information on its proposal and an EIA (or more likely, the precursor to an EIA: a less comprehensive initial environmental evaluation [IEE]). These will be assessed by the MRC for quality before forwarding to potentially impacted countries. The consultations are intended to provide suggestions to address any concerns. The process takes six months or more.[125,126]

The PNPCA has been criticized for being a tickbox exercise (as evidenced again by construction work continuing on several schemes, while consultations were still underway) and there are no guarantees that the proposing country will address any concerns raised. The MRC has, on occasion, rejected assessment documents submitted and sent them back for revision. However, neither the MRC (nor the consulted countries) have powers of veto. Whether or not to build a mainstream dam or to implement recommended mitigation measures remains a proposing country's own decision. The only situation when the required process involves a specific agreement is when an inter-basin transfer is proposed. While the MRC is constrained by the need to ensure its guidance is non-prescriptive, it is perhaps not surprising that projects have proceeded without rigorous environmental and social assessments.

124 Source: "Mekong effort fails after years of lavish foreign funding" (19/ 10/2016) retrieved 11 November 2020 from https://phys.org/news/2016-10-mekong-effort-years-lavish-foreign.html.

125 Under the Procedures, any infrastructural project using the mainstream water during the dry season within the same basin, as well as during the wet season between two basins, must undergo the prior consultation process. Applicable projects include large-scale irrigation and hydropower developments, which may cause significant impacts on the environment, water flow and quality of the Mekong.

126 For example, in 2016, a committee was established in Cambodia to resolve compensation and resettlement issues for 1,000 families displaced by the 400MW Lower Sesan II project. The Chinese, Vietnamese and Cambodian joint venture came into operation in 2018, but failed to have community representatives on the committee. Decisions cannot be made on behalf of communities without their input.

Three significant failings can be highlighted for the process.

1. Omitting the tributary dams from the PNPCA ignores the fact that their cumulative impacts can be more severe than mainstream dams.
2. China, a major driving force behind dam developments, is not a member of the MRC: a major handicap to basin-wide coordination.
3. Civil society engagement has been limited.

In 2020, the MRC Council approved a new Basin Development Strategy for 2021-2030 and the MRC Strategic Plan 2021-2025. Both indicate a potential shift in role for the MRC, from one primarily focused on knowledge acquisition and sharing, towards more comprehensive cooperation on water resources development, data sharing and management across the Mekong Basin. For example, work is being initiated on ecosystem services valuation and a basin wide sedimentation management plan. The first Mekong Strategy for Basin-wide Environmental Management of Environmental Assets of Regional Importance 2021-2025 was also approved (Mekong River Commission 2019).

A partial withdrawal of the International Financial Institutions (IFIs) has been underway from the MRC, explained, in part, by their hesitancy to invest in environmentally and socially controversial mega-projects. The investment vacuum has been gradually filled by "Chinese investment banks and companies (who) are not bound to similar standards in their overseas activities" (Heinrich Böll Stiftung, World Wide Fund for Nature and the International Institute for Sustainable Development 2008).

18.7 The Lower Mekong Initiative

Initiated by the USA in 2009, the LMI is a multinational platform engaging Cambodia, Lao PDR, Myanmar, Thailand, Vietnam and the USA, to promote integrated regional cooperation and policy consistency among the five lower Mekong countries. It focuses on these themes: agriculture and food security, connectivity, education, energy security, environment and water, health, gender and other and cross-cutting issues.

18.8 The Lancang-Mekong Cooperation

Since 1996, China (and Myanmar) have been limited to being dialogue partners in the MRC process. A separate agency, the LMC has now been established by China, guided by the Sanya Declaration, which was launched at the First LMC Leaders' Meeting, along with a five-year action plan in 2018. GMS countries have been quick to enlist in the LMC, attracted by an special fund, which was established to implement the action plan based on "trade deals" (Eyler and Weatherby 2020). A LMC Environmental Cooperation Centre was established in Beijing in 2017. While the LMC has similar objectives to the MRC, an Memorandum of Understanding was agreed in 2019, seeking to allay fears of overlap of their activities.

The LMC has recently indicated that it is keen to broaden discussions beyond hydropower schemes to the wider BRI agenda (Eyler and Weatherby 2020). One advantage is that the LMC provides a forum through which to better engage PR China, the biggest promoter of hydropower schemes on the Mekong, albeit under their terms. It is also one, unlike the MRC, in which development agencies are unable to exercise an influence and promote their environmental, social and governance standards. There is little evidence yet that this will lead to better environmental and social planning, and management standards, but the promised data sharing is perhaps indicative of better collaboration (Biba 2018).

18.9 Review of hydropower developments

The Mekong River Basin is one of the world's most rapidly developing regions, albeit with uneven development distributed both within and between countries[127] (Organisation for Economic Co-operation and Development, Asian Development Bank, Mekong Institute 2020). All Mekong countries are engaged in the regional power trade. PR China and Lao PDR are the main net exporters, and Cambodia and Myanmar have the potential to join them. Thailand and Vietnam are the main net importers of electricity.

Although the legislation and guidance exist, it is evident that variable attention is paid by the host countries and hydropower investors to adequately assessing and managing the environmental and social consequences of hydropower developments. China is the lead investor or developer in over 20 hydro projects. Backed by EXIM Bank, Sino-hydro, the largest hydropower dam building company in China, is developing numerous hydropower projects in both Lao PDR and Cambodia, and China Southern Power Grid is either active or exploring opportunities in the Mekong.

Annex 1 provides a summary of significant hydropower developments on the Mekong (status as at 2021). The case studies are selective, rather than exhaustive, and have been included for their value in giving insights into the status of environmental and social safeguards in the Mekong.

127 The Organisation for Economic Co-operation and Development Development Assistance Committee classifies Cambodia, Laos and Myanmar as least developed countries. In contrast, Thailand was classified as an upper-middle income economy in 2011 (Organisation for Economic Co-operation and Development, Asian Development Bank and Mekong Institute 2020).

18.10 Environmental planning and management

18.10.1 SEA

The diverse, interconnected, multivariate and transboundary nature of the Mekong makes it a particularly appropriate candidate for the application of good governance tools such as SEA. It is increasingly being recognized that SEA can strengthen strategic planning of the power sector by creating a better understanding of long-term consequences and assessing different development scenarios, identifying the most sustainable development pathways and establishing the framework for rigorous project-specific EIAs (should hydropower be established as the appropriate option for the future).

Most Mekong countries have SEA legislation, reflecting growing interest in the process over the past decade. A variety of studies have highlighted elements of an SEA process. They have focussed on the issues that lie in the grey area between project EIA and policy SEA, where no discrete boundaries exist, only in degrees of emphasis. These include transboundary (Mekong River Commission 2018b), cumulative (SEATEC 1997; Asian Development Bank 2004; Mekong River Commission 2020), basin-wide (Mekong River Commission 2019), scenario planning (The Delta Study Ministry of Natural Resources and the Environment (MONRE 2015), social impact monitoring and vulnerability assessment (Mekong River Commission 2010b), multisector (Mekong River Commission 2019) and alternative assessments (National Heritage Institute 2017).

The comprehensive SEAs that have been undertaken to date have been primarily of the impact-centred type (i.e. the general project-specific EIA process, but with a broader temporal and spatial coverage). They have recommended frameworks, strategic priorities and processes for identifying and pursuing the most sustainable future for the Mekong.

The most notable impact-centred SEAs undertaken in the Mekong region to date have been the following.[128]

128 Both undertaken by the International Centre for Environmental Management, Australia.

1. MRC's SEA of Mekong Hydropower (2010), which provides a critical appraisal of dam plans and planning. It postulates the future economic benefits of power generation against a wide-range of environmental and social costs, some of which would be irreversible, and highlighted knowledge gaps and scientific uncertainty. Its main recommendation was to defer decisions about future Mekong mainstream dams for 10 years, allowing for further studies and building knowledge of existing dams' impacts, and encouraging decision makers to explore alternative ways to meet energy needs. Not all of the MRC governments accepted the SEA's findings. Lao PDR, for example, continued with the Xayaburi dam's construction within months of the SEA publication. (Mekong River Commission 2010a).

2. The International Finance Corporation's (IFC's) SEA of the Myanmar Hydropower Sector (2018). This SEA assessed the existing and planned hydropower projects in Myanmar (+/- 80 projects) and recommended a procedure to replace the prevailing project-by-project process with basin zone planning (Comprising a classification of river basins to reflect their sensitivity/suitability to dam developments) to be used to guide future project locations. It recommended no go zones in sensitive basins and no hydropower development on the five main rivers of Myanmar (including the Mekong). It also proposed a three-step approval process for hydropower projects (including a specific cumulative affects assessment) and the establishment of new institutions and policies to improve management capacity (International Finance Corporation 2018; International Rivers 2019).

The alternative policy analysis approach to SEA assesses different scenarios to establish how a hydropower development programme could be balanced with other priorities. This approach could be used before clear physical definitions of projects have been finalized, which would be difficult with an impact-centred approach (i.e. during policy formulation).

Several early attempts at policy analysis SEA-like approaches were made. One, a rapid sustainability appraisal (aka SEA), was undertaken of Thailand's Power Development Plan (and the planning processes of the MRC and the AsDB's GMS). The assessment is a type of audit, based on section one of the Hydropower Sustainability Assessment Protocol (drafted by the Hydropower Sustainability Assessment Forum in 2009). It assessed issues such as the implications of Thailand's importation of power from poorer countries (such as Lao PDR) in Thai power planning (AusAid, M-Power and Consortium of International Agricultural Research Centres 2010). Although similar exercises were done in Vietnam and Cambodia, the pioneers have been AsDB, who have advocated a widespread policy approach to SEA. They have applied it in the power sector under the AsDB's Core Environmental Programme (CEP) and Biodiversity Corridors Initiative, supported by their Environmental Operations Centre. For example, in Vietnam, SEA Guidelines[129] exist to provide a national framework for the application of SEAs and this has led to the SEA of National Power Development Plans (PDP) VI and VII.[130] The PDPs are strategic frameworks to guide the energy sector's future development, so that they can meet projected demands with social equity and environmental sustainability based on three growth scenarios. The SEA analysed the potential social and environmental impacts of the various generation and demand-side management options.

SEAs provide a means to identify possible issues and alternatives explored before a plan is finalized. New regulations and a system of payments for ecosystem services have been put in place to ensure enforcement and internalization of current externalities, respectively. Specific recommendations for

129 Vietnam government Circular No. 05/2008/TT-BTNMT. 8.12. 2008,

130 This built on a pilot exercise to consider the potential impacts of 21 hydro schemes included in the Vietnam Power development Plan V1 considered within five scenarios with the impacts of non-hydro power sources in each scenario to meet the same generating needs.

hydropower development include better support for displaced people, the multipurpose management of reservoirs, the development of community forestry, protection plans for the areas surrounding hydropower sites and the preparation of biodiversity management plans in localities of high ecological value. This SEA process is now widely regarded as a benchmark for good practice in integrating environmental factors into strategic planning (Asian Development Bank 2018a; Asian Development Bank 2018b).

The SEA has important lessons for the power sectors of other Mekong countries and shows how a SEA, when fully integrated into a strategic planning processes, will result in more rigorous plans for developments that are based on a better understanding of their implications for the economy, society and environment (Asian Development Bank 2018a). It is anticipated that applying "SEA in preparing power development plans will become standard practice in all GMS countries in the next few years" (Asian Development Bank 2018b) and national legislation will reinforce this requirement, as it has already in Vietnam. This will encourage better assessment of decisions, such as that of Cambodia, which has postponed hydropower developments in the Mekong, but instead expanded the role of coal-fired power plants in its energy portfolio.

In spite of this improving situation, projects are still identified without reference to appropriate energy strategies and regional plans, or sensitivity criteria, against which specific projects can be assessed. "Overarching planning guidance […] with which all development sectors need to comply…. is not in place regionally or for each national component" (Mekong River Commission 2010b). "Unless the Chinese and Mekong governments integrate considerations of ecological sustainability into their national development goals, water governance in the Mekong region will become a failed case of responsibility-sharing" (Yeophantong 2013).

18.10.2 EIA

All Mekong countries now have EIA requirements (supported by regulations, technical guidelines etc.) (Baird and Frankel 2015). While these are generally of international standard, Annex 1 illustrates the diversity in how these are implemented in practice. Many projects lack sufficient EIAs, some even have none. Most countries incline to EIA as a bureaucratic necessity and a self-regulatory responsibility of developers. There is little expectation of monitoring of any compliance obligations and sanctions for non-compliance are often inconsequential to the developer, and so is a limited deterrent. It is not unusual for projects to go ahead in spite of inadequacy, partiality and even alleged illegality in the assessment process.

Reliance is put on the MRC's PNPCA procedures for assessing if an EIA report (or more likely, a prior requirement for an IEE) is of sufficient standard.[131] Some assessments have been sent back for improvements, although there does not appear to be any obligation for these to be made.

It is difficult to undertake quality assurance of project-specific EIA procedures or reports when they are often publicly inaccessible. Compliance monitoring mechanisms for conditions imposed on developers permitted to proceed are even scarcer. In their absence, resort has to be made to unverifiable anecdotal evidence and media reports, which have a tendency to be partisan. These indicate regular concerns about inadequate baseline information, bias towards the positive aspects of projects, ineffective participatory processes and so on. It is also frequently reported that environmental studies run parallel to construction activity, suggesting a project is a *fait accompli* and ensuring reactive mitigation as the only option for aggrieved communities. It is unlikely that EIAs will have adequately referenced contextual considerations and would thus not be very good-quality EIAs, especially in developments with trans-frontier implications. A further frequent criticism is that many hydropower projects are poorly justified,

131 MRC's three-stage EIA: (1) Prefeasibility and Initial Environmental Evaluation (IEE); (2) Feasibility and EIA; (3) EIA Process.

driven by the interests of the investment and construction sectors, not by a demonstrated demand for electricity. Justification for a project and its positive impacts is a fundamental requirement of any EIA and brings the no go alternative into serious consideration.

18.10.3 Public participation

International experience shows that an EIA process without meaningful public participation will be fundamentally flawed. Transparent and inclusive stakeholder engagement (with the possibility to influence decisions) should underwrite both SEA and EIA.[132] There is a general lack of openness to public participation shown by some of the regimes driving hydropower developments in the Mekong. Information on EIAs and other studies are routinely withheld, precluding engagement. There is little evidence of efforts to include civil society (let alone marginalized groups) in consultations. Among those countries with responsibility for the Mekong River, there are some with limited commitments to democratic processes generally, such as press freedom, protection of rights and so on.[133] In some cases, what happens on their portion of the river is considered a sovereign issue, with little notion of shared responsibilities and water stewardship.

Hydropower dam projects are invariably sensitive, divisive and clouded by arguments of national interest/security versus local interests. Water data for the Lancang cascade has even been regarded by China as a state secret. [134]

In reality, the majority of hydropower projects begin without prior knowledge of the people affected, at least about the details that might impact them. Their engagement takes place, at best, after all strategic decisions have been made by those with vested interests in taking a project forward and with agendas to promote the sector or even once construction crews move in; conflicts are thus inevitable. Too often, it appears that public consultations begin with negotiations about compensation for involuntarily resettlement, rather than about a project's merits. A top-down decision-making model dominates (Eyler and Weatherby 2020).

Public participation is a valuable means of improving the prospects of acceptance for large-scale infrastructure projects and essential to address the frequent trust deficit and misunderstandings between communities and developers/governments. Perhaps initiatives such as formation of the Civil Society Organisation Mekong's Peoples Forum in 2020, the developing rights-based approach to rivers (International Rivers 2014b) and the production of Pact's Mekong Partnership for the Environment, Guidelines on Public Participation in EIA in the Mekong Region 2017 will slowly change this.

18.11 Conclusion

Hydropower developments are likely to continue in the Mekong, in spite of the current moratorium. A generally weak regulatory environment, under-resourced capacity and implementation deficit results in poor-quality assessments, management and monitoring of hydropower projects impacts. Environmental damage and socioeconomic grievances are mostly considered after they have occurred, rather than during the planning phases, and

132 A challenge in a situation where in 2019, Transparency International ranked all the MRS countries lowly on the Global Corruption Perception Index (Cambodia 162/180, Lao 130/180 Thailand 110/180 and Vietnam 96/180).

133 For example, the government of Lao PDR does not allow citizens meaningful access to information or consult with them on development projects. In contrast, Thailand has a very vocal Civil Society Organisations sector and an active investigative media.

134 Source: Eyler, B "Science Shows Chinese Dams Are Devastating the Mekong" in Foreign Policy 22 April 2020.

as risks to be avoided or mitigated. Both the Asian Development Bank and the MRC have attempted to improve the situation by providing guidance, but the situation is heavily dependent upon on responsible self-regulation by developers and the political will of government decision makers.

The main hydropower protagonist in the region, China, pursues a policy of non-interference in the domestic affairs of partner countries that host their investments. More Chinese leadership is required if standards are to improve and available tools more effectively applied.[135] Reliance on the current local host country's regulations, standards and systems is a risk-laden strategy when they are not rigorously implemented by those countries. This should not be interpreted as an opportunity to avoid appropriate standards. Robust systems should be put in place to convince investors that more responsible standards are in their own business interest.[136] A key finding of a recent three-year study by International Rivers indicated that "companies neither adhere to nor insist upon accepted international standards". It found that "companies were typically satisfied with much less stringent steps required by host governments, in some cases even failing to ensure compliance with local laws" (Jensen-Cormier 2019;[137] Best 2019) (Klemm 2019).

All operators now have a plethora of guidelines, but a gulf remains between their rhetoric and evidence of practical implementation[138] (Jensen-Cormier 2019). However, this is not a responsibility for developers alone. "Collective action at both the national and regional levels, based on the recognition of common interests and shared obligations is vital if rivers and the invaluable ecological services they provide are to be safe-guarded for the sake of livelihoods and biodiversity" (Yeophantong 2013). An effective route to improved standards is to ensure that they are demand-led by the host countries, insisting that they are applied in projects in their country. Screening systems have been suggested to help host countries select the more committed and responsible operators.[139,140]

No go areas for hydropower and other developments should be identified. Protection of critical parts of the river is necessary to ensure unimpeded pathways and connectivity for water, sediment, fish and so on. This suggests a more selective approach towards which developments to pursue, based on the evidence of the risks involved. The precautionary approach must prevail. The SEAs that have been undertaken recommend no hydropower dams should be built on the mainstream Mekong until better systems for assessing their impacts are established. Perhaps there are signs of hope illustrated by the cancellation of some of the most damaging projects and the current 10-year moratorium on the mainstream Mekong. This has provided a window of opportunity for improving water security, building better systems and ensuring their routine application.

Figure 18.1 Hydropower case studies

135 Source: The Diplomat: Citowicki. P (2020) "China's control of the Mekong" 02/05/2020.

136 Source: Washington Post: Shiban Mahtani; "How China is choking the Mekong" 28/01/2020.

137 For a contrarian view see Source: Shan Jie and Hu Yuwei; "BRI hydropower projects around the world focus on green construction, operation" Source: Global Times: 2020/11/20.

138 E.G. "Guidelines for Sustainable Infrastructure for Chinese International Contractors" China International Contractors Association (2018).

139 Source: China Dialogue: Tianjie. M "Advisors propose new system to regulate China's overseas investments." 04/12/2020.

140 Source: China Dialogue: Klem. J "Chinese hydro companies are falling short on standards." 23/12/2019.

18.12 Upper Mekong

By virtue of their close proximity to the sources of the Mekong, PR China (Yunnan) and Myanmar are classified as Upper Mekong countries.

18.12.1 Yunnan

Table 18.2 The Lancang cascade dams

Name	Installed capacity (MW)	Completion date	Notes
Lancang cascade			
Manwan	1,570	1995/6	Operational; first of the cascade dam; required a 30km reservoir and relocation of 3,500 people
Dachaoshan	1,250	2003	Operational
Jinghong	1,750	2008	Operational; the nearest dam to the Thai border to which power is exported
Xiaowan	4,200	2011	Operational; one of the world's highest compound arch dams (nearly 300m)
Gongguoqiao	900	2011	Operational
Nuozhadu	5,850	2016	Operational; creates the largest reservoir on the Mekong (100km long, 27,490,000,000m) water storage); required relocation of 43,000 people
Miaowei	1,400	2017/18	Operational
Huangdeng	1,900	2017	Operational; construction started without formal approval causing controversy
Dahuaqiao	900	2018	Operational
Lidi	420	2018	Operational
Wunonglong	990	2018	Operational; most recent cascade dam

The Upper Mekong topography of ravines and gorges is well suited to hydropower development. It has been a centre of extensive hydropower developments for the past 20 years. China has built 11 mainstream hydropower dams in this area, of which two are very large storage dams. Many smaller dams are being planned or being built further up-river. A search for relevant EIAs for these dams reveals only limited post facto studies.

An EIA framework (and inclusion of an SEA-like requirement) was established by China's EIA Law 2003. However, amendments in 2016 and 2018 have been criticized for weakening requirements under the original law (Chun 2016; Best 2019). The provinces, autonomous regions and municipalities set the scope for examination and approval of EIA documents for construction projects, unless they are transnational or trans-provincial (when the responsibility falls to the Ministry of Ecology and Environment under the State Council). The weakness of the regulations has been attributed to the devolution of decision- making to poorly resourced local authorities, proponents exploiting loopholes to avoid public participation requirements and allowing legal start of construction activities without an approved EIA (i.e. EIA no longer being a prerequisite before other feasibility studies) (Chun 2016). This effectively allows non-compliance (Cameron

and Wei 2013).[141] National laws devolved by local authorities are unlikely to encourage attention to transboundary and cumulative risks (Greater Mekong Sub Region -Core Environmental Programme 2018).

The downriver impact of the 'cascade' dams on water supply are of particular concern (Mekong River Commission 2018a; Tang 2020). Allegedly, water flows no longer follow the seasonal patterns that people and wildlife have adapted to. Dams raise the Mekong level in the dry season and lower it in the rainy season. In 2020, this culminated in China being accused of limiting the flow of water to the extent that rivers reached their lowest ever recorded levels. Downriver drought conditions prevailed, even though China had had higher than average water levels that year in its catchment. [142] "Chinese policymakers consider water a sovereign resource rather than a shared resource, an approach which has significant influence on countries downstream" (Eyler and Weatherby 2020), a situation that will not promote water stewardship, as a now widely accepted strategy.

Although true of most places, the need for socially and culturally sensitive impact assessments is paramount in this region of the upper Mekong. It is home to at least nine of China's 55 officially recognized ethnic minorities. These historically marginalized communities have survived incursions, yet the opening up of new or improved access to build dams has created a possibility to better integrate them into the China's central state mechanism, threatening their culture and livelihoods (Eyler 2019, p. 51).

Dam construction frequently requires involuntary resettlement of people, resulting in loss of community cohesion, sometimes replacing their upland with unfamiliar lowland oriented livelihoods. The inundation of sites of spiritual and cultural value is not unusual in areas required for reservoirs. Such negative impacts have been considered the necessary cost to be borne by communities in the national interest, that is, necessary to support the rapid growth (and alleviate the pollution) of distant eastern China industrial urban centres; a national programme called Send Western Electricity East. Local governments are mandated to oversee the companies building infrastructure and ensure that they pay adequacy of compensation to those adversely affected.

The Manwan dam, the first of the cascade dams developed in 1995, has been indicative of the difficulties in establishing a fair level of compensation (Eyler 2019, pp. 57-65). A Kunming-based non-governmental organization (Green Watershed) championed local communities' concerns during Manwan's development. Among the concerns raised were those about inadequate compensation (failing to reflect the non-market based values of resources important to the livelihoods of ethnic communities) and the promise of replacement jobs and incomes, which did not always materialize. The communities' concerns were reported to Beijing by the NGO and (then) Premier Zhu Rongji called for a social impact assessment. The re-assessment called for increased compensation, which was duly paid. (Eyler 2019, pp. 60-61).

Hydropower development in Yunnan has received more recent motivation. At the 2020 United Nations General Assembly, President Xi Jinping pledged that China will be carbon neutral by 2060. This was good news for proponents of hydropower (perceived as 'renewable' energy) because their projects can be seen to support a reduction of China's current reliance on imported oil, natural gas and coal (Normile 2020). It should, however, be accompanied by better planning procedures for hydro schemes.

141 Part of the penalty for failing to undertake an EIA is a retrospectively applied 'make-up' assessment, which allows developers to effectively circumvent the restrictions applied by an EIA. (Chung. Z "Has China's Impact Assessment Law lost its teeth" in China Dialogue 20 /07/2016).

142 Source (a) 27th Regional ASEAN Forum, The USA's 'Eyes on Earth ' Group – a view repudiated in a report by Tsinghua University and the Institute of Water Resources and Hydropower Research. (Tang, 2020) (b) Reuters News Agency (2020) (quoting report of 'Eyes on the Earth Group') "Chinese dams held back large amounts of water during drought in downstream countries, report says" USA. 14/04/2020.

18.12.2 Myanmar

Table 18.3

Name	Installed Capacity (MW)	Completion date	Notes
Irrawaddy/Ayeyarwady river Basin			
Myitsone	6,000	On hold	Situated on tributaries of the Irrawaddy Kachin state
Nu – Salween (i.e., Thanlwin) River basin			
Mong Tong (previously known as Tasang)	7,000	Planned (feasibility studies halted, resumed 2013)	Consortium: China (Three Gorges company) and Thailand; Shan state; largest of six proposed dams in Salween river; 90 per cent of electricity planned for export to China/Thailand; redesigned as a two-dam cascade in 2016 Expected to flood 640km2 of farmland, villages and primary forest 200-300,000 people already displaced. 240m high wall
Mekong River basin			
Mongwa	66	Construction	MOU signed; Shan state; 50 m dam wall and 8km2 reservoir
Ken Tong	170	Planned for Completion 2025-2026	Tributaries in Mekong basin; in 2007 an MOU was signed to develop four dams; feasibility studies submitted 2011 Not known if EIAs were undertaken, but legally required
Suo Lwe	240		
Keng Yang	70		
He Kou	138		
Nam Lin	36	2021	

Myanmar has potential as a regional electricity exporter, but it is still in its infancy, albeit it is no less controversial. Myanmar has only four per cent of its territory in the Mekong basin and no mainstream dams are proposed. However, there are three Mekong tributaries with identified hydropower potential: the Nam Lwe, the Nam Lin and the Nam Hkoke.

The regulatory architecture for an EIA system in Myanmar was initiated in 2012 but is still work in progress. Myanmar's Environmental Conservation Law (2012) makes reference to SEAs and states that an SEA may be required if deemed necessary.

Ethnic diversity gives an added imperative for sensitive planning in an area subject to regular conflicts.[143] EIAs need to give extra consideration to any potential risks of aggravating these conflicts further and how to engage people who may be exiled and living in refugee camps.

Myanmar is currently following the conventional hydropower development process exhibited throughout the region with ad hoc, individual project assessments with limited consideration of the cumulative impacts that multiple projects have on river basins. This risk was addressed in 2018 by the World Bank's International Finance Corporation who commissioned a SEA to assess and inform

143 Most existing activity relates to other rivers such as the Nu-Salween (Thanlwin) that runs parallel to the Mekong for part of its 2,851km length, Shweli and Irrawaddy etc. Large scale hydropower potential is estimated at +/- 40,000 MW.

the planning of the hydropower sector in Myanmar (International Finance Corporation 2018).[144] The SEA was treated with scepticism by some CSOs because, as it was funded by the IFC (the private sector arm of the World Bank) there would be an inherent interest in progressing projects[145] (International Rivers 2019).

A project that has received considerable criticism for its poor environmental and social assessment work is the Myitsone dam, in the conflict-prone Kachin state bordering China. The dam is situated at the culturally significant confluence of the Mail and N'Mai rivers (tributaries of the Irrawaddy/Ayeyarwady). It was favoured by Myanmar's previous military junta, but construction was suspended in 2011 by President, Thein Sein. Although construction has apparently still continued with some design modifications.

A further controversial project has been the large Mong Tong project on the Nu-Salween River. It too is in a conflict prone zone, Shan state. The Mong Tong involved an EIA and SIA process (Snowy Mountain Engineering Corporation (SMEC) in 2015). It was criticized for allegedly downplaying negative impacts, seismic risk and human rights concerns.[146] Local opposition hampered consultations, leading to military intervention. Allegedly feasibility studies began before the EIA was concluded questioning the influence of the EIA process Environmental Justice Atlas [updated May 2018] ejatlas.org).[147]

18.13 Lower Mekong

Since the end of the Vietnam war and China's 'opening up', interest in hydropower in the LM has escalated. The estimated hydropower potential of the LM is +/-30,000 MW.[148] Over 11 dams are planned or being built in the main river, many more on the tributaries.

144 Unusually because the IBRD normally leads on SEAs. In the World Bank.

145 https://news.mongabay.com/2016/12/my-spirit-is-there-life-in-the-shadow-of-the-mong-ton-dam/

146 Source: Hnin Wut Yee presentation made to IFC workshop -18/10/2018, during SEA consultations.

147 Source: ejatlas.org.

148 Source: Internationalrivers.org 2018.

18.13.1 Lao PDR

Table 18.4

Name	Installed Capacity (MW)	Date	Status and Notes (at 2020)
Mainstream Dams(Laos Cascade)			
Xayaburi	1,260	Operational 2019	Thailand (SEAN Ch Kamchang); EIA submitted First of the 11 'Laos cascade' dams First 'run of river' dams- but still poses a barrier to fish migration 95 per cent of power generated exported to Thailand Dam wall 100 feet high and nearly 1km long. Resettlement of +/- 2,000 people, reservoir 50km2 Went Operational without agreement and despite strong opposition (first PNCPA 2010)
Don Sahong	360	Operational 2020	Malaysia (Mega First/ Supported by Sinohydro) EIA (IEE) submitted Controversy over the impact on Khone Falls, Siphandone "Run of river", with wall comparatively low and narrow No significant storage capacity (290ha) but still poses a barrier to fish migration 60 people needing relocation (see associated Thako diversion scheme)
Sanakham	1,260 (700)	On hold 2028	China (Datang) Length of wall 1,144m; height 38m; reservoir 94km2 Proposed; on hold following objections from Thailand But in 2020 became the sixth project to be submitted for the MRC PNPCA process EIA reportedly inadequate, out of date and incomplete Would require resettlement of 12,950 people (now possible to reduce to 1,890)
Pak Beng	Undergone revisions:912 (reduced from 1,320)	On hold (was planned to start 2017 now 2024)	China (Datang Overseas Investments) Upper-most dam in 'Laos cascade' Run of River; reservoir 87km2 Originally 6,694 needing relocation (possible to reduce to 4,250) PNCPA 2019
Pak Lay	1,320	On hold 2030	China (CEIEC)/Sinohydro) Length of dam 630m, dam wall 35m reservoir 108km2 Would require resettlement of 18,000 people (now possible to reduce to 5,010) PNCPA 2017
Luang Prabang	1,410	Under construction	Vietnam (Petro Vietnam Power Corp/Thai CH Kamchang) Length of dam 1,106m. Wall 76m, reservoir 90km2 Requires resettlement of estimated 17,700 people (possible to reduce to 5,920) .
Significant tributary dams			
Nam Theun 2	1,075	2010	Multinational; exporting power to Thailand A trans-basin diversion project; financed by private/public institutions including the World Bank
The Nam Ou River Cascade			
Phase 1 Nam Ou 1-6 began operating in 2016 Phase 2 Nam Ou 1,3,4 and 7 expected to be operational in 2021			

Lao PDR has ambitions to be the "Battery of Asia". Electricity currently comprises about 25 per cent of Lao PDR's exports. Thailand is the main electricity market. Lao has developed hydropower projects on the Mekong mainstream (with this market in mind) and has plans for others (known as the "Laos cascade"). Specific concerns exist over how the Laos cascade will impact the downstream floodplains of Cambodia (especially Tonle Sap Lake), Vietnam (the delta) and the livelihoods dependent upon them.

Current activity is mostly on numerous tributary dams. Seven new cascading dams are built or under construction on the Nam Ou,[149] an important Mekong tributary. Villages have been razed to make way for the projects.[150] Many of the dams are regarded as part of China's BRI cooperation programme with Lao PDR, and the latter have apparently granted Chinese investors planning and development rights over the entire Ou River basin.[151]

Lao PDR's first EIA Regulation was issued in 2000 and upgraded to a Decree on EIA No 112/pm (2010).

Lao's Environmental Protection Law (2013) requires that SEAs are conducted while policies, plans and programmes are being developed. In 2012, the IFC launched an advisory service to help improve environmental and social standards and the capacity to implement them in the hydropower sector in Lao PDR.

Critics have complained that Laos projects are shrouded in secrecy. There have been allegations of corruption tied to the awarding of construction contracts and EIAs have routinely been criticized as being of poor quality. (Lovgren 2018).

While the lack of environmental scrutiny and public participation in large-scale projects are not unusual for developments in Lao PDR, one exception that it was hoped would change this was Nam Theun 2 (NT 2). NT2 fell under the influence of IFIs and their safeguard policies, not least the World Bank. The project was initiated in the 1980s, but it was temporarily side-lined by international protests and the 1997/8 Asian financial crisis. The IFIs returned in 2005 and NT 2 began commercial operation in 2010. NT2 is a trans-basin diversion project that transfers water from the Theun river to a reservoir on the Nakai plateau for gravity feeding through turbines before 27km tunnelling to discharge into the Xe Bang Fai River. It required resettlement of 6,200 people and it is an important wildlife corridor, the Nakai plateau. The World Bank and AsDB, who had initially declined participation, reportedly due to environmental and social concerns, were encouraged to ensure a best practice example was created.

Part of the motivation for the IFI re-engagement was their lack of confidence in the Lao government's capacity to effectively manage the risks, transparently manage the revenues, protect people's rights and support relocated communities with adequate compensation without their involvement (see Lower Sesan 2 project below). These concerns were sufficient to mark a return by the World Bank to funding large-scale infrastructure projects after an unofficial 10-year absence in the face of widespread international CSO opposition. They progressed with caution, recognizing the opportunity for a model process to set a benchmark for regional standards. Extensive additional funding for relocation and environmental mitigation measures was provided.[152] One international advisory group (IAG) concluded that the project had involved "one of the most comprehensive and proactive processes ever engaged in by the World Bank" (IAG World Bank, 2001). As part of the process the IFIs produced a pioneering Cumulative Effects Assessment [CEA]) to evaluate the current and future combination of impacts of a number of hydropower developments in several river basins (SEATEC 1997; AsDB

149 Source: China Dialogue (27/03/ 2020): "Loss of faith along the Ou River".

150 Source Washington Post 28/01/2020 "How China's Belt and Road initiative is choking the Mekong River".

151 Source; China Dialogue (25/02/2019)): 25/09/2020 : Thailand under pressure to act against the Sanakham dam project".

152 Although the flooded area itself (equivalent to the size of Singapore) was not considered critical natural habitat, the region had been described as "one of the most intact areas of tropical biodiversity left in the world" (IAG, World Bank 2001).

2004). This was accompanied by other new standards for the region, including in levels of transparency, involuntary relocation procedures and the appointment of several independent expert advisory groups to critically monitor the project. It was suggested that three extensive protected areas on the Nakai Plateau were expected to be better managed through the significant resources made available under the project (Singh 2010). However, the International Rivers NGO has suggested that subsequent monitoring by Lao PDR authorities of the mitigation measures contained in the EMP have been limited and "that the dam's costs outweigh its benefits and represents a "complete failure of water governance in [the] Mekong region" (Shoemaker and Robichaud 2018). "Despite the number of participatory impact assessments conducted prior, during and after the construction of Nam Theun 2 project, questions continue to persist as to whether participation in project planning is indeed possible in Laos where structures of governance remain largely hierarchical and top-down" (AusAid, M-Power and CGIAR 2010).

On the Mekong main river, the Xayaburi scheme has been the most controversial project to date. It was the first of the Laos cascade dams to become operational (in 2019). Xayaburi is described as a run of river dam, arguably implying that it will be less obstructive to fish migration and silt transportation and not require a large reservoir as a holding dam. Fish ladders, passes and sediment-flushing gates have been provided but criticized because the design used is based on structures built in Europe and the USA and is thus inappropriate to the Mekong.[153]

Xayaburi progressed sporadically, due to complaints from downriver Cambodia and Vietnam. It was the first project subjected to the MRC's PNPCA procedure. However, construction went ahead while Cambodia and Vietnam and the MRC's donors continued to raise objections. Cambodia threatened to take Lao PDR to international court if they chose to build the dam unilaterally. In response, the Lao PDR government and the MRC commissioned a number of additional studies but it was suggested that these were simply to justify the development.

Notification of the Don Sahong project was submitted to the MRC soon after the Xayaburi PNPCA process. The Don Sahong only partially dams the mainstream but is in a biologically sensitive location (Khone Falls, Siphandone, or "the Four Thousand Islands"),[154] The area is considered as a potential Ramsar site and construction of the dam would threaten its eligibility for this status. It is situated less than 2km upstream from a deep river pool, which contains Lao PDR's last four Mekong/Irrawaddy dolphins (although dolphins exist in three other river systems in Southeast Asia). Further downstream, at Kratie in Cambodia, there is a larger population (85), but they are threatened by another proposal: the Sambor dam.

The 2013 Don Sahong EIA has been criticized as lacking credibility. The EIA "consists of, at best, sloppy and incomplete research and fails to address a large number of potential and probable effects on fisheries […] it is (in) the worst location possible […] given how important the Hou Sahong channel is for fish migration"[155] (International Rivers 2014a). Following the PNCPA process the MRC has requested additional studies.

A further scheme, the Sanakham has also been proposed on the Mekong main river between Xayaburi and Vientiane, again motivated by export of power to Thailand. It will be the fifth in the run of river projects. A PNCPA is currently in progress (2021) but Sanakham's initial EIA work has already been criticized because it uses outdated and allegedly plagiarized information from earlier EIAs for the Pak Lay and Pak Beng projects. The MRC called it "rudimentary and largely copied" and requested revisions. Yet both the Pak Beng and Pak Lay EIAs had themselves been criticized during their earlier processes in 2017 and

153 The MRC's SEA (MRC 2010) indicated that fish passes were inappropriate for the Mekong.

154 Source: The Economist (2012) "Damming the Mekong river: River Elegy" 13/11/2012.

155 Source: Do Viet Cuong "Is Laos Building a New Illegal Dam on the Mekong River? In the Diplomat, 27/10/2015.

2019, respectively. The projects are on hold. A Transboundary Environmental and Social Impact Assessment and Cumulative Impact Assessment has been undertaken by the developer but could not be accessed (Power China 2018).

With poor EIA quality, fundamental questions about dam developments in Lao PDR remain both unanswered and unaddressed. The lack of press freedom and civil society tolerance reduce opportunities for local stakeholder dialogue[156] (International Rivers 2014a).

In 2020, the Lao PDR government announced that it would suspend approval of new dams, while reviewing those currently under construction.[157] Thailand, meanwhile, in the face of more active CSO opposition, is said to be reconsidering its decision to purchase hydropower from Lao PDR – not least because of its current over-supply.[158] However, in spite of this, construction of new access roads and dams continue and construction of another project, the Luang Prabang dam, the third of the Laos cascade, is indicated to be under consideration. As with Xayaburi and Don Sahong, this is in spite of the widely expressed concerns, including those by three neighbouring countries and calls for more rigorous transboundary impact assessment.

18.13.2 Thailand

Table 18.5

Name	Installed Capacity (MW)	Date	Notes
Thai-Lao PDR border			
Pak Chom/ Santhong/	1.079	Originally planned 2017	PDR Lao/Thailand Length of dam 1,200 (in both Lao PDR and Thailand) People needing to be relocated in both Lao and Thailand: about 600 Includes an irrigation area (2,707ha)
Ban Koum	2,230 (1872)	Originally planned 2017	Thailand/Italy (Ital Thai Asia) (Charoen) Includes 20,000ha of irrigation scheme Dam; would require resettlement of 2,570 (now reduced to 1000) people in both Thailand and Lao Includes irrigation projects (+/- 8000ha)
Pak Mun	136	Originally planned 1994	Thailand Situated on confluence of the Mun and Mekong Fisheries concerns (estimated fish catch decreased by 60-80 per cent). A fish ladder (unsuccessful) provided and the dam was opened for a period after demonstrations on site
Lat Sua	651/800	Proposed 2023	Thailand/Italy (Charoen) Revisions changed location downriver to avoid flooding of Thai villages Feasibility and environmental assessment underway 1.300m; 27m tall dam wall; 13km2 reservoir Close to border but both reservoir and dam in Lao

156 Source: The Diplomat 2020 Sebastian Strangio. "Laos Stumbles Under Rising Chinese Debt Burden" 07/09/2020.

157 Both reports can be accessed online at http://bit.ly/paklay and http://bit.ly/pakbeng.

158 Source: China Dialogue 2020: Jirenuwat R and Roney T. "Thailand under pressure to act against the Sanakham dam project."25/09/2020.

No large-scale dams are planned by Thailand, but it is a customer and will represent (with Vietnam) 96 per cent of regional power demand until 2025 (Mekong River Commission 2010). However, Thailand now has an oversupply of electricity and, recently, the Electricity Generating Authority of Thailand announced that it will decommission old generating plants, promote power-intensive agribusiness and sell electricity to Myanmar.

It has engaged in multiple-use projects with Lao PDR, and causes concern amongst its neighbours by the amount of water it intends to abstract for irrigation purposes, for example, The Kong-Loei-Chi-Mun project, an ambitious US$ 75 billion domestic project in Thailand to divert water from the Mekong to irrigate 17 provinces.

Thailand has had EIA regulations since 1992 and SEA guidelines and regulations under development since 2018 (lead agency National Economic and Social Development Board).

18.13.3 Cambodia

Table 18.6

Name	Installed Capacity (MW)	Completion date	Status (at 2020)
Mainstream Mekong			
Sambor,	1,800-2,600	On hold	China (China Southern Power Grid who have now pulled out) Would have been largest dam on LM and would create a complete barrier to migratory fish The dam would be 16-18km wide, 56m high, reservoir 620km2 Resettlement of 19,000 people
Stung Treng	980	On hold	Russia/Vietnam (Song Da) Length of dam 10,884m, 22m high; reservoir 211km2 Would require resettlement of 9,000 people
Significant tributary dams			
Lower Sesan 2	400	Operational 2018	China (Hydrolancang) Situated at the confluence of, the Se San and the Sre Pok Southeast Asia's longest dam wall at 6km (75m high) 33,560 hectare reservoir Would require resettlement of 5,000 people (including ethnic minorities)

Due to the legacy of war, Cambodia's power supply situation is one of the poorest and most fragmented in the region. According to the International Energy Authority, Cambodia has the second lowest electrification rate in southeast Asia (Only about 15 per cent of 2 million households have access to electricity in their homes). In 2018, total electricity produced was about a third from fossil fuels and two-thirds renewable sources, mostly hydropower. Cambodia's theoretical hydropower potential is 10,000MW, with about 50 per cent of that potential on the Mekong mainstream (Xia 2020).

EIA has been a requirement in Cambodia since 1999 (Environmental Protection and Natural Resources Management Act-Sub-decree on Environmental Impact Assessment). Cambodia's Environment and Natural Resources Code (2017) added SEA

and transboundary assessment as requirements for strategic planning in many sectors (including power). A lack of public participation, limited publicly available reports and the poor quality of those that are available, indicates an implementation capacity deficit. An issue of concern is that, if the Ministry of Environment fails to respond to submitted EI reports within 30 days, their concurrence can be assumed by the authorising Ministry (Xia 2020).

Two of the planned mainstream dams of the 'Laos Cascade,' are situated in Cambodia (Stung Treng and Sambor). The Sambor, if built, would be the lowest dam of the Mekong's main river cascade and largest in Cambodia. It has been described as the "worst possible place to build a major dam" (National Heritage Institute 2017). At least 86 migratory fish species periodically exist in the Cambodian part of the Mekong and all would be adversely impacted by the Sambor dam. It would also put the remaining 80 endangered Mekong/Irrawaddy river dolphins at high risk.

In 2013, the Cambodian government invited the National Heritage Institute to undertake the "Sambor Hydropower Dam Alternatives Assessment" (National Heritage Institute 2017). It considered siting, design, operational and 'no dam' alternatives by evaluating them against a set of environmental Performance Standards, and then postulated how a major hydropower facility could be developed to achieve those standards while maintaining economic viability. The study did not employ the usual approach of defining mitigation measures to accommodate a dam, but instead established a set of standards to preserve the health of the natural and social systems and then considered how a major hydropower facility could be sited, designed and operated to maintain those standards. Ten alternatives sites, designs and operations were considered**.** The NHI recommended that Cambodia defer any commitment to the Sambor Dam while it pursues better alternatives (National Heritage Institute 2017). The Cambodian government has apparently subsequently abandoned plans to build the Sambor project.

Cambodia's controversial Lower Se San 2 project will be located on the Sesan River, 1.5km downstream from its confluence with the Srepok River and 25km from where the two rivers meet the Mekong River mainstream. The project was approved by Cambodia's government in 2012,[159] despite its EIA being sub-standard, and inadequate consultations. Se San 2 is southeast Asia's longest dam at over 6km. Although international financiers pulled out of supporting it, partly on environmental grounds, and Vietnam reduced their financial interest, the dam progressed and became operational in 2018, with inadequate consultations, lack of transparency and excessive logging outside the area defined for the reservoir. NGO complaints led to a study of best practice guidelines for compensation and resettlement by The Cambodia Rivers Coalition NGO Baird 2009).

Of further concern in Cambodia has been the threats caused by hydropower developments to the ecology of the Tonle Sap Lake (Mekong River Commission 2010b).[160] The Mekong feeds the lake via the Tonle Sap river, which reverses flow when the Mekong river floods in summer. The flooded Tonle Sap Lake increases to five times its low-water levels, creating the largest lake in southeast Asia and supplying one of the world's most intensely fished inland bodies of water. As the annual flood subsides, millions of fish swim back into the Mekong river. 2019 saw a reduction in fish yields in Tonle Sap that were reportedly 10-20 per cent lower than those of previous years. This was attributed, in part, to mainstream Mekong dam construction (Bengali 2020; Basist and Williams 2020).

159 Source: Cambodia Daily..http://www.cambodiadaily.com/news/government-approves-dam-on-lower-sesan-5159/ November 5, 2012.

160 See MRC. BDP "Assessment of basin-wide development scenarios Tech Note 4: Impacts on the Tonle Sap great lake ecosystem".

In 2020, Cambodia announced that it would postpone building new hydropower dams on the mainstream Mekong for 10 years (including the Sambor). The government is still allowing construction on tributaries to continue as a priority.[161] The temporary halt was perhaps more due to increasing power cuts and blackouts in 2019 and an emerging concern of over-reliance on hydropower, as well as the 2018 Xepian-Xe nam Noy dam collapse in PDR Lao, than environmental concerns. (Basist and Williams 2020).

As a consequence of the postponement, Cambodia has turned instead to a spate of heavy oil, natural gas and coal projects. Two large coal plants were approved in 2020 (one, Botum Sakor requiring downgrading of part of a National Park) to add to three existing facilities and two under construction. No EIA is publicly available.[162] The country has also become a destination (a coal plant near Sihanoukville) for second-hand, outdated and polluting coal technology that can no longer comply with China's environmental regulations.[163] Current planned energy projects would see Cambodia reduce its share of 'renewables' on their grid significantly.

18.14 The Mekong Delta

18.14.1 Vietnam

Vietnam is important both as a hydropower developer and importer. It is itself is a regional leader in hydropower, with its own investments in Laos and Cambodia. Domestically hydropower is the second largest source of power in Vietnam. Presently there are more than 50 hydropower stations in operation, 10 of which are on tributaries of the Mekong Basin and thus can impact water supplies in Cambodia. In 2020, Vietnam indicated that it intends to double its coal-fired powerplant capacity by 2030, while continuing to expand on the 4,000MW of solar power that it added to its energy mix by 2019 (Asian Development Bank 2018a).

Vietnam has had EIA legislation since 1994. The critical hydropower issue for Vietnam is the secondary impacts of upriver dam developments on the Mekong delta. The delta is a network of 5,000km of natural and artificial canals interconnecting settlements and markets. It is home to 20 million people and is one of the major rice and fish producing areas of southeast Asia. This productivity is dependent upon the supply of silt and nutrients from the higher reaches of the Mekong. The dynamic marine/freshwater interface adds a new dimension to the delta. Vegetation removal for fish farms, urban expansion, reduced supplies of freshwater and silt and rising sea levels associated with climate change, result in increasing coastal erosion, saline water intrusion and use of compensatory chemical fertilizers to replace nutrient losses and so on.

According to the Intergovernmental Panel on Climate Change, the Mekong delta is one of the three major delta systems in the world that are most vulnerable to climate change and associated extreme weather events. The delta's resilience to the effects of climate change depends on, inter alia, the continued replenishment of sediment. No wonder then that the Vietnamese government periodically calls for upriver dam building to be stopped. [164]

161 Source: The Guardian (U.K): "Cambodia scraps plans for Mekong hydropower dams" 20/03/2020

162 Source: China Dialogue: "Cambodia choses coal in rush for power". 2/11/ 2020

163 Source: China Dialogue: "Coal plant deemed too polluting for China heads to Cambodia". 29/08/2019 Transfer and reconstruction of a plant from Hunan. "China's shift to a greener economy – and a pollution scandal – led to the Hunan plant's closure; Formerly the Huna Chuangyuan coal plant that powered an aluminium smelter but is now getting a fresh start".

164 Source: Tuoi Tre News (2016); "Vietnam's Mekong Delta faces most serious drought, salinization in 90 years" 18/02/2016.

It has been acknowledged that delta specifics require a different approach to previous studies. In 2015 Vietnam initiated the Study on the Impacts of Mainstream Hydropower on the Mekong River (also known as the Mekong Delta Study). The approach involved analysis of the effects of river flows and inundation patterns, sediment and nutrient loading and salinity intrusions on six sectors: fisheries, biodiversity, navigation, agriculture, livelihoods and economics. The incremental effects of tributary dams on mainstream water levels were also studied. Alternatives were considered, to determine the level of relief that could be obtained from only constructing selected dams in the Laos cascade. Results were indicated according to three scenarios. Under all three, the most severe adverse impacts were anticipated to result from a combination of the dam barrier effects and the reduction in sediment/nutrient loading. Development alternatives on constructing and operating a fewer number of dams would decrease the projected impacts to varying degrees depending upon which of the 11 proposed dams are constructed (Ministry of Natural Resources and Environment 2015).[165]

SEAs have been mandatory for most strategic plans since Vietnam's 2005 Law on Environmental Protection. The power sector was identified as a key sector requiring SEAs. Capacity development has been supported by AsDB and international donors and power development planning is better aligned with national policies and priorities as a result. A pilot SEA of hydropower plans for the sixth National Power Development Plan, 2006-2015, used a methodology and guidelines developed by the Ministry of Natural Resources and Environment (MONRE 2015). This was followed, in 2012, by a SEA of the seventh National Power Development Plan, 2011- 2020 and then in 2014, by technical advice for an SEA of the revised PDP 7.

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165 The credibility of the report was questioned by a subsequent Oxfam Australia review who have, in turn, been criticised for their comments. For a discussion of this disagreement see: "Comments on the Final Report of the MDS-IAR and The Ripple Effect of Oxfam Australia's input" Lilliana Corredor – on behalf of Scientists for the Mekong (5 May 2016) https://www.scientists4mekong.com/wp-content/uploads/2016/05/Comments-on-Final-Report-MDS-Study-Ripple-Effect-Oxfam.

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19

The Belt and Road Initiative in Mongolia: Infrastructure Development and Impact Assessment

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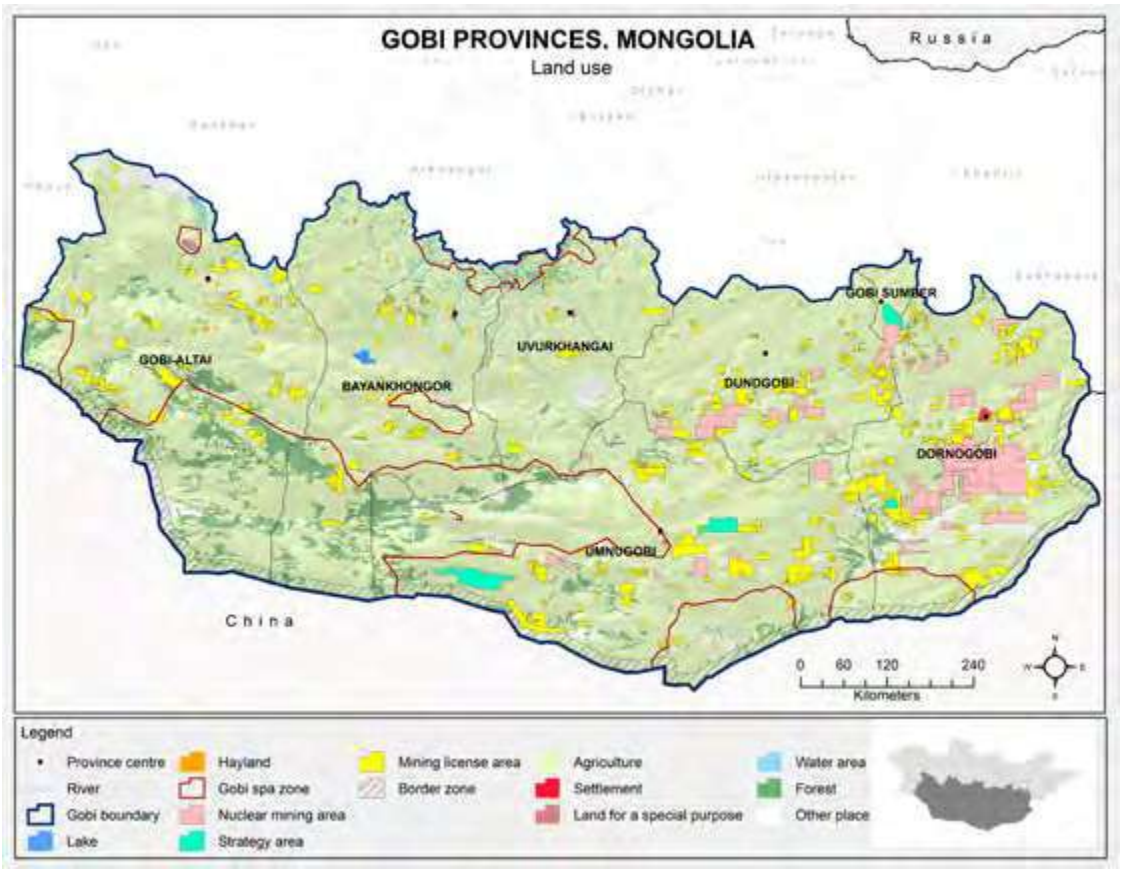
ABSTRACT

Situated between Russia and China, Mongolia has a central geographical role in regional transnational connectivity and infrastructure development between these super-powers. This has been escalated recently by the evolving concept of the Russia-China-Mongolia corridor (CMR) (a part of the Belt and Road Initiative [BRI]). This chapter situates the CMR with reference to historical and current connectivity projects and related governance institutions. The BRI (see Chapter 16) is a larger system of infrastructure development projects, led by a diversity of investors and companies. As elsewhere, in Mongolia these projects are governed by a range of national laws and regulations, as well as, in some cases, financier compliance mechanisms. This chapter reviews the history of Mongolia's Environmental Impact Assessment (EIA) law and the development of related social impact assessment (SIA) guidelines. The Gobi Framework's[166] Economic and Social Research Council (ESRC) and Global Challenges Research Fund (ESRC-GCRF)-funded project's research findings underpin this analysis and focuses on resource corridor developments associated with several anchor projects mainly in the mining sector. Mining projects invariably include constellations of infrastructure. Those considered to be part of the BRI emphasize energy development, trade, resource extraction and opening up of markets. We conclude with three recommendations for policy action, including: (1) all financiers should require and strengthen robust environmental, social or governance (ESG) standards and compliance mechanisms; (2) the capacity of stakeholders to engage in these projects needs to be developed; and (3) in the Central Asian context, it is also necessary to ensure any ESG interventions are appropriate for mobile peoples and are respectful of their traditional culture and land tenure rights.

166 The Gobi Framework for sustainable infrastructure development promotes inclusive economic development and social welfare in the context of mega infrastructure initiatives in Mongolia and Kyrgyzstan. With funding from the UK's Economic and Social Research Council (ESRC) and Global Challenges Research Fund (GCRF), this 30-month project (2018-2021) was a collaboration between the University of Oxford's School of Geography and the Environment, Independent Research Institute of Mongolia (IRIM) and the University of Central Asia.

19.1 Introduction: the China-Mongolia-Russia corridor overview

Figure 19.1 Research sites for the Gobi Framework project were located in the Gobi provinces, depicted here showing existing mining license areas. Map by Enkhbat Sainbayar.



Mongolia, situated between Russia and China, has a long history as a transit country for east-west-east commerce and trade. For example, it was host to some of the historic 'silk roads' between Europe and East Asia dating back to the first millennium BC, and initiated the *Pax Mongolica* that protected traders using those routes. Later the 17th century, a tea road or tea horse road between China and Russia traversed the region (Batbayar and Tsenddoo 2018). These ancient trade routes have been cited as the inspiration (and provide an updated vision) for a reinvigorated cooperation programme in the guise of the BRI. Today, Mongolia's size, its low population density, landlocked geography and limited modern infrastructure creates a dependency on trade relations with its near neighbours. Mongolia hosts part of the iconic Trans-Siberian Railway linking Russia and China. The historical Russian influence over Mongolian infrastructure and industry reached its peak in the 20th century, but it has shifted significantly following the collapse of the Council for Mutual Economic Relations and the wider Soviet trading bloc.

A monument to the Tea Trade route erected when hosting the 11th Asia-Europe Summit (ASEM) 2016, Ulaan Baatar, Mongolia.

(Image credit: Jon Hobbs)

Since the 1990s, and the collapse of the Soviet Union, Mongolia has broadened and diversified its ties with others, including the USA, Canada, Australia, Japan and Europe (Reeves 2012). Agencies such as the World Bank, the European Bank for Reconstruction and Development (EBRD) and the Asian Development Bank (ADB) are also now critical sources of investment in infrastructure, economic development and government capacity-building. However, the importance of both China and Russia remain, with imports from both countries accounting for over 76.9 per cent of trade as of 2019. Economic analysts such as the World Bank identifies Mongolia's poor transport infrastructure as hampering economic diversification and growth (World Bank 2020). Most recently, the Chinese-led BRI has emerged as a significant potential source of financing to address this infrastructural gap.

Mongolia's status as a democratic country with successful and relatively peaceful election cycles makes it stand out as an example in the wider Central Asia region. This has attracted the interest of international investors due to its status as a mineral resource-rich country. The predominance of low-cost, high-volume commodities has increased the requirement for extensive infrastructure. Consequently, Mongolia is experiencing an unprecedented expansion of interest in resource, trade and utility corridors to serve mining anchor projects, predominantly supplying their industrializing neighbours and fuelling its own recent economic growth; yet such rapid develop-

ment and land acquisition also includes risks for Mongolia's population of rural mobile pastoralists.[167] The extractive sector comprises almost 30 per cent of Mongolia's gross domestic product, including over 80 per cent of export products and over 70 per cent of foreign direct investments. Currently explored minerals valuation varies from US$ 1.2 to US$ 2.5 trillion, with a population of only over 3 million. Over 90 per cent of Mongolia's mineral exports (primarily coal, copper and gold) are sent to China (World Bank 2020, p. XI). In 2018, US$ 6.36 billion of a total of US$ 7.71 billion were exported to China, amounting to 82 per cent of total exports (Observatory of Economic Complexity 2021). This has led to concerns over foreign influence, over dependence on limited markets and consequent vulnerabilities. This has been so high that, as Pieper (2020) recalls, the Mongolian National Security Concept of 2010 was created, introducing restrictions to the amount of foreign investment that one single state could account for in the country.

19.2 The China-Mongolia-Russia corridor

The CMR is one of six regional corridors that constitutes China's BRI. The CMR was officially announced following a tripartite meeting between the Russian, Chinese and Mongolian Heads of State in 2014 (Grossman 2017). This was formally launched in Tashkent at the 2016 Shanghai Cooperation Organisation's Summit. A programme was announced, including 32 projects to be implemented in Mongolia (Campi 2018). Infrastructure projects included were seven rail and four road corridors, one logistics, one telecommunication, and associated projects (such as one border cooperation, four customs and trade control points as well as three environmental, three scientific and education cooperation, three social and humanitarian, one agricultural and one health initiative). Mongolia selected these 32 projects after reviewing many proposals including 190 economic projects (Narantuya 2020). The total cost of the projects was estimated at over US$ 50 billion and China expected to fund US$ 30 billion with possible extension up to US$ 90 billion (Kenderdine 2017; Organisation for Economic Co-operation and Development 2019, p. 150). Even though significant funding will be channelled through Chinese and Russian sources, Mongolia plans to raise funds on its own, including soft loans from development organizations. Eighteen out of the 32 projects, mainly non-infrastructural projects, have been started according to the National Institute for Security Studies (National Institute for Security Studies 2020). The tripartite agreements surrounding the proposed CMR economic corridor aligns domestic initiatives in each country; namely, the Chinese BRI, Russia's Trans-Eurasian Belt Development Initiative and Mongolia's Steppe Road programme. As Zemanek (2020) notes, the BRI has, therefore, been introduced into a wider system of regional connectivity and trade initiatives, including the Shanghai Cooperation Partnership and the Eurasian Economic Union.

Additional projects identified as part of the CMR corridor include the establishment of Confucius Institutes and Mongolian access to Chinese ports (Grossman 2017), cooperation in the banking sector (Pieper 2020), and agri-

167 The links between the extractive sector, energy and transport infrastructure in the context of the BRI deserves further investigation in future research. Currently nearly five per cent of Mongolia's territory is occupied by mining licenses, totalling 2,651 licenses (36 per cent exploration and 64 percent exploitation) (Mineral Resource and Petroleum Authority of Mongolia (MRPAM, 2020); In Dalanjargalan soum (county) of Dornogovi aimag (province), almost 80 per cent of the territory is occupied by the mining licenses while in others, this number ranges between 30 to 60 per cent of the total territory (Kh. Maamuu 2020).

cultural projects, such as an agricultural land lease agreement in Mongolia's eastern Dornod aimag/province (Grossman 2017). There is a general emphasis on updating and building infrastructure to connect provinces in Western China and Eastern Russia. New railway routes will allow for the faster transportation of goods and raw materials (Zemanek 2020). A direct railroad line between Russia's Zabailkalsk and China's Manzhour is also currently used for freight but does not pass through Mongolian territory.

According to a recent OECD report (2019), a number of key national infrastructure development projects such as the Western Regional Road Corridor Investment Programme, which will connect Russia and China, are funded with AsDB support. In this sense, investments from the major Chinese development banks labelled as BRI components in Mongolia sit alongside a range of similar projects that broadly make up Mongolia's national development programme.

While the CMR is projected as regional in nature, and therefore multinational, the infrastructure and mining projects established within the corridor agreements are regulated by national laws and procedures. There is little attention to transboundary impact assessment, yet regional connectivity is not often smooth, frictionless and free of international boundary and border issues. For example, a lack of standardization, such as the size of rail gauges between Russian and Chinese tracks presents an ongoing obstacle (Pieper 2020; Wu 2020).

The BRI builds upon existing infrastructure that has developed to connect China, Mongolia and Russia. Mongolia is inevitably impacted by such influential neighbours. The history of cooperation (and periodic competition) between these countries is complex, and continues to be so. Russia exercised years of political, cultural and infrastructural influence in Mongolia during the Soviet period from 1921-1990. During the nearly 70-year history of the Socialist People's Republic of Mongolia, the organization of the Mongolian state and economic system was closely modelled after the Soviet Union and Moscow played a strong role in foreign and domestic policy (Morozova 2002). Collectivization of pastoralism, city-building, electrification (Sneath 2009) and industrialization characterized what might be called the "development corridor of 20th century Mongolia"; Humphrey (2005) eloquently articulates the relationship between Soviet architecture and socialist ideology, while Reeves (2005, p. 84) identifies the Soviet Union's infrastructural expansion throughout remote Central Asia as a means to link various territories into a single economic logic.

19.3 The Mongolian Steppe Road Programme

Mongolia's Steppe Road National Programme's development objectives are situated within Mongolia's Sustainable Development 2030 Vision. The general concept of the programme specifies a focus on agriculture and industry, including light industry, food, construction materials, copper processing, coal, petrochemical, metallurgy, tourism and mining sectors. The development of the extractive and energy sectors requires associated infrastructure development (Legalinfo 2019). These priorities are also reflected in China and Mongolia's Comprehensive Strategic Partnership, which was further elaborated in 2019 (Communique, Ministry of Foreign Affairs of the People's Republic of China 2019).

The overview of the programme further states that the Steppe Road projects will be implemented within the respective Russian and Chinese regional economic integration frameworks. The plan lays out 10 key objectives, including domestic rail and road construction (including the Millennium Road, Tourist Roads and Mining service Roads),

transport and logistics (including airports), the creation of free trade zones, and domestic energy sector projects, with the aim of establishing an integrated energy system (urban power, mining power supply, wind and solar farms). Additional domestic projects include the construction of processing plants for coal and the production of synthetic gas, the establishment of tourist complexes, further development of light industry and agriculture (including irrigation facilities, water transfer schemes and beekeeping), and lastly, security infrastructure in urban areas and border crossings (Legalinfo 2019**)**. Additional projects specifically focused on regional cooperation include the development of regional electricity transmission and natural gas infrastructure, export energy from solar and wind resources in the Gobi region, and infrastructure for a high-speed data network connecting Asia and Europe (Legalinfo 2019).[168]

19.4 Mongolia and the Belt and Road Programme

Given the long history of relations between China, Mongolia and Russia, what would the proposed BRI regional development corridors look like in practice and what legal mechanisms and standards for impact assessment are currently implemented in Mongolia, and are they effective to manage environmental and social consequences?

Potential BRI-related projects are diverse in terms of geographical setting and scope, and environmental and social risks can be significant (Xiheng 2019). As Zemanek (2020) has pointed out, unlike organizations such as the World Bank and the International Finance Corporation, proponents of BRI related projects are unlikely to push for legal or institutional reforms in host countries. This is because they are in line with Chinese government development models that stress principles such as "sovereignty, non-interference, […] and a plurality of political systems conceiving their own participation in integration" (Zemanek 2020, p. 200). As Carrai (2020) explains, Chinese investors do require some conditionality with its investments such as adherence to the "One-China" principle. There has been increasing scholarly attention on the complexity of legal regulation of BRI projects, including contract dispute resolution (i.e. what legal system adjudicates – national, Chinese or international courts) (Chaisse and Górski 2018; Erie 2019a; Erie 2019b). Some scholars speculate that new standards and legal frameworks specific to the Chinese development vision will emerge over time (Anh and Ha 2020).

In research carried out in Mongolia and Kyrgyzstan as part of the Gobi Framework project, the authors have observed clear differences in Chinese company/local community relations. These differences may partially be influenced by national political culture, including the rule of law and access to the courts, the role of civil society, and legal reforms related to transparency and promotion of human rights. These differences also indicate that approaches to community relations and impact assessment processes for BRI projects differ depending on the host country systems. Xiheng (2019) makes an important point in this regard which resonates with our own research findings; he states, "Chinese companies have been used to relying on local governments to deal with communities as is usually the case in China, and many have not realized the need to acquire a 'social contract' from local peo-

168 It is important to note that private sector companies will participate in Concession projects listed under the Steppe Road through tendering processes (list of state property concession items are available here: https://www.legalinfo.mn/annex/details/2732?lawid=3089). In Chapter 5 of the Steppe Road National Programme, there is no explicit reference to Chinese investment or aid. Rather, sources of project investment are listed as "the state budget, foreign assistance and aid, foreign and domestic investment, PPPs, and other financial sources" (Legalinfo 2019**)**.

ple" (p. 61-62). Sternberg (2020), highlights findings from the Gobi Framework project in Kyrgyzstan, where he indicates that "nebulous BRI presentation(s) play well in the capital but a lack of jobs, water and environmental degradation and little community engagement make mines a target for local frustrations. The dichotomy arises that though a foreign company may satisfy its legal licensing requirements assigned in the capital, it fails to obtain a 'social license to operate' in the rural host community". Understanding company behaviour and company/community relations in different national settings is crucial for understanding impacts and potential conflicts. Wang's (2022, forthcoming) extensive study of two BRI projects funded by the EXIM Bank in Kenya and Ethiopia is instructive in this regard and germane to Chapters 11, 12 and 13 in this publication.

Such difficulties are not only experienced by Chinese investors. Beyond national legal regulations, major projects that are financed by the IFC, the World Bank, EBRD and so on follow standards required by these investors. The Oyu Tolgoi copper gold mine, which includes extensive infrastructure such as airports, a pipeline, roads and energy followed IFC Performance Standards, though two subsequent complaints from local herders surrounding a lack of due diligence exposed problems in assessment and subsequent managing and monitoring procedures.

In 2014 the EBRD also received complaints in relation to their investments in Energy Resources, a company working at the Tavan Tolgoi coal mine, regarding impacts of roads on fragmenting herder pasturelands, and dust and waste generated from mine-related transport (European Bank for Reconstruction and Development 2013). Again, in 2015, the EBRD received complaints from local herders in relation to an iron ore mine run by the company Altain Khuder in Gobi Altai province (European Bank for Reconstruction and Development 2015). All of these complaints address issues of inadequate social and environmental safeguarding, despite the standards required by financiers such as the IFC and EBRD.

Evolving official guidance for a "Green Belt and Road" emphasizes environmental protection and attention to climate change impacts as well as promotion of the idea of 'shared benefits.' (Xiheng 2019, p. 51). This is an essential requirement in the transition from infrastructure to development corridors. Xinhing (2019) compares the IFC Performance Standards with China's Green Credit Guidelines, demonstrating alignment in some areas.

However, a recent United Nations Development Programme (UNDP) publication on Chinese private-owned enterprises (POEs) along the BRI reports that fewer than half of the surveyed companies had completed an EIA in relation to their project (United Nations Development Programme China 2019). This indicates that the presence of impact assessment procedures for all projects across the Russia-Mongolia-China economic corridor is reliant upon national legal procedures and requirements, the principles and frameworks required by financiers and voluntary commitments, as well as the extent to which host partner countries have signed and incorporated international conventions into their national legal system (i.e. ILO C 169, and others). With this in mind there remain open questions around the governance of infrastructure investments although they could represent an opportunity to encourage or help host governments to reform domestic environmental and social standards and safeguards.

19.5 Impact assessment in Mongolia: the legal context

The legal processes governing major projects in Mongolia are largely a combination of national laws and regulations, as well as voluntary standards used by companies and/

or Performance Standard conditionalities required by lenders or investors (e.g. IFC or EBRD). The Mongolian Constitution ensures protection from environmental pollution and harm. Based on this stipulation (Article 16.2 of the Constitution), the Government of Mongolia adopted several laws related to environmental protection in the late 1990s and mid-2000s, including the Law on Water (1995) and the Law on Air (2004), which were later revised between 2010 and 2012. These laws created a basis for regulating relations between the government, public and private sector companies.

Since 1976, the Mongolian government has been a signatory to the International Covenant on Economic, Social and Cultural Rights (ICCPR). Impacts on minority and indigenous groups are of concern in Mongolia and have included loss of traditional land, lack of participation of local peoples in decision-making, and a developmental vision which has struggled with implementing principles of transparency and human rights. (Burgés, Simm and Cooper 2019; Anh and Ha 2020). The Asian Infrastructure Investment Bank (AIIB), which was set up to assist with funding BRI projects, does have an environmental and social framework that includes reference to environmental and social assessments, managing impacts on Indigenous peoples and outlines processes for free, prior and informed consent for Indigenous peoples and outlines processes for free, prior and Informed consent for indigenous peoples (Asian Infrastructure Investment Bank 2019). However, the AIIB only funds a small percentage of projects in Mongolia, with the majority of funding coming from China's large banks such as the China Development Bank, China Exim Bank and so on (Organisation for Economic Co-operation and Development 2018).

In 1998, Mongolia adopted the Law on Environmental Impact Assessment (which was revised again in 2001 and 2012) (Byambaa and de Vries 2020). The EIA Law states that the government shall adopt impact assessment guidelines or methodologies (in Mongolian) for environmental, social and health impact assessment and define the operational procedure of the government councils to monitor, review and adopt these assessments. Article 7.7 of the revised 2012 EIA Law states "The Government shall approve procedures and methodologies for impact assessment, which shall include issues related to Environmental Impact Assessment, assessment analysis, review and regulation of professional council activities, and social and health impact assessment" (Legalinfo 2012).

Following the 2012 EIA law revisions, the government was obliged to adopt EIA, SIA, and health impact assessment (HIA) procedures and detailed guidelines. The government was required to adopt guidance documents for EIA, SIA and HIA, as well as three sets of government administrative procedures (i.e. processes for review of assessments) in addition to strategic and cumulative impact assessment (SCIA) guidelines and procedures. The government adopted procedures for EIA and SCIA by the Environmental Minister's resolution A/11 of 2014. However, this resolution was annulled by the subsequent minister in 2017 (Resolution A/80).[169,170]

The Ministry of Health followed by developing HIA guidelines in 2014 (Order 413), but these have struggled in practice due to an absence of complementary procedures for implementation (Byambaa, Wagler and Janes 2014).

The lack of progress in developing specific SIA guidelines has been a key policy gap identified by the Gobi Framework project and civil society partner Steps without Borders. Probably due to lack of knowledge and expertise, SIA guidelines have not been developed by any government agency (as of 2021) and reference to social impacts have been

169 See: Legalinfo http://www.mne.mn/wp-content/uploads/2017/07/2014.7.pdf).

170 In 2019, Orkhon province citizens filed a case against the Ministry of Environment for not conducting a cumulative impact assessment for contamination and health risk caused by Erdenet Mining Corporation to the surrounding area. The litigation went on for about 1.5 years and the Ministry agreed to conduct an investigation of Erdenet's surrounding area in 2020. The Administrative court decided that the parties have reconciled and dismissed the case. The Ministry has sent the methodology to the Orkhon province Environmental Department and instructed them to procure a professional organization to conduct the assessment.

inadequately included in EIA guidelines. Additionally, a publicly available electronic database of EIA documents in Mongolia shows a lack of substantive analysis on social impacts within completed project EIAs.[171]

This is to say that EIA's have not been effective in addressing social and livelihood issues including Indigenous land use practices.

In 2020, a Government Working Group was formed in Mongolia, with the explicit aim of developing national guidelines for SIA; the authors of this chapter in collaboration with the NGO Steps without Borders, have contributed to the working group over the course of 2020-2021 and helped develop SIA guidelines (as well as conducting training and stakeholder consultations in Ulaanbaatar and remote rural areas). This has helped fill the policy gap identified above. The final draft of the guidance was submitted to the Mongolian Cabinet Office in 2021,[172] and discussions are ongoing regarding Ministry implementation procedures.

A long line of trucks transporting coal and copper concentrate line up in Khanbogd, Mongolia while waiting to cross Chinese border.

(Image credit: Jerome Mayaud)

171 The Environmental Information Centre database (Environmental Information Centre 2020) includes 8,560 General EIA reports and 6,206 Detailed EIA reports. Currently, there are 102 companies licensed by the Ministry of Environment to conduct an EIA in Mongolia, 20.8 per cent of which are mining related, 12.6 per cent infrastructure, 25.8 per cent agriculture and manufacturing, and 40.8 per cent in service projects (Environmental Information Centre 2020). (See Purevsuren, Darambazar and Lkhagvasuren [forthcoming] for further analysis of these reports).

172 The analysis in this chapter, while focused on impact assessment, is based on research conducted on the social impacts of mining and mining-related conflicts more broadly from 2016-2020 as part of the Gobi Framework research project (ES/S000798/1). In this case, mine development involves the installation of a range of infrastructure including power stations, pipelines, roads, railroads, airports and accompanying border infrastructure to facilitate export. Therefore, reference to mining in this case refers to infrastructural development beyond local sites where minerals are removed from the earth (see also Lezak et al. 2019). This chapter will present recent developments in Mongolian national requirements for social impact assessments, which would apply to mining and infrastructure projects beyond, but including BRI projects.

Two camels relax in Bayanhongor province, Mongolia. Traditional land tenure allows for free range grazing of livestock

(Image credit: Ariell Ahearn)

Mongolian households summer together in Bayanhongor, Mongolia. Herders practice traditional mobile pastoralism across the country; development-inducted displacement and pasture fragmentation is happening across the country, especially in areas which are heavily impacted by mining.

(Image credit: Ariell Ahearn)

19.6 Effectiveness of impact assessment policies and procedures

A 2020 World Bank Report identified institutional complexity as a challenge in addressing future investment infrastructure in Mongolia. In this way, the confusing nature of national requirements and procedures may pose a challenge to the effectiveness of the implementation of impact assessment procedures in Mongolia, especially when it comes to transboundary programmes such as corridors.

The frequency of grievances and national court cases on issues such as resettlement, compensation and harmful impacts from projects indicates a problem with the implementation of impact assessment policy and company understanding of social and environmental risks in the particular context of the region. Prior to launching the Gobi Framework project, the work of the authors for the IFC CAO (Office of the Compliance Advisor) Ombudsman concerning community grievances against Oyu Tolgoi (see MDT/IEP Final Report 2017) highlighted knowledge gaps of key experts tasked with doing initial environmental and social baseline assessments. Problematic understandings about (and in some cases lack of attention to) mobile pastoralist livelihoods and land-use practices resulted in many families not receiving appropriate or adequate compensation for involuntary resettlement and livelihoods of vulnerable groups not being improved or restored following resettlement. The CAO-facilitated dispute resolution process related to these complaints, which took place over approximately seven years, demonstrated the effectiveness of multi-stakeholder engagement through a tripartite committee (TPC) structure (consisting of representatives from herder groups, local government and local mine management) (Sternberg, Ahearn and McConnell 2019). While this process was a success, it is an anomaly in Mongolia. The great majority of mines and infrastructural projects are not required to comply with external Performance Standards, and grievance mechanisms for local citizens, if they exist, are opaque and difficult to navigate. Additionally, the extra-legal nature of the TPC means that it did not have an impact on national policy related to environmental, social and health impact assessment, resettlement and compensation.

The Gobi Framework was initiated with the aim of understanding the successes and limitations of the TPC model and its potential for being scaled up to similar environmental and social conditions in Central Asia. The research on the TPC indicated that training and capacity-building were crucial to the success of this model, according to interviews with TPC representatives. Training in negotiation and communication skills and joint fact finding helped to equalize power and knowledge inequalities between the groups. Over the course of the research on community/company relations in Mongolia and Kyrgyzstan from 2018-2020, the authors observed significant issues related to involuntary and forced resettlement, pasture fragmentation, lack of complaint mechanisms for locals, negative impacts on livestock and breakdown in social cohesion. Additional issues identified in the research include: limited access to and decline of clean water; inaccessibility of local people to employment positions at mining companies; lack of adequate compensation and resettlement policies; unfair valuation of their assets; increased stress and health-related problems due to blasting; loss of land titles by herders; dust from unpaved roads; lack of monitoring of environmental management plans; lack of discussions, notifications and public engagement prior to the licensing and local development agreements; absence of accountability and association between an environmental restoration and license extension and so on.

In conclusion, while Mongolia does have an existing legal requirement for EIA, the lack of specifications for HIA procedures, and the absence of both procedures and detailed guidance on SIA has limited the effectiveness

of a holistic set of assessment processes. As Vanclay et al. (2015) have emphasized in a Social Impact Assessment Handbook, assessment processes are not simply a box-ticking exercise. Rather, the SIA is a living assessment that should be managed and monitored over the life of a project and provide an opportunity for community engagement and decision-making at every stage of the development project.

The empirical work in Mongolia carried out by the Gobi Framework project on mining and mining-related infrastructure – including pipelines, roads, airports and railways, which include a range of investments – indicates a lack of attention to and systematic analysis and understanding of social and human rights impacts. Recent decades of policy development in Mongolia have emphasized concerns over environmental damage from major development projects, evidenced in civil society movements (Byambajav 2015). Likewise, most of the recent academic work on environmental and social standards has emphasized the natural environmental risks and dimensions (Tracy et al. 2017). This focus on natural environmental issues, while important, has limited focus on equally pressing concerns related to social protections, cultural heritage and Indigenous knowledge and livelihoods (including nomadic).

With the absence of consistent and enforceable principles (with the possibility for third-party verification) for environmental and social safeguards, it is up to national governments of BRI host countries to set out clear legal regulations regarding IAs. While Mongolia has made progress in developing detailed EIA procedures and guidance, and has created a legal requirement for HIA and SIA, an absence of guidance and procedure for SIA, and a delayed procedure for HIA combined with the lack of synthesis between these different but intricately related forms of assessment poses a challenge. While the EIA law requires cumulative and strategic environmental assessments, these have not been conducted consistently in practice. This is particularly problematic as collective risks cannot be addressed. Gobi Framework research in Gurvantes county clearly illustrated this issue. In this case, multiple mining companies excavated a single large resource, each following different company protocols for community relations, compensation and corporate social responsibility agreements. In this way, enforceable legal regulations are needed in Mongolia to enable responsible and sustainable development of infrastructure and hold companies accountable for their impacts.

Additionally, the increasing significance of Human Rights Impact Assessment (HRIA) (Götzmann 2021) highlights a quickly moving field within impact assessment that is often poorly understood by local actors. At this point, Mongolia has not considered implementing HRIA, though it has implemented a United Nations Working Group to assess the impact of business on human rights starting in 2011 (see Chapter 6). A key challenge in implementing SIA, and in the future HRIA is the lack of domestic expertise and capacity in social science research methods and analysis. Relying on international consultants to conduct impact assessments will not be sustainable in the long run. Mongolia will need domestic expertise to conduct assessments and broaden and deepen related management and monitoring plans which will require significant investment in training and educational programmes.

As mentioned in previous sections, when social issues are bolted onto EIA in Mongolia, the analysis often overlooks critical issues related to the sociocultural and economic aspects of pastoral nomadism. This issue has been corroborated by Byambaa and de Vries (2020), who importantly identify the issue that "static land use-oriented methods underlying the current EIAs restrict them to sufficiently mitigate impacts on dynamic land use in nomadic pastoralism" (p. 40).[173] The lack of attention to mobile pastoralist livelihoods is a

173 The Oyu Tolgoi Resettlement Action Plan document, for example, exhibits an inappropriate criterion for determining impact zones that does not consider local herder mobility patterns, seasonal camp sites or differences in livestock water and pasture requirements.

major shortcoming that has resulted not only in infrastructure-related conflict, but in a disregard for local herder land rights, traditional practices and their concern for long-term livelihood security in the face of multiple risks to livelihood health and well-being.

Another challenge mentioned above relates to the coherence of policies in Mongolia and the frequency of policy change. Further clarity is needed on the obligations of companies and how the impacts of projects will be assessed by government agencies. This is particularly challenging with BRI-related projects because the nature of investments is often not available for public scrutiny or may be in the form of government concessions (the usual method for BRI projects). Concession agreements should be published in a Glass Account according to the Law on Glass Account (2014). In Mongolia. Information on projects is accessible through Mongolian government websites such as Legalinfo or local business associations (e.g. Chinese Chambers of Commerce). However, in Mongolia this information is currently very limited. Without transparent information on infrastructure projects, there is little opportunity for public consultation or debate.

19.7 Impact assessment in planning and management of corridors

From an empirical point of view, the Russia-China-Mongolia economic corridor is not a smooth, frictionless and borderless corridor. It is also not (yet) a regional trade agreement. Investment actors, project types, policymakers, political priorities and physical geographies are diverse across the three countries. As Xiheng (2019) highlights, any recommendations for future action needs to take into account the diverse range of actors involved in corridor projects. Relying on financiers and project proponents to implement standards, however, results in a fragmented regulatory environment. If social and environmental risks are too high, financiers with higher standards will not take on the investment, leaving it open to private companies or financial organizations who may lack awareness of, commitment to or alignment with United Nations principles and international standards. Additionally, principles that uphold national sovereignty and non-interference assume a political will and put the burden on national governments to create robust legal frameworks requiring standard sets of environmental and social assessments for investment projects across their national territories.

19.8 Key recommendations for Central Asia

19.8.1 Infrastructure financiers should encourage mandatory environmental and social standards in line with United Nations human rights frameworks

Infrastructure projects are implemented through a diverse range of financiers and companies (both state-owned and private). This diverse investment landscape is operating in a range of political and geographical contexts. The Gobi Framework's research in Mongolia and Central Asia illustrates clear disconnects between aspirational

development projects brokered in Bishkek or Ulaanbaatar, and the reality of implementation in remote rural settings that pose serious risks for local communities. Such risks need to be predicted and avoided or managed, while development opportunities are maximized.

19.8.2 Capacity-building for stakeholders in infrastructure projects should be prioritized

A wide range of stakeholders are involved, including national and provincial governments, companies, financiers, local community groups and NGOs, and embassies and Chambers of Commerce among others. For example, BRI projects exists alongside World Bank and IFC investments in infrastructure which arguably make up the envisioned Russia-Mongolia-China economic (or development) corridor. Civil society organizations, academic institutions and other associations may be in a position to create knowledge exchange around the business case for more effective impact assessment processes to stakeholders, including government.

19.8.3 Develop appropriate guidelines and indicators for mobile peoples

A significant gap in impact assessment processes is a lack of tools and methodologies to represent and address infrastructural impacts on mobile pastoralists and other mobile peoples in an appropriate way. The application of mapping techniques which reproduce private property and sedentary land use patterns has contributed to conflicts, human rights violations and serious mistakes related to resettlement of Mongolian herders. Better accounting of seasonal and common property regimes, mobile grazing patterns, water use and access, and herder rights to these forms of property should be developed in collaboration with local Mongolian NGOs and herders themselves. This issue is not only specific to Mongolia. Mobile pastoralists live across all countries of Central Asia and their rights should not be discounted in the assessment of corridor initiatives.

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Latin American Case Studies

20

Carajás Corridor in Brazil: Could a SEA have Reconciled Shared-use Infrastructure & Environmental Protection?

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ABSTRACT

The 998km Carajás railway corridor connects the world's largest iron ore mine, operated by private mining company Vale S.A. (Vale) in Brazil's northern state of Pará (PA), to the company's maritime terminal in São Luís, the capital of the northeastern state of Maranhão (MA). Carajás is one of the few integrated railway corridors financed by a mining company that, apart from transporting the iron ore that made the infrastructure investments viable, also transports general cargo and operates passenger services along the corridor. This corridor was born from the Brazilian government's plans in the mid-1950s that foresaw the iron ore reserves of Carajás to be among the anchor investments to develop agriculture and industrial production in the Amazon region and help attract migrants from other parts of the country. As such, third-party access (i.e. shared use[174]) to infrastructure investments was a fundamental part of the regional development plans. When these plans were created, environmental and social considerations of those living within and beyond the corridor's region played a secondary role, which helps explain the conflicts that can still be observed along the corridor and the impacts in other parts of the country (Brauch et al., 2020) (see Section 20.1.) The Carajás corridor has facilitated enormous economic development for this otherwise very poor region of Brazil, but at a high environmental risk for an environmentally sensitive area. Neither Environmental Impact Assessments (EIAs) nor Strategic Environmental Assessments (SEAs) were undertaken. The industries that were attracted are the most prone to engaging in deforestation: large-scale farming and pig iron factories fuelling themselves with charcoal. In addition, apart from municipalities hosting mining activities or port operations at the end points of the corridor and certain urban centres along the corridor, the development indicators of smaller and poorer municipalities along the corridor have not improved more than outside the corridor. Among communities in those smaller and poorer municipalities, there is widespread perception of the negative environmental impacts of the railway corridor, including air, noise, soil and water pollution. Perceived environmental problems resulting from the corridor were again evidenced throughout the recent expansion and duplication of the tracks of the Carajás railroad (Brauch et al., 2020) (see Section 20.2.) This state of affairs begs the following questions. Was the environmental cost worth it? Could a rigorous SEA framework have led to better environmental outcomes? We answer these questions in Sections 20.3 and present our conclusions in Section 20.4.

174 Shared use consists in sharing an infrastructure under a multi-user or multipurpose arrangement. Shared use differs from co-benefits, which are the economic benefits emerging from shared use.

20.1 Historical background and current status of shared use of the Carajás corridor

In 1953, Brazil's federal government created the Superintendence for the Economic Valorization of Amazonia (SPVEA) to formulate five-year plans to develop the agriculture, livestock, mining and industrial sectors in the Amazon. Starting in 1964, the military governments accelerated plans to populate and develop the region and ensure control over its territory, and replaced SPVEA with the Superintendence for the Development of the Amazon (SUDAM), which still exists.[175]

Encouraged by incentives offered by the federal government – including tax exemptions and subsidized credits for land acquisitions – foreign companies flocked to the Amazon in search of mineral deposits. On 31 July 1967, during an exploration flight, US Steel discovered the Carajás deposit, with 17 billion metric tons of high-grade iron ore (Vale, 2012.)

In addition to public investments in power and transportation infrastructure, the government redistributed land for agriculture and livestock and promoted migration of small-scale farmers from other regions of the country. The focus of land allocation in the 1970s turned to large-scale, export-oriented investments. Land allocation led to conflicts – many of which still exist – between the government, Indigenous and traditional communities, and small- and large-scale farmers.

The Greater Carajás Program (PGC), established on 24 November 1980 (*Decree-Law No. 1813*. Federative Republic of Brazil. Presidency of the Republic, 1980), covered an area of roughly 900,000km^2. Considered the largest-ever integrated development plan undertaken in a tropical rainforest area, the PGC foresaw US$ 62 billion (in current prices) in public and private investments throughout one decade to develop the Carajás iron ore mine, two integrated bauxite and aluminium projects, and the hydroelectric dam in Tucuruí

175 This section is based on Brauch et al. (2020), with additional references specifically indicated.

(PA). Through tax exemptions and reductions and subsidized electricity prices, the PGC sought to attract large-scale agriculture, infrastructure and mining investments.

Vale, then a state-owned company called Companhia Vale do Rio Doce (CVRD), financed the initial US$ 3.1 billion investment (in 2021 prices) in a mine–railway–port infrastructure complex through bonds and loans from Europe, Japan, the Soviet Union, the USA and the World Bank. The Carajás Railroad (*Estrada de Ferro Carajás* [EFC]) would not only serve to transport iron ore produced in Carajás, but would operate under a multi-user, multipurpose shared-use arrangement to transport downstream products (such as pig iron and ferroalloys), general cargo and passengers.

Brazil's Ministry of Agriculture also implemented the US$ 1.18 billion (in 2021 prices) Greater Carajás Agriculture Program (PGCA), aimed at leveraging the railway corridor to develop export-oriented agriculture projects, including soybean, sugar cane, beef cattle and eucalyptus plantations to produce charcoal for the pig-iron complexes. However, because of issues including low soil fertility and quality, topography, climate, lack of funding and political wrangling, the PGCA led to few large-scale agriculture projects in the region.

Construction of the EFC was completed in 1985, and the plans advanced to connect the EFC to the North–South Railroad (*Ferrovia Norte–Sul* [FNS]) from Açailândia (MA) to Anápolis (state of Goiás [GO]). The connection between the two railroads – which allowed agricultural production from the interior of the country to be transported to and shipped out of the port of Itaqui, in São Luís (MA) – bolstered grain production in the northern Cerrado region (to the south and southeast of Carajás), which did not face the agronomic constraints of the Amazon.

Vale's mineral production has been the dominant cargo transported on the EFC – roughly 190 million metric tons in 2019. Even so, other users have increasingly used the EFC and its connection to the FNS to transport significant volumes of soybean and soybean meal, corn, pulp and pig iron (roughly totalling 9 million metric tons in 2019). The EFC and FNS were also used to transport beverages, cement, trucks, wood, gas, sand, bricks and fertilizers in the past.

The EFC is also Brazil's longest railroad with passenger services. The passenger train has five stations and ten stops, runs three times per week each way (interior–coast and coast–interior), and transports around 1,200 per trip, amounting to a total of 270,000 passengers in 2019 (see map of the Carajás corridor in Fig. 20.1.)

Brauch et al. (2020, p. 15).

Therefore, in addition to the EFC's core use for Vale's mining operations, shared-use opportunities have generated economic benefits for third-party users within and outside the corridor and for local communities. As discussed in the following section, however, these economic benefits have been accompanied by significant social and environmental impacts.

20.2 Long-term social and environmental implications of a pro-economic development agenda

When the mandates of the SPVEA and SUDAM were established in the 1960s, Brazil did not have a legal framework on EIAs. Only in the early 1970s did the first EIAs emerge in Brazil, spurred on by the World Bank's conditionality in financing large hydroelectric power plants. The EIA framework, however, was only developed a few years later. The Brazilian Congress enacted the law on the National Environmental Policy in 1981 (*Law No. 6938*. Federative Republic of Brazil. National Congress, 1981, Art. 9[III]), the government detailed its implementation by federal decree in 1983 (*Decree No. 88,351*. Federative Republic of Brazil. Presidency of the Republic, 1983; *Decree No. 99,274*. Federative Republic of Brazil. Presidency of the Republic, 1990), and in 1986 the National Environment Council issued a resolution, making EIAs a mandatory requirement in certain environmental-permitting processes (*Resolution No. 1*. Federative Republic of Brazil. National Environment Council, 1986).

Therefore, when the Brazilian government started to implement the PGC in the early 1980s, the EIA framework was being developed. By the time the framework was fully in place in 1986, the EFC had already been operational (since early 1985). Though the World Bank requested that CVRD indicated its plans to manage the environmental impacts of the Carajás corridor project, no EIA was required or ultimately undertaken (Redwood, 1992).

SEAs were even farther from becoming a reality in development policymaking in Brazil at the time. They were still in their infancy in Europe and the USA (Fischer, 2007). Brazilian law did not, and still does not require SEAs, which authorities only run on a voluntary basis and with no clear framework and guidance (Fonseca et al., 2017).

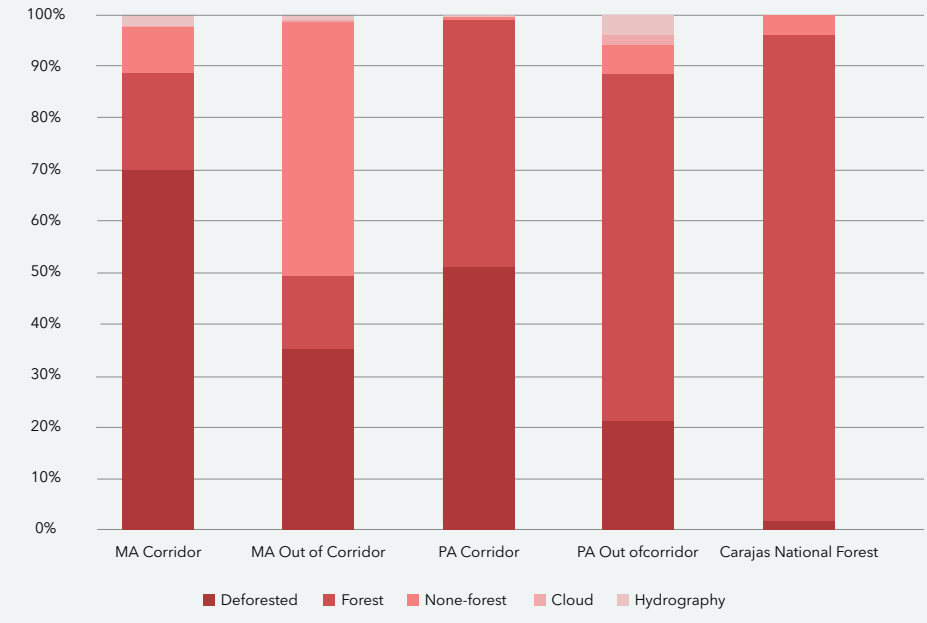
As a consequence of the absence of a strong environmental and social protection framework, the development of the Carajás corridor triggered significant environmental and social impacts felt to this day, despite Vale's mitigation efforts, whether mandated by law or resulting from the company's voluntary corporate social responsibility (CSR) activities in the region.

Social conflicts along the Carajás corridor include those arising from the land interests of Indigenous peoples, residents of communities of Afro-Brazilian slave descendants (*Quilombolas*), and small- and large-scale farmers. Many conflicts predate the EFC and may be more closely related to broader changes in the socioeconomic and environmental landscape of the region since the 1980s. Perceived negative environmental and health impacts of the passage of trains, economic activities enabled by the railroad (such as pig-iron smelting), and the construction works for its double-track expansion have led to dissatisfaction (Penha and Nogueira, 2015; NEEPES et al., n.d.; International Articulation of those Affected by Vale, 2015; Coelho and Monteiro, 2007; Faustino and Furtado, 2013). Protesters sometimes block the tracks, though often for reasons unrelated to the railroad.

Carajás is in a precarious position from an environmental standpoint: one of the richest mineral reserves, it is located within the extremely important and vulnerable Amazon biome. Despite Vale's significant efforts and expenditure in mitigating direct environmental impacts from its mining and logistics operations, certain activities enabled by the corridor's development and shared use – particularly urbanization, large-scale agriculture and pig-iron smelting – have led to cumulative indirect impacts, including deforestation and biodiversity loss in areas not under Vale's management and otherwise not protected as conservation units (Castaneda, 1992; Reis, 2001). Fig. 20.2 illustrates the stark difference in forest conservation rates in the Carajás National Forest (where Vale operates) on the one hand and, on the other, in the municipalities of the MA and PA states along the corridor.

Figure 20.2 Deforested areas and forest coverage Pará, Maranhão and the Carajás national forest, 2019

Figure 34: Percentage of deforested areas and forest coverage in Maranhao and Para municipalities and in the Carajas National Forest (2019)



Source: prepared by the authors based on INPE data.

Source: Brauch et al. (2020, p. 68).

Local communities perceive and report additional environmental impacts, such as the loss of wetlands and wildlife; insufficient rainwater drainage systems, leading to flooding; pollution of the air, soil and water from pig-iron smelters and from dust and iron ore particles falling from trains; damaged buildings, roads and wells caused by vibrations from passing

trains; and fragmentation of ecosystems cut by the tracks (Castaneda, 1992; Reis, 2001).

20.3 Could a SEA have reconsiled shared-use and environment protection in Carajás?

Given the social and environmental cost of the economic development spurred on by the open-access Carajás corridor, this case study is rich in lessons for governments attempting to deploy shared use as an instrument of economic development. While we have been advocating for this approach as opposed to an enclave model, whereby concessionaires develop infrastructure to exclusively serve their operational needs, the Carajás corridor is a cautionary tale, particularly for those regions that are as socially and environmentally sensitive as the Amazon.

As noted above, no EIA was conducted to respond to the sensitivities. However, even if a high-quality, project-based EIA had been undertaken, it may have failed satisfactorily to capture siting and technology alternatives and to consider indirect, cumulative and synergistic impacts of the PGC within the area of influence of the Carajás corridor, as well as in the broader Amazon region and in the Cerrado region to the south. These inherent limitations of EIAs are among the reasons why policymakers turn to an SEA instead of, or in addition to, an EIA (Sánchez, 2017).

An SEA goes beyond an EIA's direct assessment of the environmental effects of project specifics to address the policies, plans and programmes that frame them (Partidario, 2012). As stated in the SEA Performance Criteria developed by the International Association for Impact Assessment, "a good-quality SEA informs planners, decision makers and affected public on the sustainability of strategic decisions, facilitates the search for the best alternative and ensures a democratic decision-making process. This enhances the credibility of decisions and leads to more cost- and time-effective EIAs at the project level" (2002). (See Introduction for more context on SEAs and its relation to EIAs.)

In this context, we ask whether an SEA could have led to better decision-making and social and environmental outcomes in the Carajás case, thereby enabling the maximization of the benefits from shared use, while minimizing harm. To answer this question, we take a bird's-eye view on how an SEA might have input into the decision-making process of Brazil's federal government in the development of the Carajás corridor, as part of the PGC. Entering the details of the history of the Carajás corridor development and exploring the intricacies of a SEA lie outside the scope of this chapter. Rather, our narrower goal is to schematize how conducting a SEA could have influenced decision-making and outcomes.

For this exercise, we use as a starting point the generic checklist for all SEAs included in the good practice guidance on SEAs published by the Organisation for Economic Co-operation and Development (2006). At the core of these checklists sit five principles that, had they been followed, could have changed the social and environmental impact of the Carajás corridor. Table 20.1 provides a summary of our analysis, on which we elaborate in the following sections.

Table 20.1 How applying SEA principles could have improved the social and environmental outcomes of the Carajás corridor

OECD principle	How a SEA could have changed the social and environmental impacts of the Carajás corridor
1. Predicting and analysing the potential direct, indirect and cumulative negative and positive effects of the proposed corridor	» Improved forecasts and planning insights regarding cumulative pressures for deforestation resulting directly or indirectly from the corridor activity » Better understanding of potential negative and positive impacts of the corridor on agricultural production and exports in the region and beyond » Prediction of the need to double-track the railway due to the growing production of iron ore
2. Minimize direct, indirect and cumulative negative social and environmental impacts to maximize positive impacts and opportunities	» More careful design of the railway to avoid damaging biodiversity hotspots and protect communities from negative impacts » Improved understanding of the impacts of pig-iron production, leading to stronger regulation and the banning of the use of charcoal » Better consideration of incentives for responsible agriculture practices, sustainable water use solutions » Better evaluation of potential co-benefits of the railway that may have been left untapped for lack of planning
3. Building the data collection capacity necessary to inform and monitor design and implementation	» Better data and forecasts for the use of the railway by all actors » Anticipation of the scope and impact of shared use over time, to deploy avoidance or mitigation measures for risks and enhancement mechanisms for co-benefits
4. Integrating the views of civil society, particularly affected communities and enabling their influence in the development of the PGC	» Consideration of concerns from Indigenous peoples, traditional peoples, and local communities, leading to greater efforts to provide alternative and suitable livelihoods and compensation » Relevant private sector actors heard, allowing exploration of benefits from shared-use arrangements and their associated co-benefits
5. Establishing an environmental policy framework and authority to manage and regulate the use of natural resources	» Understanding about the long-term ramifications of the corridor to put in place appropriate mitigation measures and the institutional and legal framework to enforce them » Development of environmental protections and stronger analytical, monitoring and enforcement capacities of Brazil's nascent Ministry of Environment

20.3.1 Predicting and analysing the potential direct, indirect and cumulative negative and positive effects (short-, medium- and long-term; environmental and social, including climate change considerations) of the proposed corridor[176]

A SEA would not have looked narrowly into the impacts of the Carajás corridor in its immediate vicinity, in existing and mining-related sectors, and in the short- and medium-term. Rather, based on broader geographic, economic and time horizons, it would have led to better forecasts and planning insights. A broader outlook would have considered the corridor's impacts not only along its spinal cord, the EFC, but in the broader Amazon region and the Cerrado, as well as across economic sectors. It could have predicted the cumulative pressures of deforestation resulting from pig-iron production, urbanization and other economic activities, from the short to the long term. Given that the connection of the EFC to the FNS was already projected at the time, a SEA would have examined the potential negative, as well as positive, impacts of the creation of the corridor as an outlet for grains and other exports produced in the Cerrado region and beyond. It would also have forecast the growing production of iron ore and the ultimate need to double-track the railway in the 2010s. (Fig. 20.3 situates the Carajás corridor within its broader regional and national geographic context and at the edge of the so-called Arc of Deforestation, where 75 per cent of the deforestation in the Amazon region is concentrated.)

Figure 20.3 The Carajás corridor and the arc of deforestation

Source: Brauch et al. (2020, p. 65).

176 The OECD (2006, p. 70) elaborates on this with the following questions: "Have the potential indirect and cumulative (short, medium and long term) environmental and social impacts of the investment been evaluated, have relevant mitigating measures been identified and included in the design of the investment and its companion programs? Are there major risks from the investment that have potential significance beyond the immediate project area? Is the investment under risk from environmental degradation created outside the project's influence?"

20.3.2 Seeking to minimize direct, indirect, and cumulative negative social and environmental impacts (by identifying alternatives or mitigation measures) and to maximize positive impacts and opportunities

A SEA would have led to more careful design of the railway to avoid damaging biodiversity hotspots or particularly sensitive ecosystems, as well as to protect communities from negative impacts. Foresight of the deforestation, health and other impacts of pig-iron production could have resulted in discouraging or limiting the activities of the sector, tightening control over its operations, or at the very least banning its use of charcoal. A better understanding of the urbanization and rural development trends resulting from the development of the shared-use corridor could have justified more incentives for responsible agriculture practices, sustainable water-use solutions or other support to public services that came under tension with the growing population and in-migration. In addition, n SEA could have led to evaluating and enabling other uses and users of the railway that may have been left untapped for lack of planning, for example, small-scale farmers and other firms transporting products besides extractives and grains along the line, whether for export or not.

20.3.3 Building the data collection capacity necessary to inform and monitor the design and implementation of the PGC

Conducting a SEA and implementing the damage-mitigation and benefit-enhancement measures, it is suggested, would have required an effort to generate economic, social and environmental data in the region, serving as a baseline for monitoring. The data collection effort could have included demand forecasts for the use of the corridor, not only for Vale and its cargo, but also for small- and large-scale producers of agricultural and other products. The datasets generated could have been used to anticipate the scope and impact of shared use over time, and deploy the appropriate avoidance or mitigation measures identified for risks and enhancement mechanisms for environmentally benign opportunities.

20.3.4 Integrating the views of civil society, particularly affected communities, and enabling their influence in the development of the PGC

Had an inclusive and regulated SEA process been in place, social conflicts along the railway might not have been completely avoided,[177] but concerns from Indigenous Peoples, *Quilombolas*, and local communities could have been heard and accommodated by efforts to provide alternative and suitable livelihoods – and, where appropriate, compensation – and protect ecosystem services supporting them. Furthermore, the needs of private sector actors within the corridor and from its broader area of influence could have been heard from the outset, allowing them to benefit from shared-use arrangements and their associated co-benefits sooner.

20.3.5 Establishing an environmental policy framework and authority to manage and regulate the use of natural resources, accountable for responding to any problems that might arise

A strong SEA process could have helped equip Brazil's government with the necessary understanding of the long-term ramifications of the corridor to put in place the right mitigation measures, as well as the institutional and legal framework to enforce them. Conducting a SEA for the PGC and other regional development plans for Carajás could have fostered the development of environmental protections enshrined in laws on biodiversity protection and forest conservation, as well as strengthened the analytical, monitoring and enforcement capacities of Brazil's nascent Ministry of Environment.

Having gone though some of the advantages that an SEA could have brought to the Carajás context, we must not neglect the political economy of the development of the corridor. Even if SEAs were already being used as global best practice, it is unlikely that the military dictators who governed Brazil when the PGC was created would have committed to a SEA process, and particularly one that would have been genuinely participatory, giving the public a meaningful opportunity to participate and effectively change the course of policy and plan design. Brazil's military governments considered the PGC to be strategic for the country's economic development (Martins de Sousa and Fonseca, 2020), and it may be naïve to think that having their eyes opened about any of the project's negative social and environmental impacts would have dissuaded them from going ahead with it any differently.

Even under a democratic regime, Brazil is failing to leverage this important process to balance the trade-off between infrastructure development and environment. Several Brazilian academic studies have documented the limited use of SEA and the ineffectiveness of those that have been conducted (Sánchez, 2017). The main reasons stem from using SEA as an instrument to "fill the gaps of the environmental licensing process, using the same approach as that of regular project EIAs," and, as such, being deprived of alternatives analysis, social participation and impact on decision-making (Oliveira et al., 2013; Margato and Sánchez, 2014). Other analyses have mentioned that the purpose and scope of SEAs is not legally and institutionally defined in Brazil, and that policymakers and project proponents manipulate SEAs to legitimize projects and fast-track EIA processes (Sánchez and Silva-Sánchez, 2008). While SEAs should be a tool to optimize sustainable development, the Brazilian experience reveals that SEAs can be perverted, just like EIAs (see Chapter 3), if there is no widespread political support and understanding of its use.

177 Sánchez (2017, p. 177–178) notes that, in plans and programs in the transportation sector including projects with high potential for impact, conflicts with local communities and judicialization often occur even if socio-environmental concerns are considered at the early stages of planning."

20.4 Conclusions

As explained in the Introduction of this volume, as opposed to a logistic corridor centred on a railway from pit to port, shared use along infrastructure corridors anchored on mines can help directly contribute to sustainable development and, in particular, it can help achieve 10 out of the 17 SDGs (Toledano and Maennling, 2018). At the same time, as the Carajás corridor case study demonstrates, shared use can also be detrimental to SDGs 13 (climate action) and 15 (life on land) through damage to ecosystems and through deforestation.

However, the international community has developed a formidable tool to enable the reconciliation of economic development goals with environmental protection goals: the SEA, "a governance tool that attempts to ensure that environmental issues, and their interplay with social and economic considerations, will not be treated as an afterthought" (Hobbs, 2020.)

Thinking through how the Carajás corridor could have looked different had a strong SEA process been conducted leads to findings that are applicable to any shared-use plans. An SEA – if appropriately built and implemented – can enable policymakers to reintegrate the mining sector into the long-term vision of the responsible economic development of the country. Within this vision, shared use rises as one of the mechanisms that can translate depletable resources into long-term assets that work for the economy, the environment and society.

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Lessons Learned from SEAs of Road Infrastructure Developments in Bolivia: Santa Cruz-Puerto Suarez Corridor

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ABSTRACT

The Santa Cruz-Puerto Suarez corridor, located in the southeast of Bolivia, is part of the bi-oceanic export corridor that connects the Atlantic Ocean with the Pacific Ocean. It provides an essential link in the inter-oceanic corridor developed as part of the South American Regional Infrastructure Initiative (IIRSA). The Santa Cruz-Puerto Suarez Corridor has been essential in increasing the competitiveness of agricultural production chains in the Santa Cruz area. The wetland areas surrounding the Santa Cruz-Puerto Suarez corridor are rich in flora and fauna, and thanks to their hydrological connection with the Amazon basin, they permit the flow and interchange of species of the wetter north with those of the south's arid zones. Izoceño and Guaraní people have lived on the shores of these wetlands since at least the 15th century, and these areas are the physical and spiritual centre of their culture. Moreover, the development area occupied by the Santa Cruz-Puerto Suarez corridor has historically been inhabited by the Chiquitano or Chiquitos communities, who are almost entirely indigenous, and represent 1.45 per cent of the total Bolivian population. Considering these socioenvironmental characteristics, in 1999, the National Highway Service (currently the Bolivian Highway Administrator) and the Inter-American Development Bank agreed to complement the already established Environmental Impact Assessments (EIAs) with a Strategic Environmental Assessment (SEA). This chapter analyses the SEA process that was planned to diagnose the environmental and social impacts on the influence areas affected by the Santa Cruz-Puerto Suarez corridor. This case study shares some important lessons on planning SEAs.

21.1 Background and context

The Santa Cruz-Puerto Suarez corridor is located in the southeast of Bolivia in Santa Cruz Department. This corridor results from the necessity to support exports from the agricultural production areas of Santa Cruz to improve the production chains' competitiveness, including soybeans, wood, meat and agro-industrial products. This corridor is part of the bioceanic export corridor that connects the Atlantic Ocean with the Pacific Ocean.

The Santa Cruz-Puerto Suarez corridor is an essential link in the inter-oceanic corridor,

promoted through the IIRSA. The IIRSA initiative aims to integrate South America, and to make it a competitive region. It divides South America into 12 integration and development corridors. One of these is the Santa Cruz-Puerto Suarez corridor, which covers the area extending from Puerto de Santos in Brazil to the Peruvian and Chilean Pacific ports of Ilo, Matarani, Arica and Iquique, passing through Puerto Suárez, Santa Cruz and La Paz.

This corridor covers 566km of highway from Pailón to Puerto Suarez. Pailón is located 60km from Santa Cruz de la Sierra, the largest city and the most populous urban agglomeration in Bolivia, with an estimated population of 2.3 million in 2020. Three roads intersect in Pailón: the Santa Cruz-Beni interdepartmental highway to the north, the highway that connects Santa Cruz-Puerto Suárez, and the Santa Cruz-Puerto Suárez railroad to the east. Puerto Suarez is located 10km west of the border with Brazil, in the Bolivian Pantanal, next to the Cáceres Lagoon, connected to the Paraguay River by the Tamengo Canal. Puerto Suarez has a population of 12,546 (estimated in 2007, based on the census of 2001). Puerto Suarez is one of the significant fluvial port of the country and is the gate to the Atlantic Ocean by the Paraguay River.

The corridor included constructing a highway bridge over the Rio Grande river and 4.4km of access routes necessary to overcome a bottleneck, crossing the river through the railway bridge of only one way, which causes long queues and hours of delay for the traffic. This bridge has 1,404m of extension and is located in Pailas, 60km from Santa Cruz and 80m upstream from the current and existing railway bridge. The budget for the construction of the corridor was US$ 250 million.

21.2 Characterization of the corridor development area

Twenty years ago, the Santa Cruz-Puerto Suarez corridor development area was a region with little human intervention. It included the Chiquitanos communities and valuable ecosystems with very little human intervention such as the Chiquitano dry forest, dry forest the Chaco, the wetlands Bañados de Izozog, and the Bolivian Pantanal. There are also protected areas in the highway's indirect influence zone, such as the Kaa-Iya National Park, the San Matías Natural Reserve, and the Otuquis-Tucavaca Natural Area (Fig. 21.1).

The Chiquitano or Chiquitos communities represent 1.45 per cent of the total Bolivian population, the most significant number of any lowland ethnic group in Bolivia. The Chiquitano population consists almost entirely of indigenous people, with 80 per cent to 90 per cent classified as "poor" by the 2001 National Census. This ethnicity emerged among socially and linguistically diverse people who spoke a common language introduced by the Jesuit Missions. Over the last several centuries, livestock farming, weaving on a loom and wood carving were their main activities. The region covered by these indigenous communities is well known and currently of excellent tourist value for the different types of Chiquitano churches and villages.

Figure 21.1 Area of influence: Santa Cruz-Puerto Suarez development corridor

Source: Fabomade, Foro boliviano sobre medio ambiente y desarrollo

Chiquitana woman

Chiquitana church

Source: WWF/Gustavo Ibarra

On the other hand, the wetlands, Bañados de Izozog, are the largest and most important wetlands in the Santa Cruz region. These wetlands host a diverse community of flora and fauna characteristics of the Chaco biogeographical region's rivers. Because of its hydrological connection with the Amazon basin, the site serves as part of a biological and genetic corridor that permits the flow and interchange of species of the wetter north with those of

the south's arid zones.[178] Since at least the 15th century Izoceño and Guaraní people have lived on the shores, making little impact upon the site's natural values. The area remains the physical and spiritual centre of their culture.

The Bolivian Pantanal's mosaic of lakes, lagoons, swamps, rivers, flooded savannas, palm groves, and dry and closed forests are of great ecological importance. The Pantanal contributes to regulating climate and flooding/drying, controlling soil fertility, biological control, maintaining biodiversity, a water source and the main productive activities such as agriculture and livestock.

Bañados Izozog

Bolivian Pantanal

Source: WWF/Gustavo Ibarra

21.3 From EIA to SEA

The Santa Cruz-Puerto Suarez corridor was the first corridor that the Bolivian State decided to develop. In compliance with current Bolivian environmental regulations, the Bolivian government prepared the EIA of the Santa Cruz-Puerto Suarez Corridor. This included identifying and evaluating the environmental and social impacts of the construction and operation of the corridor, considering in its analysis the specific activities that could affect the corridor's area of influence.

According to Bolivian regulations, all the projects must have an environmental license before starting construction. The process to obtain the environmental license in Bolivia begins with a document (*Ficha Ambiental*), which the Environmental Authority categorizes. According to the category granted, an EIA must be done to analyse the environmental factors indicated. The corridor case was categorized as Category 1, which meant it had to prepare an integral comprehensive analytical EIA of the Santa Cruz-Puerto Suarez Corridor, including a detailed analysis of all socioenvironmental factors. Once the document has been prepared, and after a review and complementation process, the Environmental Authority proceeds to grant the environmental license, which is valid for ten years. Within this period, the work must be executed.

Although the Environmental Impact Assessment of the corridor was prepared according to the Environmental Authority requirements, due to its scope in a vulnerable socioenvironmental area and a regional influence in a productive region, the corridor's construction was conditional on socioenvironmental feasibility. With the social and environmental characteristics in which the Santa Cruz-Puerto Suarez corridor would develop, better accessibility would generate indirect, synergistic and induced impacts in strategic

178 Information and description from the Ramsar Sites Information Service. https://rsis.ramsar.org/es/ris/1089

sectors that converge in the corridor region. Better accessibility would expand the border, due to increased migratory movements, new agricultural and productive activities, and improved logging and uncontrolled deforestation. Thus, it would generate the degradation of the region's ecosystems, such as the loss of, and impact on, the region's biodiversity.

In the same way, in social terms, the region included a considerable ethnic and social diversity, given that the urban population, indigenous peoples (Chiquitanos, Ayoreos, and Izoceño Guaraní), peasants, settlers from other regions of the country, Mennonites, smallholders, ranches and agricultural businesses. This coexistence and interaction, together with the land tenure situation, in association with the critical picture of poverty (mostly rural), constituted vulnerability factors that had to be analysed and considered at a planning level before the conception of the Santa Cruz-Puerto Suarez corridor.

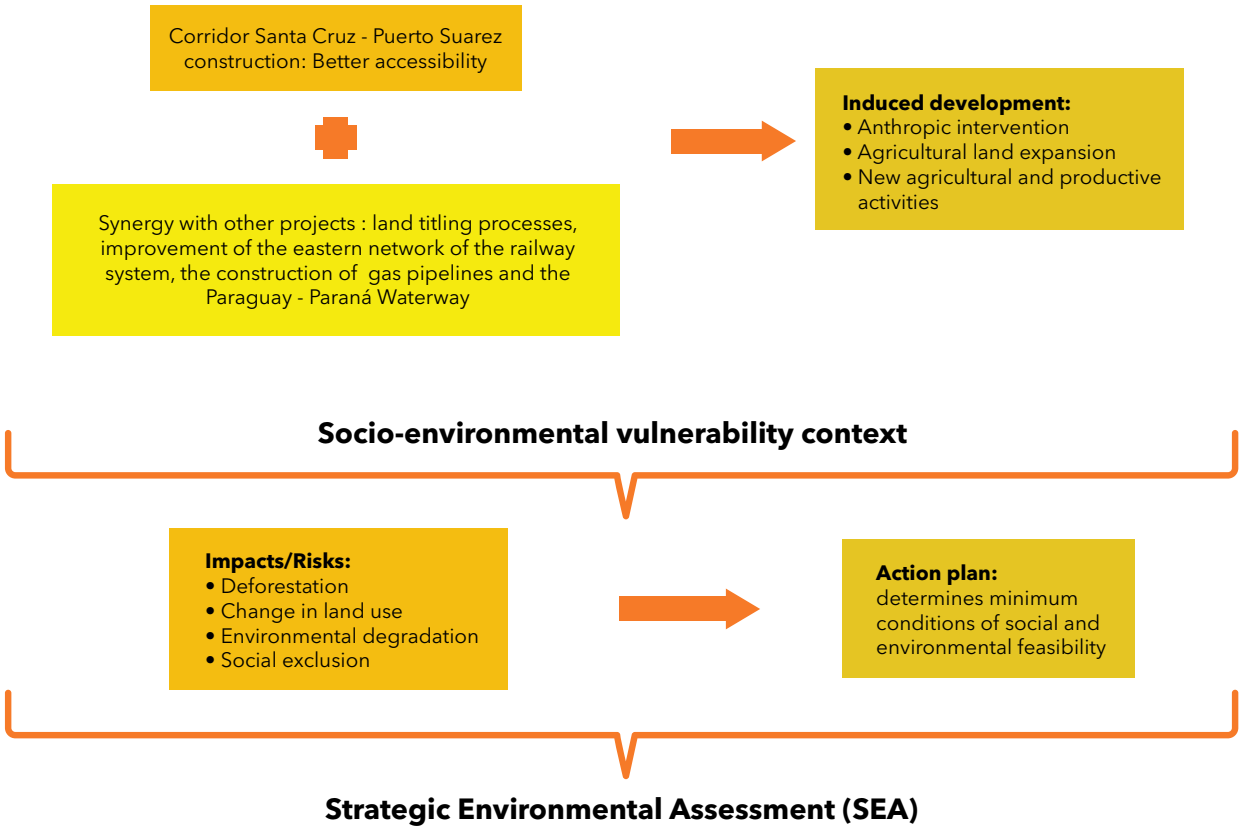
Likewise, the construction and subsequent operation of the Santa Cruz-Puerto Suarez corridor had both positive and negative synergy impacts, with other projects taking place in the region, such as the improvement of the eastern network of the railway system, the construction of gas pipelines to export gas to Brazil and the Paraguay-Paraná waterway.

Therefore, in 1999, the National Highway Service (currently the Bolivian Highway Administrator) and the IDB agreed to complement the EIAs with a SEA.

21.4 The SEA process

In this specific case, the SEA was not applied to a policy, a programme, or a plan, but to the Santa Cruz-Puerto Suarez corridor. This instrument allowed a strategic analysis of the synergistic and induced social and environmental implications of the region's best accessibility. Fig. 21.3 presents the mechanism considered in the SEA.

Figure 21.2 Strategic Environmental Assessment process for the Santa Cruz–Puerto Suarez corridor.



Source: Based on the scheme presented in the Executive Summary of the Final Report of the EAE prepared by Consorcio Prime Engenharia/Museo Noel Kempff Mercado/Asociación Potlatch.

The SEA included an environmental and social diagnosis of the project's influence area, a deep process of socialization with the sectors involved, an analysis of both direct and indirect, synergistic, cumulative impacts in interaction with other projects, the construction and evaluation of long-term scenarios, to visualize the future of the region under different hypotheses and the design of an action plan.

One of the main activities in the SEA process main activities has been social participation, mainly due to the influence area's different social groups. The first objective while preparing the SEA has been to ensure that stakeholders are informed regarding the region's development plans and the interaction between them. The second objective was to look for consensus and internal agreements to articulate their proposals as culturally differentiated groups.

The first stage of socialization included workshops in seven municipalities; six with the Ayoréodes, Izoceño Guaraní, and Chiquitos indigenous communities, with 451 citizens, authorities and representatives of 106 communities. Later, non-governmental organizations, foundations and other actors who worked in the area were included. In 2000, the socialization process covered 100 per cent of indigenous communities' representatives. This process allowed each indigenous community and social group to express their concerns and proposals. Finally, during the last phase, each community's representatives presented the results and promoted discussions about the action plan.

In April 2001, the National Highway Service (currently the Bolivian Highway Administrator) and Santa Cruz's s Departmental Government published the SEA and EIA study results. The Action Plan of the Strategic Environmental Assessment considered five programmes:

1. Land registration programme, led by the Agrarian Reform National Institute: Carrying out the registration and titling of land in three provinces (Chiquitos, Germán Busch and Ángel Sandóval), considering intersectoral coordination, institutionalized participation of social actors, municipal rural and urban cadastre.
2. Environmental conservation co-executed by the National Service of Protected Areas and the Forest and Land Supervision and Control Authority. This programme conferred protected area status to territories close to the highway and contributing to the management organization of protected areas such as the Kaa-Iya National Park, the San Matías Natural Reserve and the Otuquis-Tucavaca Natural Area, and implemented financial mechanisms to ensure long-term resources to solve the recurring costs of protection and administration of the protected areas of the region.
3. Indigenous programme: implementing a trust fund to support the organizational and institutional strengthening of six indigenous zonal organizations in the area and ensuring the conclusion of the ongoing registration land processes for indigenous lands before starting the road works.
4. Institutional strengthening and municipal sustainable development.
5. Communication programme: developing permanent communication with the local communities' leaders and representatives to train them to implement the other programmes.

The proposed budget to implement all these programmes was US$ 85,218,791 million. Unfortunately, the Bolivian government could invest only US$ 26 million in the Environmental and Social Protection Project, representing only 30 per cent of the action plan budget.

In May 2002, the Bolivian government signed a loan contract with the IDB to partially finance the action plan by implementing the Environmental and Social Protection Program (PPAS, its acronym in Spanish). The purpose of the Environmental and Social Protection Program was to control the socioenvironmental impacts and ensure that the SEA's implementation began before construction. To achieve this objective and manage this programme, the Bolivian government launched a Project Executing Unit.

21.5 Results of the implementation of the SEA

From the social point of view, the implementation of the communication programme, before and during the highway construction, allowed the different social groups (mostly indigenous people and others who live in the area as immigrants from other Bolivian regions, Mennonite settlers, small landowners, livestock farms, agricultural companies and others) to contribute their knowledge and proposals at different stages. During the construction phase, there were meetings with the communities and stakeholders to include their requests or suggestions; such was the case of the construction of the Roboré-El Carmen[179] section, or during the design of the tourist circuit San Ignacio de Velasco-San Jose de Chiquitos, where the small landowners negotiated with the Mennonite settlers in some areas along the road.

Regarding the land registration programme, due to several factors, the land registration process was not carried out as quickly as it should have been, and the corridor's construction has generated a demand and land speculation, which has generated agricultural frontier's expansion. One of the most common methods to increase the agricultural frontier is the burning of land, which in many cases is not controlled. The lack of control generates fires that affect lands suitable for crops, such as forests with great diversity. In 2019, the uncontrolled wildfire caused the loss of nearly 6 million acres of forest and savanna.[180]

21.6 Lessons learned

The implementation and execution of a corridor required an accurate analysis of the construction of linear infrastructure. Above all, it required a macro-analysis through the SEA, since the corridors are strategic projects for developing a region.

Since a SEA includes cross-cutting themes, different authorities must implement the SEA action plan. Therefore, all these government offices have to be fully involved in assuming responsibility during the SEA's execution and design. In the case of the Santa Cruz-Puerto Suarez corridor, the instances of cross-cutting issues were dealt with by the National Institute for Agrarian Reform (INRA), the National Service for Protected Areas (SERNAP), the Authority for the Control and Social Control of Forests and Lands (ABT). Although in the action plan's implementation, SERNAP and ABT worked in coordination, the coordination with INRA encountered many execution and budget problems, causing delays in the programme's implementation.

As indicated above, the budget for the implementation of the SEA was around US$ 85,219 million. Unfortunately, the available funding was US$ 26 million. This difference has required prioritization in the execution of some components. Although any SEA defines an ideal budget, it is necessary to have possible budget options for an environmentally viable project.

The creation of the project executing unit, as part of the local government, ran into conflicts of competence between the national authority and the municipalities. Therefore, it is essential that the SEA clearly defines the scope, competence and relationship between the different stakeholders.

179 The Ecoviana SRL Company was selected by the Bolivian Highway Administrator (Administradora Boliviana de Carreteras – ABC) to control and monitoring construction of the construction of Roboré - El Carmen (one section of the Santa Cruz - Puerto Suarez Corridor). April 2009.

180 The information about facts of the fires and the extensión of the damage has been obtained from different sources: BBC News (https://www.bbc.com/), Newspaper Página siete (https://www.paginasiete.bo/), News NPR (https://www.npr.org/2019/09/18/761591604/bolivia-is-fighting-major-forest-fires-nearly-as-large-as-brazils)

The indigenous communities were distrustful due to the lack of fulfillment with certain agreements in previous projects, such as the Bolivia-Brazil Gas Pipeline. Consequently, it is crucial to identify these kinds of issues in future SEA projects and work on them during the socialization process.

Despite the SEA on strategic cross-cutting issues, such as the expansion of the agricultural frontier, it has not been possible to avoid these indirect impacts, so a political commitment and a specific regulatory framework outside the scope of a SEA are necessary to manage indirect impacts that were not well considered in the SEA.

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181 http://ecoviana.com.bo/

22

Strategic Environmental Assessment for a Sustainable Mining Corridor: Addressing the Social and Environmental Risks of Tailings Dam Disasters after Mariana and Brumadinho

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ABSTRACT

The catastrophic tailings dam (TD) failures in Mariana (2015) and Brumadinho (2019), both in the Iron Quadrangle of Minas Gerais, in the southeast of Brazil, shocked the whole world. The flood of tailing waste caused significant environmental degradation, and hundreds of people lost their lives. The mining infrastructure in the Iron Quadrangle has provided an economic stimulus to the communities along the development corridors. However, public authorities and companies have failed to prevent the known high risks posed by hundreds of cumulative structures in this region containing significant levels of hazardous materials, such as heavy metals and other pollutants, to the nearby communities and the environment. In the aftermaths of these disasters, legislation and regulation in Brazil, and more rigorous standards at the international level have been updated to prevent future tailings failures and put safety first. The disasters' responses include the Netherlands Commission on Environmental Assessment (NCEA) mission to develop a Strategic Environmental Assessment (SEA) for iron ore plans for Minas Gerais. This chapter analyses the SEA's role in the Iron Quadrangle and its potential contribution to the strategies for disaster risk reduction in tailings dam failures. Through the evidence, this chapter aims to establish that, after the disasters, the integrity of the SEA for the Iron Quadrangle requires robust preventive measures and meaningful public participation. The SEA should contemplate adopting the latest devices for monitoring dams' risks, considering that one of the main challenges of implementing the Brazilian law and policy on dams' safety is the shortage of staff. Moreover, the SEA can enhance governance of the TDs in the Iron Quadrangle, mainly because the overall strategy will support the Environmental Impact Assessment (EIA) and licensing practice, focusing on the local communities.

22.1 Introduction

The state of Minas Gerais in southeast Brazil suffered two catastrophic TD collapses in three years, leaving a trail of extreme destruction in the affected communities and environment. In 2015, a TD in Mariana collapsed, and this was followed by a similar event in Brumadinho in 2019. Both Mariana and Brumadinho are part of a 7,000km^2 region known as the Iron Quadrangle, which accounts for 11 per cent of worldwide iron ore production (Lima *et al.* 2020).

The mining infrastructure in the Iron Quadrangle has provided economic stimulus to the communities along the broad-based development corridor. However, public authorities and companies have failed to prevent the known high risks posed by the incremental growth of hundreds of structures in this region containing significant levels of hazardous materials, such as heavy metals and other pollutants, to the nearby communities and the environment. The following questions arose in relation to these disasters:

» What could have been done to prevent or mitigate such events?

» How can catastrophes such as these be avoided in the future?

There are different approaches to answer these questions. From the perspective of the public duty to protect the society and the environment, they may include the preventive role of the EIA and SEA.

Under Brazilian law, EIA is a mandatory requirement to promote compatibility between socioeconomic development and the preservation of the environment (The National Environmental Policy [NEP] Law 6,938/1981 regulated by Decree 99,274/1990). Despite being a well-established process and a recognized practice in Brazil, the EIA is far from perfect. Some of the risks involving the TDs in Mariana and Brumadinho were allegedly not captured in their EIAs and respective licensing processes, triggering concerns about the effectiveness of such instruments.

minerals) to allow the government to ensure that environmental assessment is not limited to a project-by-project approach. Such assessment would include impacts on the policies, plans and programmes (PPPs). Although there have been some SEA experiences in Brazil, its practice is less advanced than that of EIAs. Furthermore, no direct references are made in Brazilian law concerning its application.

In August 2020, after a visit by risk reduction experts, the government of Minas Gerais (MG) signed a Memorandum of Understanding with the NCEA to advise on the development of an SEA for a proposed state mining plan, in particular in the iron ore subsector. Although progress has been hampered by the COVID-19 outbreak, the NCEA will potentially act as an independent advisor and quality assessor in the process, whether the SEA proposal is motivated by the administrative needs of the MG or the need to re-establish societal trust for the mining sector after the tailings disasters is currently being assessed and will shape the nature of the SEA.

This chapter analyses the role of the SEA in the Iron Quadrangle and its potential contributions in the strategies for disaster risk reduction. It starts with a brief description of the Iron Quadrangle's resources, followed by an overview of the disasters at the Mariana and Brumadinho TDs and the judicial and legislative responses to them. In the next part, the chapter considers inconsistencies in the EIA and licensing of the TDs that collapsed in Mariana and Brumadinho, to analyse the challenges faced by a country where economic interests are often prioritized over environmental and social impacts. It then proceeds to consider the observations of the NCEA regarding the objectives of the SEA for iron ore, such as the need to reconcile economic activities with social and environmental protection, crisis responses and public participation. Through this evidence, the chapter aims to establish that, after the disasters, the integrity of the SEA in the Iron Quadrangle requires robust preventive measures and meaningful public participation.

22.2 Background

22.2.1 The Iron Quadrangle: human and natural resources

Minas Gerais has abundant and high-quality mineral resources, such as iron ore, manganese, bauxite and niobium. Mining has been a part of Minas Gerais's economy since colonial times, especially after the discovery of gold at the end of the 17th century. The vast scale of Minas Gerais's mineral wealth is indicated by its name, which means general mines in Portuguese. In the early 1980s, multinational companies intensified modern large-scale mining operations in the Iron Quadrangle by installing large dams. Since the mines are invariably far from the coast, they rely heavily upon transportation logistics networks (e.g. railways and maritime ports). These infrastructural additions assist in integrating the mining facilities and their minerals into the global systems of production and trade. For instance, the 900km Vitória-Minas Railway line connects the states of Minas Gerais (landlocked) and Espírito Santo (which has an extensive coastline), where the leading ports of the country are located. The transportation infrastructure is a competitiveness factor for the iron ore supply chain and its connectivity needs (Comtois and Slack 2016). As iron ore is a low-priced, but high-bulk commodity, the iron ore market demands high production volumes served by extensive transportation infrastructure to enable the production flow (Comtois and Slack 2016).

Alongside its geological heritage, the Iron Quadrangle is a place of cultural and environmental

significance. The historical centre of the town of Ouro Preto, which is listed as a United Nations Educational, Scientific and Cultural Organization World Heritage site, preserves the prosperity of the 18th-century gold rush in its Baroque-style buildings and churches. Furthermore, the area of the Iron Quadrangle overlaps with conservation units in the transition area between the Atlantic rainforest and the Cerrado savanna. It consists of the Espinhaço mountain range endowed with rupestrian natural caves, grasslands and exceptional biodiversity and endemism, which have been threatened by mining activities (Pena *et al*. 2017). The Iron Quadrangle is composed of 33 municipalities, including the capital Belo Horizonte, with an estimated population of 4.6 million. The mining companies co-exist in the region with numerous minority and vulnerable groups that are strongly linked with the land and its natural resources, such as indigenous tribes, *quilombolas* (runaway slaves), small-scale artisanal miners and farmers.

Iron ore is one of the highly mined commodities of the country, consistently playing a vital role in Brazil's balance of trade. For instance, in 2019, Brazil accounted for US$ 22.7 billion of iron ore exports (Ministério de Minas e Energia, 2020). The municipalities of the Iron Quadrangle benefit from the financial support through mining royalties and value-added tax that can potentially contribute to jobs, as well as the health and education systems of the communities in the region. It is estimated that, in five decades, the production will have increased from 40 Mt/a to 250 Mt/a (Lima *et al*. 2020). However, the increased production escalates the volumes of the tailings disposed of in the dams (Lima *et al*. 2020).

22.3 The Mariana and Brumadinho TD disasters: losses and reactions[182]

In November 2015, the upstream TD Fundão in Mariana collapsed, unleashing more than 60 million m^3 of mining waste, enough to fill 20,000 Olympic swimming pools. The flood of tailing waste caused 19 deaths and resulted in the worst environmental disaster in Brazilian history. Mining waste sediment was deposited into 600km of the River Doce and its tributaries, reaching the Atlantic Ocean. Affected communities of around 1.4 million inhabitants along the river corridor lost their settlements and livelihoods, including the three indigenous reserves, Krenak, Tupiniquim and Guarani. The flood also caused the destruction of houses and infrastructure, the death of animals and fish, deterioration of the Atlantic forest, and interruption of essential activities, such as water supply, fishing and agriculture. In January 2019, another fatal disaster occurred in Brumadinho, about 87km from Mariana, when the upstream TD Corrego do Feijão collapsed abruptly without warning. The dam had released 12 million m^3 of tailing (enough to fill 4,200 Olympic swimming pools), causing 270 deaths and large-scale environmental damage. The damage extended to soil contamination, impairment of water resources (e.g. the Paraopeba River), biodiversity loss, and extensive destruction of forests. The Fundão dam is controlled by Samarco Mineração S.A. (a joint venture between the Brazilian Vale and the Anglo-Australian BHP Billiton), and the Corrego do Feijão dam is owned by Vale.

182 The information about facts of the disasters, lawsuits, draft bills and laws has been obtained from the following sources: newspapers 'Estado de Minas' (https://www.em.com.br/), 'O Estado de São Paulo' (https://www.estadao.com.br/), 'The Guardian' (https://www.theguardian.com/uk), and 'The Wall Street Journal' (https://www.wsj.com/); the broadcasting company BBC News (https://www.bbc.com/); and Brazilian institutions' official websites, including The Minas Gerais State Public Prosecutors' Office (https://www.mpmg.mp.br/), Federal Public Prosecutors' Office (http://www.mpf.mp.br/), Legislative Assembly of Minas Gerais (https://www.almg.gov.br/home/index.html), Chamber of Deputies (https://www.camara.leg.br/), Federal Senate (https://www12.senado.leg.br/hpsenado), and Brazil's government legislation portal (https://www.planalto.gov.br/).

The Minas Gerais State Prosecutors' Office submitted a report on the Mariana case, indicating the occurrence of a liquefaction phenomenon, in which stored waste suddenly becomes a murky liquid that can flow quickly, for long distances (Morgenstern *et al*. 2016). This problem was coupled with some drainage system issues caused by changes in the dam's design between 2011 and 2012 (Morgenstern *et al*. 2016). A small earthquake 90 minutes before the disaster may have accelerated the process (Morgenstern *et al*. 2016). Prosecutors found evidence that Samarco had not taken any preventive action, even though it was aware of the risks.

So far, Vale's internal investigations into the causes of the Brumadinho disaster suggest that the dam's rupture was caused by liquefaction and excessive water pressure, aggravated by the season of heavy rainfall (Robertson *et al*. 2019). The dam had been in operation since the 1970s and, in 2016, the decommissioning process was initiated. Evidence indicated that Vale was concerned about the drainage system's imminent risks and had undertaken repair works (Robertson *et al*. 2019). Nevertheless, an inspection by the German auditor Tüv Süd had certified the dam as stable, although some problems had remained unresolved. According to Vale's internal report, there was no visible sign of distress in the dam before its collapse (Robertson *et al*. 2019). However, a recent study on the use of satellite-based monitoring techniques indicated that the timing of the dam collapse was foreseeable (Grebby *et al*. 2021). The study claims that the satellite image data would have detected the ground movement's acceleration, causing deformation in the dam's wall and tailings – a failure precursor (Grebby *et al*. 2021).

ronment. The Brazilian Constitution stipulates the polluters' clean-up obligation for environmental degradation (Article 225, § 2). Regarding the environmental damage, Brazilian law imposes a strict liability regime, namely the obligation to compensate irrespective of fault (Law 6,938/1981, Article 14; Civil Code, Article 942). Moreover, Brazilian law mandates liability to corporate environmental crimes be imposed against polluters, and penalty under these offences may include fines and imprisonment (Law 9,605/1998).

After both disasters, the Brazilian Public Prosecutor's Office did not take long to file lawsuits. Currently, there are several ongoing lawsuits in Brazil for the attribution of civil, criminal and environmental liabilities, and the environmental agency has imposed administrative fines. The mining companies face billions of reals in terms of liability for compensation for damage of lives and properties lost, clean-up and restoration. In both the Mariana and Brumadinho cases, the criminal charges include homicides, personal injuries, flood and landslide, and environmental crimes. However, none of the defendants have been held criminally or civilly liable due to delays in the Brazilian courts caused by the persistent congestion of cases.

In 2016, Samarco, Vale and BHP created the redress scheme, the Renova Foundation, for the Mariana case, resulting from a legal commitment in a lawsuit with public authorities that remains suspended in case of non-compliance. Under this scheme, several claimants received payment, and programmes were implemented for financial aid for indigenous people, rebuilding villages and establishing an alternative water supply (Fundação Renova 2021). A group of victims has opposed the decision-making powers given to Renova to provide effective remediation. They believe Renova lacks independence, since it has not disclosed essential information about the environmental impacts, and consider its compensation programme to be slow, bureaucratic and inadequate (Ridley and Shabalala 2020). During a 2019 visit to the Iron Quadrangle region, the United Nations Human Rights Council Special Rapporteur supported these views, recommending that Renova should be composed of independent experts (Tuncak 2020).

In parallel, around 200,000 victims of the Mariana case are seeking compensation for the damage in the UK courts.[183] In November 2020, the judge struck out the claims on the grounds that they are an abuse of the UK legal system. The decision concluded that the UK action duplicates ongoing litigation claims in Brazil, leading to risks of inconsistent findings and wasted time and costs. One of the crucial factors in the decision is that the claimants would be able to obtain justice in Brazil, including through the existing route of redress from the Renova scheme, without any costs for engagement. This decision is subject to appeal, and the claimants may interpret it as an obstruction of access to justice (Weiner 2020), diverting from precedents allowing English courts' jurisdiction on the parent companies' duty of care for the actions of their subsidiaries abroad.[184]

In February 2021, Vale settled the lawsuit filed by the Minas Gerais State and agreed to pay R$ 37 billion (£ 5 billion) in compensation for the socioeconomic and environmental damage, excluding individual and criminal claims. Nevertheless, representatives of the victims have declared that they have been excluded from the negotiations and have brought an appeal against the settlement to the Federal Supreme Court (Supremo Tribunal Federal 2021). In January 2021, the municipality of Brumadinho and relatives of the victims submitted a group action against Tüv Süd in Germany for its contribution to the accident. Tüv Süd also faces criminal charges in Brazil and Germany.

183 Município De Mariana & Ors v. BHP Group Plc & Anor (Rev 1) [2020] EWHC 2930 (TCC).

184 For instance, in the case Vedanta Resources PLC and another v Lungowe and others [2019] UKSC 20, the Supreme Court accepted the English courts' jurisdiction to hear a claim from Zambian villagers against a mining company related to damage arising from river pollution in Zambia.

The disasters elicited responses from legislative and policymaking quarters. Although state and national proposals for more strict legislation on the safety and monitoring of dams have been implemented with immediate effect, in many cases, the procedures are bureaucratic and lengthy, allowing no substantive changes to be implemented. At the State level, Law 23,291/19 imposed a ban on upstream TDs and forbade the granting of environmental licenses for dams located close to communities or water springs within a minimum distance of 10km. The social movement, Mar de Lama Nunca Mais (sea of mud never again), created after the Mariana disaster, actively participated in the formation of the final draft, which was based on a proposal supported by more than 60,000 people. Another draft bill to implement social licensing to guarantee the restoration process and socioeconomic development of the victims of the TD failures (PL 3,312/2016) was dropped without approval. This would have been a progressive step, with detailed measures that should be taken by the mining companies to develop projects with broader participation of the affected communities.

In practice, the Mariana disaster highlighted some flaws in the application of the National Policy of Dam Safety (Law 12,334/2010), which was finally amended in September 2020 by Law 14,066, after an extended debate. The new law determines the ban of all upstream TDs by 2022 and establishes the possibility of financial assurance for clean-up and remediation. Furthermore, new objectives for the national policy were added, such as the definition of emergency procedures through the instruments of the Emergency Action Plan (PAE) and Self-Rescue Zones (ZAS). The PAE is mandatory for all TDs in the mining sector, irrespective of the classification of risks. The law provides a detailed list of the contents of the PAE, including the emergency rescue plans and training, registration of the population and indication of their vulnerabilities, communication plan, flood maps and escape routes. The ZAS consists of the downstream valley of the dam, where there is not enough time for intervention in an emergency, as described by the flood map. If there are inhabitants in such zones, no new TDs can be installed and only workers in charge of the operation or maintenance of the dam will be allowed to enter them. For the TDs currently in operation in the ZAS, either the TDs or the population should be removed, or the TDs should be reinforced.

Another relevant change of the new law was the strengthening of the criteria for the classification of dams. Before this law was enacted, due to the lack of material resources and skilled personnel, the mining agency had prioritized the inspections of dams listed as critical risks (probability of failure), overlooking those with associated potential damage (impacts in case of failures). As Fundão and Córrego do Feijão were rated as TDs with low critical risks and high associated potential risk, they were not among the inspection priorities. Addressing this issue, the recent law included the benchmarks technical characteristics, state of conservation and security plan compliance, as well as the new additions of construction method and structure age.

Furthermore, the National Agency of Mining (ANM) has intensified the inspection of TDs. When the Brumadinho dam collapsed, the ANM had only eight experts to inspect the mining dams, and the mining companies and their auditors were allowed to certify the dams' safety. The number of staff has been increased, and more than 220 dams were inspected in 2020 (National Agency of Mining 2020). Currently, there are 436 TDs for mining purposes registered in the integrated management system for the mining dams that was created in 2017 (Sistema Integrado de Gestão em Segurança de Barragem de Mineração). Almost half of the TDs, 216, are in Minas Gerais (National Agency of Mining 2020). Following the national criteria for assessing risks, Minas Gerais has 43 TDs classified into emergency levels, three of which are under the risk of imminent rupture (National Agency of Mining 2020).

The vulnerabilities of TDs have long been known, as previous failures worldwide (e.g. Italy, Canada and the US, among others) have caused significant loss of life and damage to property and the environment. While the majority of the responses were given within

the limits of each jurisdiction, efforts at the international level include guidelines for the design, construction and closure of safe TDs (i.e. the 2001 report *Tailing dams: Risks of dangerous occurrences* from the International Council on Large Dams). The accidents in the Iron Quadrangle led to considerable international attention to review and improve guidance in tailings safety and management. One example is the 2017 United Nations Environment Programme (UNEP)/GRID-Arendal report *Mine tailings storage: Safety is no accident*, which gathered policy actions that stem from the recommendation priority of safety first (Roche, Thygesen and Baker 2017). Another example is the development of an international industry standard represented by the 2020 report *Global industry standard on tailings management*, with the goal of zero harm to people and the environment, co-convened by the International Council on Mining and Metals (ICMM), UNEP and Principles for Responsible Investment. It covers the entire life cycle of TDs, from the design, construction, management and monitoring to closure and post-closure, focusing on local communities' perspectives.

This report is part of a series of interventions by the Investor Mining and Tailings Safety Initiative that were implemented in the aftermath of the Brumadinho disaster by a group of institutional investors in the mining industry, led by the Church of England. Other interventions from this group include the public database Global Tailing Portal, tracking the TDs worldwide based on data submitted by publicly listed mining companies, supported by the UNEP (GRID-Arendal 2021). A preliminary analysis of the information disclosed by mining companies comprising 1,743 facilities (i.e. representing an average of 36 per cent of global commodity production) found that the stability risks of upstream TDs are higher than those of the average tailings facilities (Franks *et al.* 2021). The second phase of this project will test the use of satellite radar for monitoring, which according to recent research, would have been an effective technique to foresee the Brumadinho disaster (see section 22.2. above; Grebby *et al.* 2021). Other plans of the Investor Mining and Tailings Safety Initiative include pressure on the mining sector with disinvestment to persuade it to adhere to the global tailings standards (Venditti 2021).

These initiatives constitute the background and implementation of the United Nations Environment Assembly (UNEA) 2019 UNEA-4 Resolution on Mineral Resource Governance in the 21st Century (United Nations Environment Assembly 2019). While recognizing the governance challenge of TDs, it encourages efforts to facilitate international cooperation, failure prevention and crisis response.

22.4 The EIA in Mariana and Brumadinho: failures in the social and environmental protection and evolving laws

In recent decades, EIA process and practice has become consolidated in Brazil. The EIA, which was introduced by the NEP, follows the guidance of the National Council of the Environment (Conselho Nacional do Meio Ambiente [CONAMA]), a deliberative organ in charge of the NEP formulation and coordination. The EIA is tied to the licensing of projects, and the licencing types include provisional, installation and operating permits (CONAMA Resolutions 01/1986 and 237/1997). The responsibilities related to the EIA and environmental licensing are decentralized, and the distribution of competencies depends on where the impacts occur, with the states and the municipalities handling local projects. At

the national level, the environmental agency Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis has the power to supervise and rationalize the use of natural resources under the Ministry of the Environment. It is also responsible for the evaluation of impacts on multiple states or transboundary impacts alongside impacts on complex large-scale developments (Supplementary Law 140/2011). The EIA framework was later accepted by the Brazilian Constitution 1988, and amended in 1995 to incorporate a whole chapter dedicated to the environment. According to Article 225, Paragraph 1, item IV, to assure environmental protection, the public power must require an EIA for the installation of work or activity that may cause significant environmental degradation.

While the causes of the accidents at Mariana and Brumadinho remain under investigation, substantial claims were made about the unsatisfactory EIA and licensing processes. These instruments were aimed at addressing the prevention of accidents such as the dam rupture mitigation risks and their socioenvironmental implications. In the Mariana case, significant flaws were found during the dam licensing process, since some of the licenses for provisional, installation, operating and renewal permits were granted ad referendum to Samarco very quickly without evidence of full compliance (Salinas 2016). A license is deliberated ad referendum when a federal agency decides on the matter on an urgent basis pending a decision from a technical or decision-making agency (Salinas 2016). According to the prosecutors, the 2005 EIA submitted for the provisional permit lacked a detailed engineering design of the dam, and the 2007 emergency response plan for the installation permit failed to provide an emergency communication system, such as alarms and sirens (Salinas 2016).

of the accident (General Comptrollership of Minas Gerais 2019). In particular, the CGE-MG indicated that Vale had not applied for new permits for the latest modifications regarding the increase in the dam height. Moreover, it observed that Vale did not submit the EIA until 2015, since the environmental authorities had requested merely a Report of Environmental Control (RCA) during the Provisional permit procedures in 2008. The RCA is less rigorous than the EIA and can be applied for activities that do not generate significant environmental impacts (CONAMA Resolution 10/1990), which, in this case, was not adequate according to the CGE-MG.

It is not within the scope of this work to analyse the peculiarities of the Mariana and Brumadinho dams' EIA and licensing, since the facts are still under deliberation. However, the issues raised coincide with factors generally recognized as limitations of the effectiveness of the EIA and licensing in Brazil. For instance, the procedures are controlled by public entities, and it is well known that many of them lack material resources and have only a few trained and skilled personnel (Glasson and Salvador 2000). This insufficiency results not only in lengthy bureaucratic procedures, but also in the scant analysis of the project's details (Glasson and Salvador 2000). Moreover, although public participation is required by law, there are limitations in the actual involvement of the impacted communities. It is clear that they are not central to the process and the public hearings often result in a mere formality without substantial influence on the actual decision-making. Furthermore, local communities can experience difficulties in understanding the EIA's highly technical language or interpreting the impacts of the project on their lives (Hochstetler 2018). Typically, some communities that speak the indigenous language or have low education levels may not have meaningful participation without assistance (Hochstetler 2018). Ultimately, corporations can be highly influential in economic and political matters of developmental projects. In practice, the EIA works to improve the sustainability of economic projects from the proponent's perspective, instead of gathering collective views on whether and how the project should be done (Glasson Therivel and Chadwick 2012).

These concerns are now being examined in challenging times, as several draft bills on a fast-track EIA/licensing version to streamline the licensing in Brazil can inevitably reduce the effectiveness of the environmental assessment. For instance, PSL 654/2015, among others, intends to exempt the EIA for activities related to strategic and national interest, such as the exploration of natural resources and eliminating opportunities for direct public participation. The rapporteur of the proposed legislation expressly mentions that the licensing is a "villain", delaying investments needed for the development of the country. To comply with the short timescale, the government would probably need to rely on the companies' information, instead of performing a systematic investigation. Similarly, PEC 65/2012 proposes that a project cannot be suspended or cancelled once an EIA is submitted, unless there are changes in the circumstances of the elucidation of the first EIA. This proposal reveals the discontent with the "judicialization" of important projects when the court injunctions can delay or stop the licensing process. An example of this is the construction of the Belo Monte hydropower dam in the Amazon region, which was temporarily postponed by provisional court decisions to analyse allegations that the EIA process had not taken into account the impacts in the Xingu indigenous people's lands (Khatri 2013). However, access to justice is an essential power of heavily impacted communities whose safety can be ignored by large infrastructure projects. Consequently, when the administrative avenues fail, the courts have an indispensable role in scrutinizing the licensing process to hold the public and private sectors accountable.

The legal reform proposals in the EIA and licensing had been under discussion for several years before the Mariana and Brumadinho disasters occurred. These proposals did not consider the lessons learned from the catastrophes. One of the legacies of the disasters is the voice given to the impacted communities, as evidenced by the powers of social movements resulting

in Minas Gerais State Law 23,291/19 (see section 22.2 above). Supposedly, the same type of constructive effort could influence meaningful public participation in the EIA and licensing in the Iron Quadrangle.

Furthermore, the United Nations International Strategy for Disaster Reduction (UNISDR) has recognized the EIA's potential to strengthen the disaster risks reduction (Sendai Framework, item 30, 'c'). The Mariana and Brumadinho disasters are perfect examples demonstrating that they could have benefitted from this approach. Although disaster management is an integral part of the environmental and societal planning of TDs, addressing disaster risks in EIAs has not been a widespread practice in either Brazil or the rest of the world (Hapuarachchi Hughey and Rennie 2016). Nevertheless, Brazilian EIAs broadly cover the "relationships of dependency between the local society and the natural resources" for the measurement of the impacts on the "health, safety and well-being of the communities" (CONAMA Resolution 01/1986). With a severe and recurrent problem in the management of TDs, Brazil could become a pioneer in mainstreaming disaster risk implications in the TD projects in the Iron Quadrangle. This would require identifying the TDs' potential impacts within the disaster risk reduction for resilience framework, selecting the specific actions in line with best practices from the UNISDR and the Brazilian National Policy on Protection and Civil Defence (Law 12,608/2012).

22.5 Approaches of the SEA for iron ore in Minas Gerais

The Mariana and Brumadinho disasters generated discussions about the SEA's benefits for the mining activities in the region. The government of Minas Gerais has approached the NCEA for further studies of an SEA for iron ore in addition to a state mining plan. An SEA has the potential to improve evaluation of the TDs' impact as a whole, within the PPPs for sustainable mining in Minas Gerais, in synergy with the EIA practice in large-scale project developments.

In Brazil, the SEA is not a formal and compulsory process. The NEP refers broadly to "the evaluation of environmental impacts", which includes the SEA as a decision-making instrument related to a phase prior to specific projects. No progress has been made in the attempts to give the SEA the status of a legal instrument, and the draft bills are still under analysis (PL 261/2011 and 4,996/2013, among others). However, the absence of a legal framework has not discouraged some experiences. For example, both the Brazil-Bolivia gas pipeline and the Jirau and Santo Antonio hydropower dams in the Amazon basin have conducted SEAs in response to a requirement from the IDB and the World Bank for approval of investments. Another example of the SEA in Brazil is the voluntary initiative of the Rodoanel Mario Covas, a roadway system constructed in the dense urban area of São Paulo Metropolitan Region. On this occasion, many of the relevant strategic aspects of the roadway were overlooked, which was partially attributed to the absence of guidelines and low levels of expertise in strategic planning (Sánchez and Silva-Sánchez 2008).

The SEA for iron ore design is at an early stage and only a few details have been revealed. The NCEA has emphasized the need for consultation with the stakeholders in the decision-making process before, during and after the undertaking of the SEA. This process would also be in line with best practices and international standards (Netherlands Commission for Environmental Assessment 2020). To facilitate the consultation process, the NCEA suggested the creation of a stakeholder platform with representatives of the civil society, mining industry and public institutions (Netherlands Commission for Environmental

Assessment 2020). Working in collaboration with the NCEA, the organization Dutch Risk Reduction (DRR) presented the key findings on the technical stability and safety of TDs in Minas Gerais and governance (Dutch Risk Reduction 2019). The DRR highlighted that the application of the law and policy on the dams' safety can be improved, and suggested that the shortage of staff in the regulatory institutions be addressed since it is a major challenge for the law and policy enforcement. According to the DRR, the SEA is an opportunity to reconcile the interests of the mining companies, society and government, while also improving levels of trust and accountability and the coordination among regulatory authorities from multiple sectors. The SEA will provide short- to long-term strategies (for at least 20 years), and the decision-making will be informed by data derived from the technical and scientific studies. These would also be accompanied by information obtained through public participation. According to the DRR, some of the relevant data to build an SEA is related to vulnerable communities, flood-prone areas, early warning systems, waste disposal methods, as well as a guide for the spatial zone of future mining activities, among others (Dutch Risk Reduction 2019).

Depending on the quality of the collected data and the level of public engagement, the SEA for iron ore can enhance the governance of the TDs in the Iron Quadrangle. The first advantage is the synergy between the SEA and the EIA (Alshuwaikhat 2005). They can be connected as different stages of the same policy and resulting projects in a way that the SEA adds to the EIA levels of generality in greater proportions and encompasses a wider range of environmental impacts. The SEA's broader lens has a certain level of abstraction regarding the details of the EIA's projects. Nevertheless, it can ensure the accuracy, particularly with respect to the cumulative effects on the surrounding communities and environment caused by the group of dams together in the Iron Quadrangle. Dealing with the above-mentioned aspects as a whole and beyond the individual project level allows for coherency and uniformity in the decision-making (Alshuwaikhat 2005). Conversely, it is unlikely that the SEA will solve some of the major problems of the EIA in Brazil, for instance, the shortage of qualified professionals and the failures in the monitoring. Similarly, although not tied to the licensing, the SEA can still be subject to economic and political pressures from sectorial groups affected by the PPPs.

Moreover, the integrative approach of the SEA can facilitate the coordination of institutions, policies and standards that have their own agendas and priorities and act in a fragmented way. The governance of the Iron Quadrangle is a complex process, spanning a network of entities comprising mining, environmental and societal interests. These entities operate in different scales at the municipal, state, national and international levels. The SEA can contribute to integrating all these standpoints into the decision-making of PPPs. It can also link the TDs' social and environmental impacts to the Sustainable Development Goals of 2030 United Nations Agenda for Sustainable Development and to the adaptation measures of the 2015 Paris Agreement on Climate Change. The SEA for iron ore is timely, since the new legislation and policy on dam safety have just came into force as a reaction to the disasters. The SEA will deal with several new standards of safety, which are designed to be more rigorous and it can identify how the different sources of rules and standards work together. Such sources range from the Minas Gerais State, the federal level and the ANM to the ICMM with its recent international guidelines. It can be a test to apply this mosaic of standards to the strategies, providing tailor-made solutions and clarifying inconsistencies and gaps, and baseline studies, particularly the new features in Law 14,066/2020 related to the PAE and the ZAS.

Most importantly, as discussed in the case of the EIA, the SEA will be an opportunity to incorporate the disaster risk reduction framework into the strategies of PPPs, affecting the developmental objectives of the government and the mining sector in the region. It has become evident that the existence of TDs in the region implies the risks of disasters that are preventable, and

this is the most challenging circumstance to which the SEA should be applied. Typically, the SEA can deal with common technological solutions for disaster reduction mechanisms in Minas Gerais, for instance, by enabling information systems for effective early warning to minimise losses of lives and emergency response for assistance and recovery (Organisation for Economic Cooperation and Development 2010).

In the context of the TDs, the integration of the SEA and the DRR framework will require adopting the latest devices for monitoring dams' risks. In the Brumadinho case, Vale used ground-based devices, and it alleged that it was not possible to detect precursors to failures in the dam since the tailings' movements were too small and slow (Robertson *et al*. 2019). However, the latest research indicates that satellite radar monitoring effectively detects the tailings deformations, such as those in the Brumadinho case, within a week of it happening (see section 22.2. above). Researchers are developing this satellite monitoring software for the mining industry to be used alongside on-the-ground sensors (Grebby *et al*. 2021). The SEA is an opportunity to implement changes in the monitoring technology that can forecast disasters in a reliable way. Anticipated disaster detection, mapping and predicting the imminent risk of dams' failure, increases the chances of success in the subsequent phases in disaster risk reduction. Well-timed communication, warning information and evacuation of the population will ultimately impact on saving lives.

22.6 Conclusion and policy implications

The main lesson learned from the disasters of Mariana and Brumadinho in the Iron Quadrangle is that the risks of TDs' failures were predicted and they could have been prevented. In addition, there are ways to ensure they will not happen again, or at least not in the same catastrophic dimensions. The two pillars of the SEA for Iron Ore are public participation and prevention/disaster risk reduction, and they should be explicitly incorporated into the SEA.

The Iron Quadrangle is a development corridor that was planned many decades ago, for which a broader environmental strategy was never a priority. Despite the widespread use of the EIA as a condition for environmental licensing for individual projects, it has often neglected the public participation contributions in the decision-making and the public's understanding of the implications of living in a region populated by TDs. Furthermore, in the cases of Brumadinho and Mariana, the lack of an adequate number of experts to oversee the dams effectively resulted in overreliance on the information given by the companies, although a more active role of the public authorities in the disaster reduction was desired. In this context, the state-of-the-art technological devices such as the satellite radar monitoring can be decisive in forecasting a dam's failure, triggering the disaster risk response that can save lives.

A combination of the EIA and the SEA in the Iron Quadrangle may not address the current issues in the EIA practice, namely the scarcity of resources for the implementation and political pressures that prioritize the economic development. However, the SEA will provide a comprehensive approach to support the government of Minas Gerais in implementing strategy focused on rigorous preventive measures to reduce the social and environmental impacts of the TDs, including disaster risks. This can improve the practice of the EIA, as the analysis of each new EIA and licensing will be supported by the overall strategy.

The Mariana and Brumadinho disasters caused so much destruction in the impacted communities and environment in Minas Gerais that reparation and restoration will

probably never be made. They also created distrust among the local population in the government and companies. For this reason, the SEA for iron ore must be centred in the local communities, and their risks, concerns, vulnerabilities, health and relationship with the environment. It is expected that, with a collaborative effort over time, the population's perceptions of the large-scale development projects in the region can be improved.

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Lessons Learned

23

Lessons learned from a corridor focused research and capacity-building programme

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23.1 Introduction

The urgent need to improve impact assessments to safeguard the environmental and social well-being of human development along corridors has been considered in 23 case studies in this publication. The next chapter, Chapter 24, provides key recommendations and principles that the authors of this publication have identified as key principles for corridor planning, design, implementation and management.

In this chapter, experiences and lessons learned during the establishment and management of the Development Corridors Partnership[185] hereafter 'DCP', are shared. This complements the practical nature of

185 Development Corridors Partnership (DCP). 2021. Available at: https://developmentcorridors.org.

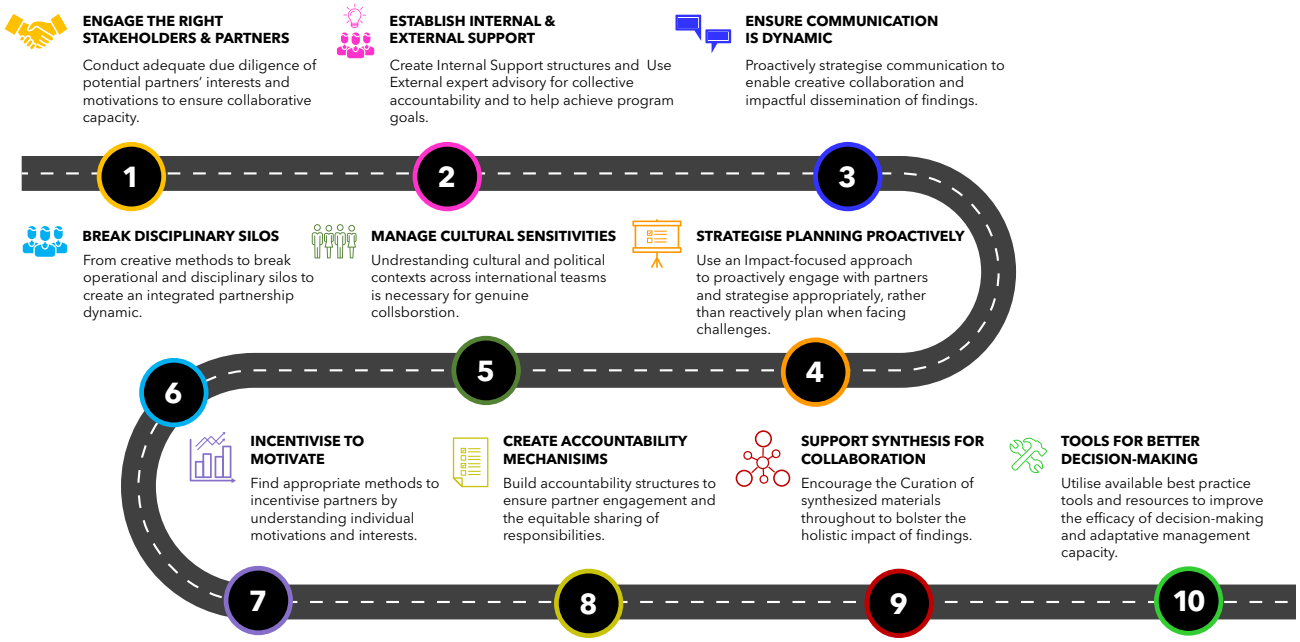
this publication through relaying the challenges and experiences of carrying out research and capacity-building within a diverse team to ultimately improve decision-making in corridors.

In many cases, the project management tools used in the development of the DCP broadly echo the fundamental needs of corridor planning and management. These include visioning (long-term capacity-building and collaboration), integrated planning and interdisciplinary collaborations (spanning biophysical and socioeconomic disciplines), impact tracking (internal and external impact monitoring), evidence basis (robust scientific evidence), ethics (internal and external ethical considerations), local leadership (local partners and delivery teams) and outcomes orientation (impact-focused systems). These tools will help practitioners to develop the approaches necessary for more sustainable practices in development corridors, as well as programmes of advice and support.

The lessons learnt by the DCP, shown in Fig. 23.1, provide unique insights into managing a pioneering multidisciplinary partnership, which traversed the learning curve of moving to a largely remote operation during the COVID-19 pandemic. The main lessons to improve the DCP's management centre around the needs for proactive, rather than reactive planning, and better internal and external communication to ensure improved collaboration and outcomes. These lessons were found to be essential for effective project management, and they reflect the fundamental barriers found in impact assessment processes.

23.2 Lessons learned

Figure 23.2 Summary roadmap of nine key lessons learnt by the Development Corridors Partnership These lessons are based on collective experiences from across partners in Kenya, Tanzania, China and the UK, working to improve development corridor decision-making and have broad applicability to all international partnership processes.



Why are lessons learned from the Development Corridors Partnership useful?

The DCP has been a UN Environment Programme World Conservation Monitoring Centre-led research and development programme, awarded approximately £4.2 million by the Global Challenges Research Fund, running from 2017-2021. The project adopted a research and capacity-building approach with national partners in Kenya, Tanzania, China and the UK, focusing efforts on building capacity among the DCP's own researchers and, importantly, extending this to communities affected by corridors and corridor decision-making stakeholders.

The programme considered how corridors in Kenya and Tanzania in the past, present and future have or could be designed and implemented to deliver more sustainable, inclusive, and resilient economic growth. This approach provided a new platform to increase knowledge-sharing and collaboration for sustainable development. By conducting semi-structured interviews with members from each of the global DCP teams, the introspective lessons learned from both individual and collective experiences have been synthesised here. Now, these lessons learned can be applied to corridors universally, as they extend beyond the confines of specific corridor projects and are applicable broadly to other international partnerships.

Guided by recommendations contained in an earlier scoping report and business plan prepared by Adam Smith International (2015) and funded by the UK Department for International Development, the DCP was formed in 2017, building on previous long-standing relationships between institutions in the UK, Kenya, Tanzania and China. Varied expertise and disciplinary backgrounds were brought together by the coordinating partner, UNEP-WCMC, to work in collaboration to understand the linkages between the biophysical, economic and social impacts of development corridors. Importantly, the DCP worked to build capacity and achieve impact using direct ties to diverse stakeholders in both host and investment countries. However, as a progressive multidisciplinary international group dedicated to creating practical impact, successes and shortcomings were part of the process.

23.2.1 Lesson one: engage the right stakeholders and partners

Choosing organizations or individuals (i.e. partners) to form a partnership is a misleadingly simple concept that can cause long-term issues if not carefully undertaken. The array of available partners, and those incorporated in the DCP, provided key lessons regarding the alignment of individual interests with collective goals. The overarching lesson that emerged was the importance of ensuring that partners are brought together after iterative discussions of feasibility, appropriateness and willingness to engage with collective goals. Personal and institutional ambitions and agendas may interfere with partnership goals. Therefore, establishing a clear understanding of role responsibilities across a partnership from the beginning will significantly contribute to collective success.

Due diligence in the corridor context specifically requires understanding of key stakeholders' and potential partners' interests, motivations and capacities to hone priority partnerships. As collaborative working creates challenges and risks, these must be thoroughly addressed during the partner selection stage to ensure that partners are chosen and paired appropriately to complement one another. Due diligence must involve the dedication of time and resources for risk assessments and participatory scenario analyses to be conducted to estimate the effects of different partner involvement on long-term project impact. Equally critical in this process is to ensure that objectives and expectations are clear from the beginning, not only regarding results, but also the process for achieving those results. Partners' interests, motivations, capacities and risks should be assessed against these objectives and expectations. The leading partner and management team should ensure that each partner has shared commitments and

motivations to feasibly contribute to mutually agreed upon objectives.

The DCP achieved great collaboration across partners, despite the challenges faced in working across disciplines, cultures, norms and countries. By maintaining regular in-person collaboration (see Fig. 23.2) prior to the COVID-19 pandemic, trust, understanding, and respect between project partners was established. However, despite good rapport between partners existing, this did not necessarily facilitate easy multidisciplinary collaboration when insular working within traditional disciplines such as political science or ecology, was the easier pathway or when distance hindered ease of communication.

"Unless commitment is made, there are only promises and hopes, but no plans"

– Peter F. Drucker, 2012

Managing the short- and long-term needs of partners is critical when working with different types of institutions. The DCP found that different perspectives, cultures of working and driving motivations, often led to individual differences and problems, often around the issue of time commitments and responsibilities. Therefore, the risks associated with different levels of commitment, even when motivations are aligned, must be accounted for early on to ensure partners' specific needs and strengths are supported. For example, postdoctoral researchers were the main research body of the DCP, and strengthening their skillsets were key foci of internal capacity-building activities. However, managing the constraints that such early-career researchers must abide by for career progression (producing reviewed scientific papers) challenged the feasibility of actioning different types of publications needed for other purposes (policy facing and practical guidelines). These restrictions are not always limiting factors if proactively addressed, but they are important to consider in projects constructed in this way.

The DCP encouraged the production of appropriate outputs to engage specific corridor decision makers across different contexts to try to suit the needs of diverse local stakeholders. Impact success is reliant on embedding local ownership by decision makers into outputs as early on as possible to help ensure their utility. Within the DCP, getting partners to participate in achieving impact through different means than what they are accustomed to in their daily work requires clear expectations to be laid out from the beginning. Therefore, ensuring the correct partners are brought together from the start will ease the achievement of intended objectives and will help to facilitate the smooth operating of a partnership with fewer tensions.

For the DCP, the realities of institutional and individual requirements and practical difficulties in working across disciplines and countries was found to need greater provision of support than originally anticipated. In retrospect, the planning of feasible collaborations could have been more rigorously designed. For example, while a Theory of Change (ToC) was collaboratively developed at the project onset, it was not reported against until reintroduction in 2020, leading to challenges in gaining partner input and interest in the broader DCP impact measurement process. Similarly, to impact assessment processes, thorough planning often falls short due to the political desire to start implementing action hastily. This results in reactive, rather than proactive measures.

To improve future partnerships, an impact-focused system should be adopted into strategic planning from the beginning to highlight how the linkages across a partnership will shape outcomes. Additionally, using a project charter to set out an agreed-upon amicable working style across a partnership could help to manage partner expectations. Establishing a clear division of labour within a collaborative framework that takes different cultural and institutional working styles into consideration will help to achieve cohesiveness across a diverse partnership.

Figure 23.2 Photograph featuring members of the Development Corridors Partnership from China, Kenya, UK and Tanzania teams in 2019 in Heilongjiang Province, Northeast China

Source: Neil D. Burgess/UNEP-WCMC.

23.2.2 Lesson two: establish internal and external support teams

Over the course of the DCP, different internal and external support teams were established to help guide the programme to build capacity and achieve impact. By extending the DCP's management support mechanisms beyond the UNEP-WCMC management team, internal and external support teams provided different scales of support for the DCP's researchers, non-governmental organization (NGO) staff and on a broad collective level.

Firstly, an internal executive committee was established as an additional platform for each member of the DCP to interact and communicate. The committee was made up of the lead management team and partner leads, who met monthly to discuss progress, challenges and opportunities. Committee meetings provided a time to address and resolve issues incurred by all partners internally and externally, and acted as a space for open communication and consensus-building. The committee proved to be the most helpful collaborative tool for the DCP and helped to harmonize the multidisciplinary research with capacity-building activities for stakeholder impact. It also helped to highlight individual partners' skill-sets, problems and opportunities, while also providing a space for each partner's voice to be heard equitably. Securing this method to systematically learn from each other, particularly during in-person events and workshops helped to secure trust and communication. The DCP regards the use of this committee as one of the driving forces behind its collaborative success. Therefore, the DCP strongly recommends future management teams of international programmes to establish an executive committee to enable the voices of all partners to be heard collectively, track accountability and maintain transparency.

Secondly, an internal 'research hub' was established for all researchers to participate in, to share research ideas, progress, challenges and opportunities. This hub was primarily for researchers, however, due to issues with online attendance, it was opened to the whole DCP. The hub was a useful tool, especially in the early stages of the project, to understand different research trajectories across the multidisciplinary discourse. However, greater incentives to participate and provide

input could have encouraged greater collaboration and synthesis materials. The hub was dynamic to the desires of researchers and provided a platform for some external presentations and ideas to be shared, yet time and resource constraints limited the productivity of the hub in the long term. Greater emphasis could be placed on data-sharing within these researcher-to-researcher teams in the future to help progress collaboration and transparency across multinational teams. Additionally, more consistent emphasis on synthesis could aid future partnerships' final outcomes through more collaborative efforts (further details in lesson nine).

The DCP also used an international independent advisory board (IAB) to broaden the disciplinary engagement and depth of expert guidance into the delivery of the programme. The IAB was made up of leading figures from different international organizations across the public and private sectors.[186] The diverse expertise found within the IAB enabled their experiences to be shared in the most effective ways to engage with decision makers. However, learning the best way to benefit from the experience and expertise of the IAB for the DCP took time as there was no direct contact between the project team and IAB members, and each had to understand the other in terms of where value could be added. A working style was, however, agreed and the inputs of IAB experts became more and more valuable as the programme progressed. By the final year, the IAB members worked with the project team on synthetic outputs, political interventions, fundraising ideas and ways to deliver the maximum legacy and impact for the programme. This external advisory body created additional 'outside-in' leadership, which helped to drive excellence in communicating procedural choices across the partnership. Additionally, the IAB provided more external accountability to the DCP's funders (Global Challenges Research Fund) through an annual independent report. However, going forward, the communication to different project partners about the external advisory recommendations should be more accessible to help facilitate wider discussion and integration of advised practices. A key lesson is therefore to invest the time to empower external advisors and find ways for them to assist the delivery of the programme and its goals.

Through expert critique, some organizations across the DCP also found national-level advisory boards to help internal committees directly link with stakeholders. Therefore, future programmes should invest in internal and external mechanisms to ensure each partner's specific contextual management and advisory needs are met and should be regularly monitored to ensure time and resources are effectively used. Moreover, using experienced external facilitators practiced in working across sectors or disciplines, can greatly aid the running of complex multidisciplinary partnership.

23.2.3 Lesson three: ensure communication is dynamic

Dynamic communication is crucial for all successful processes within a partnership. Effective communication was iteratively purported across the DCP as the fundamental reason for the project's successes and shortcomings. The resources and support provided to appropriately facilitate communication, especially during remote collaboration, was vital to work together to build capacity and impact. This required adaptive capabilities to employ new strategies and reform previous methods to effectively communicate throughout the course of the DCP. Time must be spent to understand the facets that limit effective communication to improve risk management. Management that dedicates resources to ensure that communication across each level of a partnership is secured and is regularly evaluated will contribute greatly to the wider cohesion of a partnership and impact success. Providing the means for communication to be dynamic without being reactive enables communications to

186 Development Corridors Partnership, International Independent Advisory Board details available here: https://developmentcorridors.org/advisory-board-2/

keep up with the ever-changing situations faced by corridor practitioners.

Internal communication mechanisms should not be underestimated in terms of the time allowances needed to implement them, the budget required to make them effective, or the ultimate value they can add to a partnership. Institutional leadership structures were key for the DCP's communication, as detailed in lesson two. When more time and resources were provided to communicate both internally and externally, dynamic capabilities expanded and appropriate communication mechanisms for the context-specific needs of different partners were created. For example, the COVID-19-induced shift to widespread adoption of virtual platforms facilitated higher participation rates in the DCP's internal activities, such as a virtual online conference, where all partners' research and activities could be interactively shared (Fig. 23.3). Deepening internet penetration into fast-urbanizing Africa enabled more widespread external communication and dissemination and allowed more diverse audiences to be reached than ever before, while removing the previous barriers created by the costs of international travel. The many online options available to corridor practitioners provide key communication tools needed for better integration of sectors, disciplines, areas (e.g. urban, peri-urban and rural areas) and nations for future collaborative partnerships. Unfortunately, communication outside the major African cities still suffered connection issues and there were also challenges caused by different time zones and online platform restrictions such as Google, Microsoft SharePoint, or WhatsApp, which hindered collaboration.

Communication with the communities on the ground, who could potentially suffer at the hands of development corridor implementation and poor planning, were kept at the forefront of the DCP's external communication strategy. Mechanisms that break the digital divide and allow dissemination of results to communities affected by corridor developments, require some innovative thinking, especially in a time of crisis, such as the COVID-19 pandemic, when the usual methods such as having a community meeting to disseminate and discuss findings is difficult to organize. As the DCP draws to a close, plans to use mass media, such as community radio and primetime news to highlight key findings are being coordinated. The choice of these channels is based on a consultative process involving local partners and experts, and such communications efforts need to be adopted in broader corridor advocacy, awareness-creation and public consultation processes.

A concept that resonates across the DCP is poignantly summarized in the difficult-to-source African proverb: "if you want to go fast, go alone; if you want to go far; go together". This depicts the management approach that strives to enable the best of both situations. However, the practicalities of international partnerships dictate that working together can take more time and more effort. The DCP exemplifies how a partnership as a whole is greater than the sum of its parts. Therefore, it is imperative that management resources are adequately aligned to streamline communication processes, while taking into consideration the lessons learned, which are presented here, to enable the process of going far together to be as seamless as possible.

Figure 23.3 Screenshot of a meeting during the Development Corridors Partnership Internal Mid-Term Conference in September 2020 with partners from the UK, China, Kenya and Tanzania

23.2.4 Lesson four: strategize planning proactively

Proactive target setting can shape the feasibility of ambitious long-term project impacts. The embedding of a ToC helped the DCP to think critically about how to attain project impact while remaining flexible to changing processes. This was supported by underlying management mechanisms used to measure the incremental impact of partners' work. Coordinating the planning of targets with the monitoring of the actions taken to achieve them helped to maintain accountability and momentum for the DCP. Tracking impact progress helped to improve the DCP in a dynamic manner, as risks could be flagged, and the management of different partners' needs could be adhered to with better understanding of the situation. Budgeting enough resources to adaptively help collaboration, particularly if in-person activities are not possible, as experienced by the DCP due to the COVID-19 pandemic, ultimately facilitates a more cohesive approach to attaining targets on route to delivering long-term impacts.

"Theory of change is a dynamic, critical thinking process, it makes the initiative clear and transparent - it underpins strategic planning."

– Dr Helene Clark, Act Knowledge (Vogel, 2012)

The DCP used a ToC to help to address non-complementary project outcomes from the beginning of the programme (Theory of Change 2019). A ToC identifies desired long-term impacts and then works back from these to identify all the conditions that must be in place for the impact to occur (Vogel 2012). The DCP's ToC contains high-level goals to produce research, build capacity and achieve impact, which required different mechanisms to achieve success. Therefore, incorporating a more granular approach, developed later in the programme through impact pathways, helped partners to visualize the interconnectedness between each of their individual activities and outputs, and those from across other work packages and country teams.

By establishing routes to the delivery of outcomes and impacts, operational silos were

broken, which helped unite the DCP. Using an impact-focused approach with collective input is not common in corridors, as partnerships tend to operate insularly, if they are established at all. Therefore, the DCP demonstrates how, within the corridor context, integration is possible. This contrasts with the common problem within corridor planning, for instance, of impact assessments being underutilized after completion and of research more generally. For the DCP, impact pathways[187] helped identify the different ways impact could be achieved. For instance, different output types were utilized, such as hosting workshops to engage different stakeholder groups. This focus on using impact systems thinking addresses a common flaw in Environmental Impact Assessments (EIAs) Processes where research is left underutilized and is not integrated into processes to improve corridor planning. Here, impact pathways formed the basis of identifying target and common stakeholders across the DCP for more strategic stakeholder analysis, and facilitating research-finding dissemination for effective impact.

One of the DCP's impact pathways focused on sustainable natural resource management, which aimed to inform "more sustainable natural resource management and resilience to climate change in corridors". To map this pathway, the DCP collaboratively discussed and analysed what outputs were required to primarily influence decision-making. Building the capacity of our partners to address = impact pathways was one of the most important aspects of the DCP project. The DCP was brought together to map impact activities, establish pathway-specific impact routes and elicit previously untapped knowledge of partners, which may not necessarily be captured in log frames or workplans (DCP 2020). During the remote working phase of the project (from March 2020 onwards), impact pathways enabled great collaboration, despite the challenge of travel restrictions.

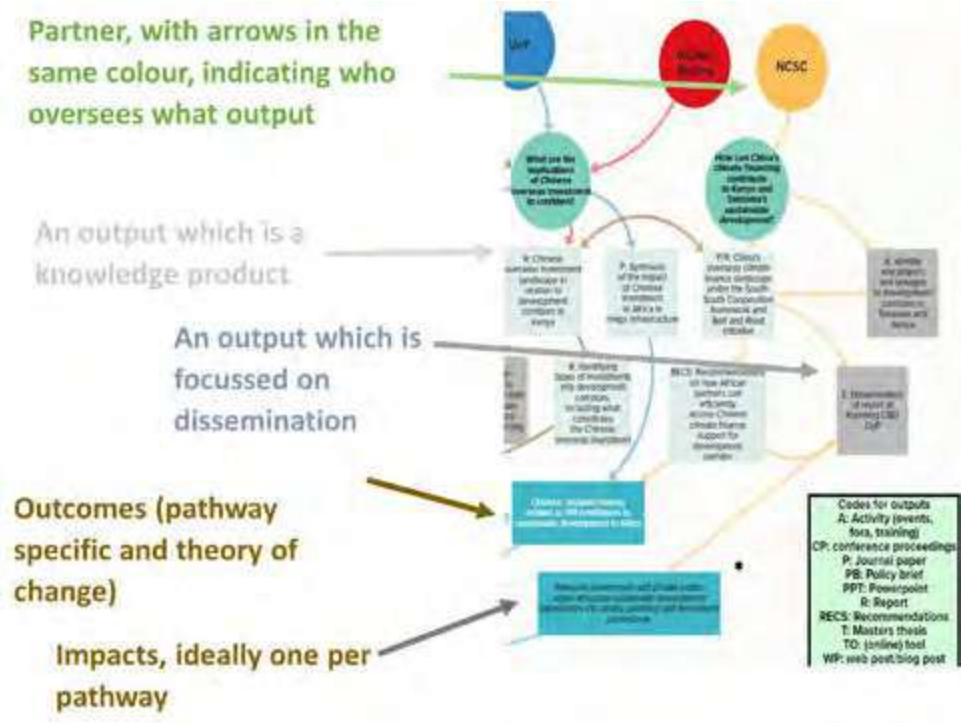
Within development corridors, planning exists through, amongst other things, EIAs and Strategic Environmental Assessments (SEAs). Yet, typically these have been incremental and sporadic and lack implementation capacity. In the DCP, systematic planning and implementation was addressed by using scoping and planning tools such as a ToC and impact pathways. These tools helped to map out how to create effective routes from research and capacity-building to the impact desired. In the same way, to create a sustainability vision for impact assessments in development corridors, EIAs attempt to secure the rigorous planning needed for project level implementation to be effectively carried out. Similarly, SEAs do this at a policy, programme and planning level, allowing wider stakeholder engagement and assessment of alternatives and trade-off analyses. If tools such as scenario planning are adopted and implementation improved, the future of development corridors could surpass the frequent dichotomous win-lose situation between the investor, and the people and nature on the ground, respectively. Development corridors could in fact be holistically beneficial if effective plans were shared and meaningfully contributed to by all corridor stakeholders, in the same manner that effective partnerships require collaboration at each stage, and considered planning with consistent partner contribution.

For the DCP, channelling individual partners' efforts into a collective process via mapping impact pathways improved the collective understanding of the feasible routes to achieve impact (Fig. 23.4). Impact pathways provided a means for partners to see the bigger picture of how their work related to the collective aims of the programme and helped to bridge disciplines and identify potential issues. The tool also helped make it explicit what parts of the programme could be achieved by internal partners and what were dependent upon outside interests for successful delivery. For future projects, using

187 Impact pathways for the Development Corridors Partnership were created on Kumu and are available online here: https://unep-wcmc.kumu.io/impact-pathways-for-the-development-corridors-project?token=PfjoEth1Ev5kKeZk

a ToC is highly recommended, as it allows for subjective analysis to be discussed and represented, through diagrams and visuals, which can in turn support more dynamic exchange between policy actors, and donors (Vogel 2012). As demonstrated through participatory scenario planning for corridors in Chapter 12 (Thorn *et al*. 2020), the DCP connected outputs to outcomes proactively, while contextualizing the present with an understanding of historical drivers of change. Therefore, the adoption of an impact-focused system should be implemented at the earliest stage possible of a project or programme, to help connect outputs to outcomes proactively, as is needed for corridors to plan appropriately.

Figure 23.4 A brief schematic flow of the Development Corridors Partnership's Theory of Change logic This diagram is originally from the DCP blog titled Early strategizing to achieve impact, available here: https://developmentcorridors.org/2020/08/19/early-strategizing-to-achieve-impact-using-kumu-across-a-multi-country-project/



23.2.5 Lesson five: manage cultural sensitivities

When working across cultures, miscommunications are a constant risk. However, the consequences of them can be minimized when addressed appropriately and proactively. The DCP managed many different political and cultural sensitivities, as well as diversity of perspectives and approaches to ensure the smooth running of the project. Working cross-culturally in the complex political arena of infrastructure projects requires great attention to context and pre-emptive risk assessment of potential issues. If sensitive issues are not appropriately managed, partnerships can derail, wasting time, money and the potential for positive impact. For future practitioners hoping to engage in international development corridor research, knowledge-sharing, and capacity-building, the DCP provides an experienced platform for further international cooperation and best practices to progress from. Moreover, to facilitate future international collaboration and the integration of disciplines, the DCP is in the process of establishing an accessible resource platform[188] to aid decision-making and research about

188 A resource hub will be available soon on the Development Corridors Partnership website:https://developmentcorridors.org/2020/08/19/early-strategizing-to-achieve-impact-using-kumu-across-a-multi-country-project/

development corridors.

The DCP has importantly learned that simply working in an international partnership does not equate to understanding different cultural working practices. The greatest cultural challenge for the DCP was rooted in different working styles, such as the differences embedded within hierarchal and egalitarian cultural structures across partner organizations. It is necessary to understand the ways in which organizational and cultural norms dictate working practices to account for them in a partnership setting to avoid mistakes, missed opportunities, frustrations and delays. In the future, thoroughly addressing the approaches of individual institutions and management teams, especially through open communication, would help to facilitate a more progressive blend of collaborative working.

For international research projects, lead management teams must maximize each partner's success through in-depth understanding of the cultural, historical and political context an organization is operating within. This could be achieved by using experienced cross-cultural facilitators throughout a partnership and ensuring the explicit understanding of responsibilities and roles from the onset of a partnership, as addressed in lesson one. Acknowledgement by management teams of the lack of cultural understanding between partners may also provide a realistic basis from which to increase understanding and collaboration. Planning in-person visits to partner organisations from early stages if an international partnership could facilitate more open dialogue and improve collaboration overall. If a partnership stems from an ethos of open-minded discussion of different approaches to outcomes, the result will aid the cohesion of partners going forward and significantly increases the potential achievable impact

"The more we can take ourselves out of one's usual environment and experience projects, initiatives, and talk to people on the ground, and do it together as a shared experience… it can have a massive impact."

– Jane Nelson, IFC Sustainability Exchange, 2019

23.2.6 Lesson six: break disciplinary silos

The original Adam Smith International Scoping Report (2015) highlighted the dearth of research into corridors (especially in Africa), carried out using cross-disciplinary methods. The DCP aimed to improve such insular working practices by working in a dedicated international multidisciplinary partnership.

One of the key factors limiting the full realisation of the social, environmental, economic, and cultural objectives of development corridors is the lack of integrated, multidisciplinary expertise guiding planning (Gannon 2021, in press). The opportunities to successfully address the challenges posed by development corridors are far greater when integration is well facilitated with the appropriate financial resources to encourage multidisciplinary or multisectoral collaboration. Therefore, the DCP's already built capacity and mechanisms to conduct multidisciplinary research and capacity building for the better planning and implementation of corridors can help to facilitate future integration and management of funding and resources needed to achieve impact.

Multidisciplinary working is necessary for progress within complex programmes such as development corridors. However, that does not make it easy to accomplish when different sectoral bodies attempt to collaborate (e.g. government ministries, academic research institutions, capacity-building and advocacy/campaigning-focused NGOs, United Nations-linked agencies (UNEP-WCMC), and government-linked think tanks). Within the DCP, the diverse disciplinary knowledge was the foundation to enabling multidisciplinary working. As mentioned in lesson two, the use of different regulatory bodies in addition to the lead management team, such as an internal executive committee and national and international advisory boards, can be greatly beneficial for project impact. They can provide the external perspective needed to guide a successful partnership through, encouraging a wider integration of knowledge and experience, thus limiting the insular

working across different scales of an international partnership's components.

Comprehensive mechanisms to integrate working practices between partners exist and must be utilized in new partnerships going forward. The success of the DCP confirms that seeking multidisciplinary practices, despite the challenges involved, helps to facilitate the necessary integration of planning approaches in development corridors from the ground up. Importantly, management teams should not underestimate the costs of being dynamic and flexible to the needs of a partnership for collaborative working. However, the benefits gained in the long-term through such integration certainly outweigh the costs of additional management needs, as the depth of impact is far greater than working within a sectoral silo. The challenge is simply necessary to undertake going forward if improved resilience, growth and sustainability are to be achieved in development corridors.

23.2.7 Lesson seven: incentivize to motivate

Motivation to improve development corridor sustainability can stem from many sources. However, the use of incentives within partnerships to encourage collaboration will help to achieve proactive results, as they help to maintain motivation and accountability. In addition to the necessary qualities to work in a productive partnership, such as willingness to actively listen and engage with others, providing incentives for e.g. data sharing or collaborative stakeholder analyses, helps to lessen the burden regularly felt by partners during collaborative working in comparison to when working insularly. The suitability of incentives greatly depends on a partner's motivations and interests. Therefore, managing the different needs of partners through strategized incentivization could help achieve desired outcomes. For example, encouraging the production of outputs may suit one partner, whereas another may be more greatly incentivized by potential employment opportunities, or capacity-building opportunities. Therefore, understanding the potential ways to support a diverse range of partners is critical for the effective management of international partnerships. Within corridor programmes, harmonizing different incentives to support collective outcomes is a challenge that is necessary to undertake as stakeholder needs do not commonly align across private and public sectors. Therefore, if adequate multistakeholder analysis is undertaken, appropriate incentives can then be proactively applied to promote sectoral integration.

The DCP management acknowledged that improved attention to incentives could have streamlined internal processes more effectively. Managing the incentives needed for partners to carry out different work plans should be addressed by management leads. A risk register was used by the DCP to assess and manage the risks associated with different elements of the project. However, an ongoing and regularly updated supplementary risk assessment of motivations and incentives could have helped to proactively foresee and minimize challenges. Projects can also benefit if flexible funding guidelines are able to be established early on. If there is some funding flexibility to shift budgets when unintentionally underfunded areas at the onset require more funding later, or to adjust budgets when unprecedented events occur such as the COVID-19 pandemic, management can be more receptive to partner's needs. The DCP recognized that greater depth of investigation into methods to manage individual motivations, such as joint ownership of outputs could have also reduced time wasted. Therefore, ensuring appropriate incentives are in place for partners, such as improved stakeholder engagement opportunities, is a proactive management practice that should be adopted. Subsequently, in the continuously evolving context of corridors, motivations and incentives must be regularly monitored and evaluated to progressively engage with partners to improve partnership dynamics to maximize objectives.

23.2.8 Lesson eight: create accountability mechanisms

In the complex multisectoral field of development corridors, curating an environment of integrated and adaptive management is paramount to success. The concept of adaptive management was deployed from the outset by the DCP, through academic institutions and non-profit organization partners being brought into all stages of project formation. Establishing effective accountability mechanisms was a key lesson for the DCP that should be integrated into adaptive management processes. It is key that tracking accountability is factored into all stages of international projects to closely monitor and ensure partner responsibilities are upheld.

To improve accountability, preliminary risk assessments were important tools used. However, greater application of risk assessments for individual partners and outputs could have identified potential shortcomings earlier on in processes, without wasting the capacity of partners later in the project's life cycle. Another accountability method used was the close monitoring of timelines and deadlines for different partners to complete outputs. For instance, this was essential during the running of capacity-building activities and the curation of follow-up materials, and the data collection, writing and dissemination for research articles. However, looking forward, earlier interventions to ensure partners were held accountable to deadlines initially could help projects to progress.

Joint ownership of outputs was thoroughly encouraged during the DCP and managed by the lead management team to help achieve desired impact. The DCP also fostered outputs with joint ownership with local stakeholders as early on as possible in an output's lifetime, to help ensure the correct needs were being met for maximized impact to be achieved. One of the DCP's objectives – to impact corridor decision-making – predominantly guided the collaborative approaches adopted. However, challenges such as different working styles and expectations were addressed by providing incentives to engage all necessary stakeholders for different research and capacity-building outputs.

23.2.9 Lesson nine: support synthesis for collaboration

In a project where individual outputs of partners are designed to fit within a collective framework to build capacity and achieve impact, it is important to form some outputs collaboratively. These outputs help to foster partnership unity and maximize expert input. Producing synthetic pieces of work, where responsibilities are relatively equitable, enables partners to deepen their relationships, as work efforts can be recognized more easily by each partner and a greater breadth of expertise can be incorporated. Achieving impact with synthetic products should rely on combined partner dedication. Therefore, if managed effectively, these outputs should illustrate a greater depth of knowledge than what an individual output could achieve. Aggregated knowledge products are necessary within the development corridor context to improve the integration of sectors and disciplines.

Many of the DCP's outputs exemplify the importance of collaboration for impact purposes. A prime example is this impact assessment publication, which illustrates a major collaborative achievement through the contribution of all the DCP's partners and 12 further external organizations. The diverse discourse within this publication demonstrates how truly ground-breaking work is possible when partners utilize each other's expertise in a collaborative manner.

South-south and north-south cooperation progressed collaborative working across the DCP's multinational teams, particularly through ongoing work on climate change adaptation in development corridors. A balance of collaborative outputs alongside individual research of institutions within a partnership helps to secure long-term relationships. It also enables new collaborative methods to come to light to address the complexities of development corridors through interdisciplinary and multidisciplinary efforts.

23.2.10 Lesson ten: tools for better decision-making

The DCP has learned the benefits and, in some cases the lack of utility, of tools created or used to enhance the programme's impact. The use of tools to inform decision-making throughout the DCP brought about effective management processes and better understanding of individual partners. Therefore, in the same way the DCP has benefited from using robust pre-established tools for better partnership management, similar tools as those described in this publication can be used by corridor stakeholders in planning, implementation and monitoring. This will rely on their ability to access, and capacity to use the resources available. Applying international best practice guidance can help translate linear infrastructure projects into sustainable development corridors.

An online data portal for managing spatial data was one of the tools set up by the DCP.[189] It was built with the intention of using it to store and visualize the available key spatial data collected to expand the external usability of the spatial data and analyses. This was achieved, as demonstrated in Fig. 23.4, which depicts the portal hosting the newly established African Development Corridors Database (Thorn *et al*. 2020). However, the portal proved difficult to gain traction for the researchers involved with individual projects and analyses and was underutilized overall. It was important to understand the value of the tool for different stakeholders internally and externally. Additionally, it is an online portal example of how partnerships can utilize or build tools under an adaptive management strategy and listen to their partners and stakeholders to proactively maximize impact.

Figure 23.5 Example of the Development Corridors Database for Africa: a tool for impact assessment, presented at the Development Corridors Partnership Internal Mid-Term Conference, September 2020 and published in Nature Scientific data in 2022.

Source: Thorn et al. 2022.

As mentioned above, a spatial database of reported development corridors in Africa (African Development Corridors Database [Fig. 23.5]) was created during the DCP project and published in 2022 (Thorn et al. 2022). It is an open access resources and it represents the world's most comprehensive snapshot of the corridor situation across Africa in 2021.

189 The Development Corridors Partnership data portal is currently available here: https://dcp-unep-wcmc.opendata.arcgis.com/

It provides a platform for sharing data on development corridors, undertaking a series of further key analyses, and showcasing how development corridors might have positive and negative impacts across the whole continent if not well managed. The scope of analyses possible through this tool highlights the utility of it well beyond the DCP's lifespan.

An update of a tool to measure the capacity of people and institutions, the Capacity Development Assessment Tool[190], has also allowed a quantitative measurement of the capacity of the DCP's internal teams at the start of the project and will be repeated at the end in late 2021. This is not often achieved in capacity-building projects and the results of the analysis, and the tool itself, are a useful contribution to the work of similar initiatives in the future.

Finally, the work around EIA and SEA, and the synthesis of that work in a major output, has allowed the project to make generalized assessments of the steps in corridor planning and the places where these typically go wrong. This generic learning is currently being packaged into a resources portal to increase the accessibility of the robust scientific findings of the DCP with decision makers on the ground. This platform will be the central channel to access and utilize the findings of the DCP, and will be shared throughout the course of 2021 on the Development Corridors Partnership website[191].

23.3 Conclusion

Corridor practitioners are now tasked to utilize the DCP's insights to improve the future management practices guiding projects and partnerships going forward. By paying close attention to the concepts raised here, the learning curves and experiences of the DCP present the opportunity to grow and improve the fundamental routes to streamlining communication and partnership collaboration for increased positive impact.

The key concepts touched upon here largely draw on methods to support the integration of scientific practices and partnerships for the future improvement of corridor resilience and sustainability in planning processes, which will require progressive integration across sectors. Therefore, the DCP encourages the assimilation of these lessons learned into future working practices for the practical improvement of managing linear infrastructure and development corridor-focused programmes.

Impact assessment practitioners face the difficult reality of managing sensitive socioeconomic and environmental contexts. Similarly, the wider context of development corridor practitioners, from contractors and designers to government officials and researchers all face these overlapping challenges. Therefore, the DCP members should be used not only as ongoing resources capable of expert scientific guidance, but also to guide the formation and management of future partnerships working towards improving the resilience, growth and sustainability of development corridors.

The DCP aims to surpass the typical minimal self-evaluation norms of project management tickbox exercises, through providing real-world lessons learned from our collective lens from across Kenya, Tanzania, China and the UK. By providing management-specific insights for future practitioners such as NGOs, research institutions, the private sector or government agencies, we hope to increase future project successes. The importance of creating context-specific partnership infrastructure to support collaboration and communication are paramount to success. Learning opportunities should not be taken for granted when working within the challenging arena of improving the sustainability of development corridors.

We invite all future corridor practitioners to implement the lessons learned, presented here by the DCP, to lead the way forward to improve management practices within development corridors.

190 Further information available at: https://www.unep-wcmc.org/resources-and-data/unep-wcmc-capacity-development-assessment-tool-cdat

191 developmentcorridors.org.

Acknowledgements

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24

Principles for development corridor planning

This publication has highlighted many of the principles necessary to guide corridor plans and investments in ways that will ensure more economically, socially and ecologically sustainable corridor investments. In this publication, over 50 authors have reviewed a diverse number of developments and assessed the effectiveness of the planning and management procedures and tools applied to them. Detailed issue-specific or subject-specific recommendations have been made within each chapter. However, based on the authors' practical experiences and insights, 10 general recommendations are highlighted below and represent the consensus on some of the most fundamental requirements for better quality corridor planning and management.

1. **Seeking to do Good. 'Green' Development Outcomes:** The mindset underwriting environmental planning of most infrastructure developments has been to mitigate negative impacts. Important as that is, seeking out opportunities to 'do good' has rarely involved more than the core objective of an infrastructure project. The planning of few existing corridors is based on their role in supporting a sustainability vision for a country or region in which they are situated. Corridors, and the infrastructure components within them, are often technically ambitious and sometimes politically prestigious, but they are not often explicitly developed to support sustainability values and principles. There are missed opportunities to use corridors as platforms to bring about 'greener' economies and technologies. A sustainability vision would include exploiting the opportunities presented by corridor investments to promote environmentally benign technologies, and ensure more equitable and inclusive benefits. In addition to mitigating negative impacts on livelihoods, ecosystems and biodiversity. The goals should include at least 'no net loss' and preferably 'net gain' to prevailing human welfare, livelihoods, environmental quality, ecosystem functioning and biodiversity.

    - Corridor developments must be based on sustainability principles and support progress towards national, regional and international sustainable development goals. A true development corridor will seek to do good, as well as to mitigate negative impacts.

2. **Integrated and Inter-disciplinary Approaches:** Corridor developments are extensive, complex, multifaceted features traversing many landscapes. They can bring about significant transformational change to physical, economic, social and cultural systems, and serve as interconnecting features. They need diverse expertise and experience in their planning and management, including local stakeholder knowledge. Yet engagement in corridor planning is often constrained by limited disciplinary and institutional involvement. Projects are superimposed upon communities. Planning often takes place in disciplinary, institutional or sectoral silos, resulting in policy conflicts, contradictions and inconsistencies.

    - Corridor developments must be based on integrated, interdisciplinary, multi-stakeholder and cross-sector dialogue and decision-making, blending specialist expertise and rigorous scientific evidence with those of non-specialist interested and affected people.

Image credits: Rob Marchant

3. **Consideration of Alternatives:** The justification for a specific corridor choice may be assumed and poorly communicated, and interpreted as in the 'national interest'. Corridors are planned with limited consideration of the full range of alternatives (or routes). Preferences are promoted by vested interests without adequate consultation or communication. The comparison of the potential benefits, costs and risks in each case is rarely made explicit. An important requirement in all corridor planning is to justify the need for a wide choice of options and an explanation of the potential benefits it will bring and to whom, in comparison with the alternatives. Any necessary trade-offs and how any significant potential negative impacts will be effectively managed and opportunities created must be explained.

    - Corridor options should not be limited to a preferred proposal. Corridor developments must consider all feasible alternatives (including maintenance of the status quo and no corridor development) and make the risks and opportunities of each option explicit.

4. **Public Participation** and Stakeholder Engagement. Corridor planning frequently fails to include meaningful participation of all stakeholders. Corridors can profoundly affect the lives and rights of people and communities, potentially for generations. A common failing is that the first opportunity for local stakeholders to engage arises only after all strategic decisions have already been made and the only option remaining is for them to react to a fait accompli. Corridor planning must be underwritten by meaningful, transparent decision-making processes and targeted to ensure inclusion of marginalized and disadvantaged members of communities throughout the planning, construction and operation of the corridor if conflicts and misunderstanding are to be avoided.

    - The meaningful engagement of all stakeholders is necessary to ensure their role is more than reactive. The way corridors are viewed by different stakeholders must be identified, understood and addressed. Corridor developments must ensure that all interested and affected people are provided with adequate information about a

proposal and have meaningful ways to engage in decision-making processes from the outset of strategic planning.

5. **Mainstreaming and Tiering.** Conceptual corridor planning is frequently dominated by technical and financial suitability criteria with environmental, social, cultural and human rights sensitivity issues being considered, at best, as externalities, retrospectively, once issues and problems arise. Strategic planning is important because it is when the full range of options is still open for discussion. It also established the parameters that will frame and implement a corridor plan or programme. Environmental and social considerations (and the interactions between them) should be considered early in strategic decision-making alongside (and to inform) technical, financial and economic considerations.

    - Corridor planning requires a tiered assessment process, ensuring that environmental and social issues are considered alongside financial and technical considerations from the start of strategic planning or programme development right though to project specifics.

6. **An Iterative Process.** Corridors exist in dynamic environments and need to be responsive to changing circumstances and priorities. New concerns and evidence will likely emerge as a corridor development progresses. Corridor planning frequently places undue emphasis on the production of a report (Environmental Impact Report) and its influence on the decision to proceed. The process may not be so linear in nature. It may involve many adjustments and decisions as new evidence emerges and predictions improve. A good-quality report and recommendations is necessary, but they are dependent upon a comprehensive process of ongoing dialogue and engagement with all stakeholders. Impact assessment is not an exact science and cannot always sufficiently answer all questions about potential consequences before they arise. Society's interests also change.

    Corridor planning and impact assessment must be an iterative process, adjusting as circumstances and available information changes. The process should identify, map and engage all interested and affected stakeholders from the earliest stage of corridor planning and throughout the planning and management of the corridor.

7. **Effective Use of Available Tools**. If they are used at all, many corridor impact assessments fail to match up to required international standards. The available procedures discussed in this publication (notably SEA and EIA) and their associated methods, tools and techniques should be used when appropriate to help ensure that a systematic process identifies all significant potential benefits and development outcomes of a preferred option and that they outweigh the costs and risks to affected people and their livelihoods and environments. The objectivity and quality of corridor decisions are dependent upon the effective use of the available tools.

    - Corridor planning and management should make systematic and adequate use of available impact assessment procedures, methods, techniques and tools to ensure good-quality decisions.

8. **Resilience and Adaptability.** While the basic principle that prevention is better, more efficient and cost-effective than retrospective or curative measures in addressing negative impacts, this option may not always still be available. Some situations may have progressed to an extent that negative impacts are unavoidable and retrospective measures and anticipative adaptations remain the only options. This may be because of bad decisions in the past (e.g. a corridor that created a barrier to wildlife movement, resulting in road hazards and kills) or because of externally imposed changes (such as climate change) will impact the efficacy of a corridor.

    - Prevention will always be better than cure in addressing the negative impacts of corridors, and this should be the priority. However,

some circumstances dictate an inevitability of negative impacts. Corridors, therefore, need to be designed to be made resilient to anticipated changes and adaptation measures may be necessary as 'coping' mechanisms or to offset unavoidable impacts. The suitability of measures will require ongoing monitoring and adaptation as needs arise.

9. **Impact, Influence and Implementation Capacity.** The decision to proceed with a corridor (and under what conditions) is ultimately the responsibility of decision makers, they are usually the representatives of all stakeholders' interests and custodians of their natural resources. A report must provide adequate information for them about the potential consequences of their decisions, to ensure sufficiently good-quality decisions. If they are to be impactful, any attempts to improve the performance of planning and associated assessment processes of corridors will have to tackle the ways in which outcomes are shaped by their political contexts and the institutional capacities available to be able to effectively implement the recommendations provided. Approaches to working on assessment processes should integrate political economy analyses and institutional capacity assessment from the outset and on an ongoing basis. The insights from these should inform the design and implementation of interventions intended to improve planning practice.

- Alongside generating ideas for best practice in impact assessment and identifying and filling various prevailing technical gaps, assessment processes need to actively identify and address power and incentive (mis) alignments in order to see best practice become actual practice. Impact assessment processes also need to incorporate attention to capacity deficits that may exist in the potential to implement rigorous corridor developments according to sustainability principles.

Image credits: Rob Marchant

10. **From Infrastructure to Development Corridors.** The prospects for linear infrastructure projects to evolve into comprehensive development corridors are often left to chance and spontaneity. Infrastructure projects are often developed in isolation and in an incremental way. For infrastructure projects to progress to become true development corridors the transition must be systematically sequenced into planning from the start. Assessments must include consideration of potential induced, secondary, synergistic, transboundary and cumulative impacts likely to result from the corridor development.

    - The progression from infrastructure to development corridors must be based on a systematic, comprehensive and integrated assessment of the potential positive environmental, social and economic opportunities and the rigorous avoidance or management of negative impacts.

In the final analysis, all investors and actors in corridors must adhere to these principles, as well as to the prevailing international environmental and social benchmark Performance Standards generally considered to be those of the multi-lateral financial institutions. The international financial community and the governments they support should demonstrate that they are unwilling to invest in socially negligent and environmentally irresponsible corridor projects. The authors recommend the principles summarized above to readers of this publication and request their support in their advocacy to corridor decision makers.

Image credits: Rob Marchant

Authors Profiles

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Asha Rajvanshi. Asha was until recently a Senior Professional Fellow at the Wildlife Institute of India after her retirement from the position of Scientists at WII. She has served over three decades as a teacher, trainer, researcher and impact assessment practioner. She has been at the forefront of research in the field of road ecology and eco-friendly design of linear infrastructure (road and rail) in India and she has contributed to the growth of environmentally responsible transport networks in India. She has been a leading advocate of better planning and assessment as requirement for responsible transportation infrastructure. She has co-authored the Best Practice Guide on Eco Friendly Measures to Mitigate Impacts of Linear Infrastructure on Wildlife (published by Wildlife Institute of India). She has made significant contributions to the development of EIA and SEA in India and Asia, both as an academic discipline and a decision support tool. She has also played a lead role in developing, testing and encouraging mainstreaming tools for biodiversity in impact assessment and in building capacity in the fields of EIA, SEA, CEA and other relevant areas of environmental assessment such as land use planning, transportation projects and restoration ecology. She has contributed to the development of several knowledge products and best practice manuals. She is a long-standing member of IAIA and served as the Chair of its Biodiversity Section. She has provided professional support to global EIA initiatives led by UNEP, the EU, the World Bank, IUCN, Wetland International, NCEA, CBD, GIZ, Global Biodiversity Information Facility, AsDB, IADB and the Environmental Protection Agency of Ghana. She is a co-author of the book Biodiversity in Environmental Assessment. She is based in Dehradun in northern India, where significant infrastructure corridors are being developed.

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Gediminas Lesutis. Gediminas is a human geographer interested in the politics of development in sub-Saharan Africa. In his research, he draws on critical theory, African studies and historical geographical materialism in narrating how the spaces created by international development processes in Africa shape the lives of vulnerable populations in profoundly contradictory ways. In his doctoral research, he explored the politics of spatial exclusion in relation to extractive industries and population resettlement schemes in rural Mozambique. Besides his own work, Gediminas has carried out policy-oriented research with FAO, UNOPS and DFID across the region of Southern Africa.

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Jaqui Pinto. Jaqui is a practicing notary and attorney at a leading international law firm in South Africa specializing in mining regulatory law. She holds a BA and LLB from Rhodes University, a Certificate in Mining and Prospecting Law (with Distinction) from the University of Witwatersrand and an LLM from the University of Witwatersrand. She is currently a candidate for an LLM in International Mineral Law and Policy at the Centre of Energy, Petroleum and Mineral Law & Policy, Dundee, Scotland.

Jessica Thorn. Jessica is a Namibian ecologist with a background in human geography, she is a Postdoctoral Research Associate at the University of York in the Department of Environment and Geography, Climate Research 4 Development and African Women in Climate Change Science Fellow at the African Climate and Development Initiative in the University of Cape Town. She uses probabilistic social-ecological modelling and scenario analysis to measure the impacts of Chinese foreign direct investment in transportation corridors on land use change, livelihoods, ecosystem services, and social coherence in East Africa. She is also leading a project predicting the synergies and trade-offs of ecological infrastructure in peri-urban areas. She is a currently a coordinating lead author for the Global Environmental Outlook 6 business brief and contributing author to the International Panel on Climate Change Africa and Mountain chapters. Jessica has been involved in various NSF, IDRC, ESRC, GCRF, NERC, NRF, DFID, CGAIR, IDRC, ESRC and USAID funded projects, conducting field research in Nepal, India, China, Vietnam, Tanzania, Namibia, Kenya, Ghana, South Africa, Switzerland and Peru Professional activities have been affiliated with the United Nations, government, NGOs, Climate Change Agriculture and Food Security, Centre for International Forestry Research, Kew Royal Botanical Gardens, Cambridge, Oxford, London School of Economics and Brown University. Jessica sits on advisory boards for five CBOs, is an elected member of the Global Environmental Facility, has advocated for ecosystem-based disaster risk reduction at the Global Platform for Disaster Risk Reduction and UNFCCC COP, is a contributing author to The Economic of Ecosystems and Biodiversity reports and has taught university courses. She completed her BSocSci(Hons) at UCT, MSc and DPhil at Oxford, and postdoctoral studies at Colorado State University and ETH Zurich.

John Banga Nakei. John studied at the Sokoine University of Agriculture in Morogoro Tanzania, completing his Bachelor Degree in Agriculture General and MA in Public Policy for Rural Development focusing on environmental and natural resource management at Yonsei University, South Korea. In his Masters studies, he focused on ecosystem management for threatened species in natural habitats of the southern and northern highlands of Tanzania due to expanding agricultural activities since the 1960s. He joined the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) as the environmental and social specialist in 2014 and became the Kilombero Cluster Manager in mid-2020. In 2014, John took the role of Secretary to the SAGCOT multi-stakeholder Green Reference Group (GRG). Linked to this, John is coordinating strategic public-private partners to promote Inclusive Green Growth guiding tools to ensure that investments under SAGCOT Partnership are socially responsible, economically inclusive and environmentally friendly.

John Harker. John chairs the Independent International Advisory Panel of the DCP. His career includes serving in diplomatic, academic and business circles. He is a leading international expert on labour relations, conflict resolution, human rights, health and safety, capacity-building and social responsibility. He has served as Executive Director of the Professional Association of Foreign Service Officers, representing Canada's diplomats and trade commissioners as well as Advisor to the Chair of the International Labour Organisation's (ILO's) Governing Body. He has advised on several pivotal historical developments, including the transition from Rhodesia to Zimbabwe in the 1980s and South Africa's emergence out of apartheid into democracy in the 1990s. In the latter case, he worked as a special advisor to President Nelson Mandela and the South Africa government on setting up a National Development Agency. Among many other high-level institutions, he has provided substantive advisory support to the United Nations Security Council, the Commonwealth Heads of Government and the Commonwealth Business Council (providing guidance to the latter on business responses to terror after the New York twin towers attacks). He has also been drafted in to help address issues such as health and safety at Heilongjiang Coal, PR China, peace building in Sierra Leone, the impact of civil war on extractives companies in Sudan, developing a human rights policy for a multinational company with coal mining interests in Colombia, and currently leads an International Independent Panel advising on the development of a controversial gold mine in Armenia. More recently, he has served as President of Cape Breton University, where, among other things, he created a Centre on Sustainability in Energy and the Environment, a campus in Cairo and an Office in Beijing, in partnership with China's National Development Research Council (NDRC). He has also been an Executive Committee Member of Canada's prestigious National Research Council, and served as Chair of the Council of Nova Scotia University Presidents. He has been based in Canada since 1970 and lives in Nova Scotia, Canada

Jonathan Hobbs. Jon advises the DCP and its Advisory Board. He specializes in environmental and social policy, Performance Standards, impact assessment and management. He has served as WWF International's policy lead on the extractives sector and for 10 years at the UK's (then) Department for International Development (DFID, London), initially as Head of Strategic Processes for Sustainability and then as a policy advisor on extractives and development. Earlier appointments have included Co-ordinator of UNEP's Cleaner Production Programme (Paris), Executive Director of two regional partners of the World Business Council for Sustainable Development's regional offices (Southern Africa and Europe), Corporate Strategy Advisor (Environment) at Eskom electricity utility (South Africa) and as a Land Use Planner in Botswana and Malawi. He is a past Chairman of the Inter-governmental Forum on Mining, Minerals, Metals and SD, the World Bank's Communities and Small-scale Mining (CASM) Network, the OECD's Environmental Professionals Network (Environet) and the OECD Task Team on SEA. He has served/serves on the Advisory Boards/Panel at the UNDP, World Economic Forum, EITI, NERC, the Responsible Jewellery Council and the Multilateral Financial Institution's 'Environment Working Group'. He also served on the Advisory Board for the Amulsar gold mine (Armenia), the EU's Experts Group on 'Social License to Operate', and was a member of the EU delegation to the Kimberley Process on Diamond Certification. He was a delegate to both the Earth Summit (UNCED-Rio de Janeiro, 1992) and World Summit on Sustainable Development (Johannesburg, 2002) He is an Honorary Associate at the University of Dundee's Center for Energy, Petroleum and Mineral Law and Policy, a long-standing IAIA member, a Fellow of the Royal Geographical Society,former member of the Standards Committee of IRMA and the ISO 14000 EMS Technical Committee. He is an alumni member of Aberdeen University, Nyenrode Business School's Sustainability Programme, and Prince of Wales's International Business Leaders' Forum.

Kate Gannon. Kate Gannon is a Research Fellow in the Sustainable Development team at the Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science. She has a background in human geography, and science and technology studies and pursues interdisciplinary and problem-focused research that explores the interactions and relationship between climate and society. Currently, Kate's research is particularly focused on social and institutional dimensions of climate change adaptation at multiple scales, including in sub-Saharan Africa and among private sector actors.

Kuo Li. Dr Kuo Li received his PhD from the Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences. His main interest lies in advancing China's climate change adaptation technology and developing China's climate change adaptation national adaptive planning. He is the editor of several publications in his field of interest, including the National Strategy Study on Technology Development of Adaptation to Climate Change (Beijing, China Science Press, 2017), Climate Risk and Resilience in China (Oxford, Routledge, 2016), and Projection on Future Climate Change in China–Constructing Hi-resolution SRES Climate Scenarios Using PRECIS (Beijing, China Science Press, 2015).

Langen Mathew. Langen is a GIS Specialist/Developer/Trainer with 20 years of experiences in GIS and Remote Sensing applications in natural resources, sustainable conservation and responsible utilizations. Before joining WWF-Tanzania 7 years ago, he worked with IRA-University of Dar es Salaam, Tanzania National Parks Authority and as a private consultant in GeoICT in Tanzania and Africa.

Leila Kazemi. Leila is a political economist and governance expert, providing research, analysis, policy advice and programme development support on issues pertaining to the governance of extractive industries, business and human rights, and human rights and development for a range of organizations including the World Bank, Ford Foundation, Social Science Research Council, Revenue Watch Institute/Natural Resource Governance Institute, Foundation for the United Nations Global Compact, Purpose, and the Carbon War Room. She received her Doctorate in Political Science in 2010 from Columbia University, where her research focused on the relationship between the governance of foreign investments and host state sovereignty. She is currently leading CCSI's Executive Session on the Politics of Extractive Industries, a multi-year project grappling with the ways in which power, interests, incentives and characteristics of political systems shape how extractive industry projects are developed, their ultimate outcomes, and the fate of governance interventions designed to improve these, with an eye to improving practice in this area.

Leo Murphy. Leo works within the Business and Biodiversity Programme at UNEP-WCMC. His current focus is on the identification, quantification and management of the private sector's impacts on biodiversity and the environment. His work includes mapping environmental sensitivity, providing site-level biodiversity indicators for companies and assessing the impacts of the financial institutions investing in the agriculture and mining sectors. Prior to joining UNEP-WCMC, Leo worked as an environmental consultant in Singapore, supporting both public and private sector developments. He holds a master's degree in Biodiversity and Conservation from the University of Leeds.

Leon Bennun. Leon is the Chief Scientist at the Biodiversity Consultancy. He has wide and varied experience in the practical application of biodiversity science to policy and management. He works across a broad spectrum of issues, but with particular focus on mitigation design and implementation, monitoring and metrics, priority-setting, strategic planning and policy development. Leon has been at the leading edge of many important technical developments, including the IUCN Red List index, the IUCN Key Biodiversity Areas standard and the Integrated Biodiversity Assessment Tool (IBAT). He has published extensively, including industry guidance on biodiversity management, more than 100 scientific books and papers, and numerous technical reports. He is an expert trainer and facilitator and has a strong track record in developing organizational capacity and national content, fostering effective partnerships and brokering agreement on contested issues. Leon has special interest and expertise in African avifauna and in migratory bird ecology and conservation.

Lisen Runsten. Lisen is the Project Manager of the DCP based in Cambridge/IIED, London UK. Previously she worked as a consultant for UNEP-WCMC based at the FAO in Rome, supporting interagency collaboration between FAO and UNEP on spatial planning and REDD+ safeguards. Previously at UNEP-WCMC, she led several projects to support UN-REDD countries' decision-making on spatial planning, REDD+ safeguards and multiple benefits aspects of forest management. She has also worked at FAO on, among other things, sourcebooks on climate-smart agriculture, in the REDD+ Partnership Secretariat, and on interactions between land tenure and climate change policy. Prior to this, she engaged in MSc studies at Stockholm Resilience Centre (Ecosystems, Governance and Globalization) and at Gothenburg University (Ecological Zoology) in Sweden.

Lucy Waruingi. Lucy is the Executive Director of African Conservation Centre in July of 2012. Lucy holds a BSc in Computer Science and statistics from University of Nairobi and an MSc in Geographic Information Systems from the Manchester University in the UK. Lucy has had long-standing interest in the management and interpretation of biological and environmental data for decision-making and informing initiatives that enhance local livelihoods in rich biodiversity areas. She is part of a regional effort in East Africa that is seeking to develop a framework for the mobilization of biodiversity information for the sustainable management of natural resources. Lucy is leading the efforts in Kenya for the Development Corridors Partnership, a project of UNEP-WCMC that is exploring the impact of linear infrastructure on biodiversity, local livelihoods and the policies and laws that would enable sustainable development in Africa. Lucy is the chair of the Conservation Alliance of Kenya and current chair and founder member of the Society for Conservation GIS, Kenya Chapter and a member of the Society for Conservation International Board of Directors.

Malcolm Starkey. Malcolm is the Chief Technical Officer at The Biodiversity Consultancy. He is a specialist in protected area management and conservation management planning, with experience in both biological and social sciences. Malcolm has over 15 years' experience of designing and implementing field-based conservation in Africa. He has worked at site, landscape and national scales, including managing complex landscape-scale conservation programmes integrating protected areas, extractive industries and community use. With TBC, Malcolm oversees the development and quality of the technical approaches applied by TBC's biodiversity and social specialists in support of companies, lenders and governments seeking best practice outcomes for biodiversity. His focus is on helping clients, ranging from small-scale to multi-billion-dollar investments, to identify and find pragmatic solutions to biodiversity challenges. He is leading development of TBC's approaches to help companies assess the biodiversity footprint and risks associated with their value chains.

Margaret G. Wachenfeld. Margaret is an international lawyer and policy adviser with more than 30 years' experience in human rights, responsible business conduct and the environment. She has had a wide-ranging career working on topics of international law and sustainable development and in particular on human rights and environmental law. She started her career as legal counsel to the Danish Institute for Human Rights, the Danish National Human Rights Institution. After practicing environmental law in a commercial firm for eight years, she joined the International Finance Corporation (IFC) Legal Department to work on environmental and social dimensions of project finance transactions, as legal counsel for IFC projects with the Global Environment Fund (GEF) and legal counsel for the first World Bank Group carbon trading facility. She later served as principal human rights advisor at the IFC for the development of the IFC Performance Standards and also advised the European Bank for Reconstruction and Development on their approach to human rights. Margaret was then senior policy advisor to UNICEF on child rights. She then moved on to a leading think tank working on business and human rights, the Institute for Human Rights and Business, which was chaired at the time by the former SRSG on Business and Human Rights (IHRB), Professor John Ruggie She currently holds several positions: Managing Director of Themis Research, Senior Research Fellow at the Institute for Human Rights and Business, Senior Adviser to the Myanmar Centre for Responsible Business, and Senior Adviser to the Centre for Responsible Business (Colombia). In addition, she serves on a number of advisory groups for United Nations agencies, the OECD, the European Parliament and several civil society organizations.

Maria-Augusta Paim. Maria-Augusta works on environmental law research on sustainable transitions within climate change strategies. She is currently an Assistant Professor in Environmental Law at the University of Nottingham and is affiliated with the Cambridge Centre for Environment, Energy and Natural Resource Governance (C-EENRG), at the University of Cambridge. Her previous positions include research and teaching at the University of Dundee (Centre for Energy, Petroleum and Mineral Law and Policy), the University of Cambridge (C-EENRG), and Loughborough University (Geography and Environment). She holds a PhD in international public law (University of São Paulo) and was awarded the British Council Chevening Scholarship during her master's studies. Her experience outside academia includes working as a dispute resolution lawyer (litigation and arbitration) for the energy sector.

Martin Dietrich Brauch. Martin conducts economic and legal research, training and advisory work at CCSI. He focuses on mining and energy investments in the context of sustainable development and the zero-carbon transition. His expertise also extends to investment law and policy, among other areas of international economic governance. He leads CCSI's cross-cutting work on climate investment policy. He has worked extensively with developing countries, speaking English, French, Portuguese and Spanish. Prior to joining CCSI, he worked as international law advisor at a global think tank, in-house counsel at a media conglomerate, and associate attorney at a boutique law firm. As a graduate student, he undertook a legal internship at United Nations Climate Change. He received a BA in Economics, a Bachelor of Laws and a specialization certificate in Environmental Law from the Federal University of Pelotas, Brazil. He holds an LLM in International Legal Studies from NYU School of Law, where he was an IILJ International Law Fellow.

Martine Maron. Martine is a Professor of Environmental Management at The University of Queensland, Australia. Her expertise is in conservation policy and ecology, with a background in landscape ecology. Her research builds understanding of how to promote biodiversity persistence in human-dominated landscapes, and improves management of trade-offs between development and conservation. She leads collaborative research efforts in partnership with government and non-government organizations to improve policy and the prospects for imperilled wildlife and ecosystems. Martine holds several roles including as Deputy Director of the Threatened Species Recovery Hub in Australia and leader of its policy research theme; lead of the IUCN Thematic Group on Impact Mitigation and Ecological Compensation; President of BirdLife Australia; and Governor of WWF-Australia. She has co-developed numerous national-level policy tools including the EPBC Act Offsets Assessment Guide, the Reef Trust offsets calculator, and New Zealand's biodiversity offsets accounting model, contributes to the Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services, and provides advice on framework development under the CBD and the UNCCD. Her current work focused on aligning ecological compensation with conservation targets.

Molly Brown. Molly was a Project Officer at UNEP-WCMC, working on the Development Corridors Partnership (DCP) during the writing of this publication. Her work focused on synthesising the DCP's scientific evidence base, capacity-building approaches and management practices to inform better decision-making within development corridors. Prior to joining UNEP-WCMC, Molly completed an MSc in Conservation Management of African Ecosystems at the University of Glasgow (2019-2020) and an MA(Hons) in Chinese Studies at the University of Edinburgh (2015-2019). In January 2022, Molly started her PhD at the University of York with the Leverhulme Centre for Anthropocene Biodiversity, where she is investigating the illegal ivory trade in China. By using interdisciplinary approaches across social marketing and biological fields, she hopes to improve the effectiveness of future demand reduction initiatives to ultimately reduce elephant poaching across Africa.

Neil Burgess. Neil heads the DCP programme as the 'Principal Investigator' supported by a team of staff. He is also the Chief Scientist at UNEP-WCMC in Cambridge, UK and honorary Professor of Conservation Science, University of Copenhagen, Denmark. His primary role as Chief Scientist is to develop the scientific work and profile of UNEP-WCMC with external partners interested in the conservation of nature, and the role that data and analysis plays in this. He also helps to publish leading scientific work at the science-policy interface, mentors staff in scientific delivery and ensures overall quality and scientific credibility of outputs. He is working on the interface between science/policy and practice. Partners include universities, NGOs, United Nations agencies and governments in Europe and Africa. His current research interests include protected areas and their effectiveness, social impacts and equity in conservation, wildlife trade analysis, biodiversity patterns and ecosystem service analysis and more. All work is targeted at practical problems and policy- and field-level solutions. Neil has been working in conservation science and practice for more than 20 years in the UK, Denmark and tropical Africa, especially eastern Africa. Much of his work has focused on habitat conservation in nature reserves in Europe and Africa through partnerships with non-governmental organizations, private foundations, state and community-based organizations. Through Neil's long-term involvement in practical, field-based conservation, he is well placed to develop conservation science that is aimed at international conservation policy targets, such as those agreed under the Convention on Biological Diversity, CITES and the UNFCCC, and the Sustainable Development Goals.

Nikki Phair. Nikki is a competent conservation scientist with a background in biodiversity and molecular ecology. She has seven years of research experience using cutting-edge molecular techniques alongside conventional methods to identify and monitor biodiversity. Her academic research has focused on biodiversity and resilience of marine and estuarine communities. Through her work at TBC she has a developed a thorough understanding of biodiversity risk assessment approaches and the application of the mitigation hierarchy to address development impacts, with a focus on renewable energy. Her academic background combined with her consultancy experience has given Nikki excellent data interpretation and report writing skills, tailored to both technical and non-technical audiences.

Nyumba T. Ochieng. Ochieng is a researcher for the Development Corridors Partnership (DCP) Project based at the African Conservation Centre (ACC) and Institute for Climate Change and Adaptation (ICCA), University of Nairobi. Tobias holds a PhD in Geography from the University of Cambridge, UK. Since 2005, Tobias has worked with research and conservation organizations in Kenya and abroad including CETRAD, the Space for Giants (K) Trust, the African Wildlife Foundation and the Ecosystem Services for Poverty Alleviation (ESPA) programme in the UK, leading science and applied research projects to promote biodiversity conservation, human development and livelihoods, and capacity-building. Tobias is currently an Associate Director for the Dakota Wesleyan University, USA in Nairobi, Associate at the University of Nairobi's Institute for Climate Change and Adaptation, a member of the of the IUCN's World Commission on Protected Areas (WCPA) and an Advisory Panel Member for the Conservation Evidence's Mammal Synopsys, University of Cambridge; Lead Author for IPBES Values Assessment. With training in political ecology, Tobias' interests revolve around the exploration of the interactions among conservation and development intervention, human well-being and poverty alleviation, particularly in sub-Saharan Africa.

Pantaleo K.T. Munishi. Pantaleo obtained a Diploma in Forestry from the Forestry Training Institute, Arusha, and a BSc. (Forestry) degree from Sokoine University of Agriculture. He was awarded a Master of Environmental Management (Natural Resource Ecology and Management) and Master of Forestry degrees (Forest Resources Assessment) by Duke University School of the Environment, North Carolina, USA in 1994. He obtained a PhD in Natural Resources Management majoring in Ecosystem Assessment, Eco-hydrology, Climate Change and Forestry from the College of Natural Resources, North Carolina State University, USA in 2001. Munishi is currently a Professor at the Department of Ecosystems and Conservation, College of Forestry, Wildlife and Tourism, Sokoine University of Agriculture, Morogoro, Tanzania. His research interests are on Ecosystem Management, Biodiversity and Climate. He has received more than 12 research grants, three study fellowships, and has been involved in more than 60 research and consultancy projects/assignments which focused on ecosystem management, biodiversity and climate change.

Perrine Toledano. Perrine heads Colombia University's Center's focus on extractive industries and sustainable development that she co-founded in 2010. She leads research, training and advisory projects on fiscal regimes, financial modelling, leveraging extractive industry investments in rail, port, telecommunications, water and energy infrastructure for broader development needs, local content, revenue management, contract transparency and optimal legal provisions for development benefits. To this traditional portfolio, she has recently added research and advisory work on the impact of the energy transition and the Sustainable Development Goals on extractive industry investments and resource rich countries. She has led projects in DRC, Liberia, Paraguay, Mozambique, Sierra Leone, Tanzania and Timor-Leste, and assisted many more government teams remotely. She is a research advisor at the The Jerusalem Institute for Policy Research, Milken Innovation Center. She also jointly developed curricula for a masters and an executive course on extractives and sustainable development taught at Columbia University. She is the co-editor of two volumes published by Columbia University. Prior to joining CCSI, she worked as a consultant for several non-profit organizations, including the World Bank, DFID and Revenue Watch Institute, and private sector companies, including Natixis Corporate Investment Bank and Ernst and Young. Her experience includes auditing, financial analysis, IT for capital markets, public policy evaluation and cross-border project management. She has a Masters in Business Administration from ESSEC in Paris, France, and a Masters of Public Administration from Columbia University.

Ragnvald Larsen. Ragnvald works at the Norwegian Environment Agency, the executive body of the Norwegian Ministry of the Environment. He holds a master's degree in Geography from the Norwegian University of Science and Technology. In his current position as a chief engineer within the Directorate he works with spatial analysis and the development of systems for environmental information data management. Larsen has been involved with international development cooperation projects in several African countries over the last 16 years.

Richard Katondo. Richard is a Community-based Wildlife Management Lead and Field Office Coordinator in the Ruvuma transboundary Landscape for World Wide Fund for Nature Tanzania Office since 2018 and January 2021, respectively. Before, Richard worked as the Project executant for Wildlife Programme for the past three years specializing in CBNRM and general management planning for WMAs in the Ruvuma landscape. Previously, he worked for the Government of Tanzania for seven years, serving as a technical resource person both at the District and Regional administration, facilitating stakeholders' sustainable utilization of natural resources, tourism, marketing and environmental conservation and protection. Richard has an MSc in Climate Change and Sustainable Development and a BSc in Wildlife Science and Conservation, both from the University of Dar es Salaam, Tanzania. In his master's studies, he focused on the role of ecosystem service in enhancing climate change resilience to Local communities, and he has contributed a chapter in the book know as climate change impact and sustainability ecosystem of Tanzania (CABI International 2020). Richard has provided technical support in implementing the Community-based Natural resource management (CBNRM) approach in wildlife management areas (WMA), participatory forest management (PFM) and conservation key and threatened wildlife species by coordinating partners and government agencies in the biodiversity conservation agenda in the Ruvuma landscape and country large. Also, he has been working diligently on climate change impacts adaptation, Human-wildlife conflict mitigation and Community's livelihood diversification.

Robert A. Marchant. Rob is a Professor of Tropical Ecology at the University of York, where he leads the York Institute for Tropical Ecosystems. His research investigates ecosystem dynamics in the moist forests, savannah-woodland spectrums and cropland mosaics across the tropics with a particular focus in Eastern and Southern Africa. Through applying a range of techniques, he aims to better understand the spatial and temporal dynamics of tropical ecosystems, their societal value and challenges to their conservation. As much of his research is focused in East Africa, he has developed close collaborations with the numerous University, NGO, United Nations and Governmental institutions that have resulted and in several joint projects, publications and continued professional and organizational development. He is a member of the Scientific Leadership Council (SLC) for the Mountain Research Initiative; a multidisciplinary scientific organization that addresses global change issues in mountain regions around the world. He sits on the World University Network (WUN) 'Global Africa Group' that combines expertise from across the WUN to enhance opportunity, build collaborations, innovations and impact to support Africa's development agenda. More widely he has contributed to the Intergovernmental Panel on Climate Change (IPCC) and The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) assessments from the African continent. Within the Development Corridor Partnership, he is leading the scenario work to assess the impact of Development corridors on ecosystems, people and livelihoods.

Roel Slootweg. Roel is co-owner of SevS human and natural environment consultants in The Netherlands, is an ecologist with PhD in environmental sciences. He supports governments, NGOs and companies in translating concepts of resilience and sustainability into day-to-day practice. Scientific evidence, public participation and transparency are constant qualities in his work. Roel is lead author of the CBD Voluntary Guidelines on Biodiversity in EIA and SEA, and has published extensively on the subject. In 2011, he received IAIA's lifetime achievement award. Presently he is involved in the implementation of the European Green Deal in EU's international cooperation programmes.

Sharon Brooks. Sharon is a Deputy Head of the Business and Biodiversity Programme at UNEP-WCMC. Sharon oversees a portfolio of work with a range of industry sectors, government institutions, and finance institutions around the world, providing technical support and strengthening the use of data and science for improved biodiversity management. Sharon has an MSc in Applied Ecology and Conservation, a PhD in the field of Conservation and Development, and a background of conducting field-based research and conservation projects.

Sophie Dicker. Sophie is a Policy Analyst at the Grantham Research Institute on Climate Change and the Environment, focused on climate change adaptation and resilience. She has a range of experience in the UK Parliament, including as Researcher to the Shadow Minister for Climate Justice and Green Jobs. Prior to Parliament, she held positions across advocacy, policy and research at Save the Children. As Research Manager in Humanitarian Affairs, she coordinated and authored research – including on urban responses to forced displacement and on the effectiveness of the humanitarian system. Sophie holds an MSc in Development Planning from University College London.

Swenja Surminski. Swenja is Deputy Director and Head of Adaptation Research at the Grantham Research Institute on Climate Change and the Environment, part of the London School of Economics and Political Science (LSE), overseeing social science research projects on climate adaptation, Loss and Damage of climate change, and disaster risk finance with a geographic scope ranging from the UK to developing countries. She is a contributing author to the IPCC and the EU Science for Disaster Risk Management Report, and lead author of the UK Climate Change Risk Assessment. Swenja works closely with industry and policymakers, and was appointed Visiting Academic at the Bank of England in 2015 to work on the regulator's first report on climate change (PDF). Prior to joining LSE in 2010, Swenja spent more than ten years in the insurance industry working on climate and risks management. Swenja was a Fulbright Scholar in the US, studying Ecological Economics and International Relations at the University of New Hampshire and received a PhD in Political Science from Hamburg University for her work on Climate Change and the Insurance Industry in 2002.

Sylvaine Rols. Sylvaine is a Programme Officer at UNEP-WCMC, overseeing the Centre's work under the Oil for Development programme. Her work focuses on strengthening the capacity of governmental institutions and private partners, especially from the energy and financial sectors, to access, interpret and apply biodiversity data for decision-making. Prior to joining UNEP-WCMC, Sylvaine worked as an environmental specialist with the European Investment Bank, appraising and monitoring environmental impacts of investment projects in Europe, Africa and Central America. Sylvaine graduated from University College London with an MSc in Environmental Biology.

Tanya Payne. Tanya leads and supports various projects at UNEP-WCMC as part of the Nature Economy team. She provides project management and monitoring, evaluation and learning (MEL) expertise for two impact and research-focused projects, the GCRF Development Corridors Partnership and the Trade, Development and the Environment Hub, aiming to improve the sustainability of global trade systems and development corridors. Prior to joining UNEP-WCMC, Tanya completed an MSc by Research at the University of Exeter, exploring the patterns and impacts of human-wildlife coexistence at Gola Rainforest National Park in Sierra Leone. Tanya also has a BSc Zoology degree.

Tegshbayar Darambazar. Tegshbayar is a lecturer at the University of Finance and Economy and a board member of the Legislation & Policy Research Hub NGO. Her research focuses on extractive industry accountability and transparency, especially beneficial ownership and disclosure systems. She holds an MA in Social Science and a BA in Law, and specialized in anti-money laundering and counte- financial crimes compliance. Previously, she worked in the private sector in Hong Kong and Mongolia and served as a public officer in the Mongolian government and cabinet.

Tehtena Mebratu-Tsegaye. Tehtana is a senior legal researcher for the Columbia Centre on Sustainable Investment. Her work with the Center focuses on sustainable investment in extractive industries, and land and agriculture. Prior to joining CCSI, she worked with Namati as a legal consultant on cases relating to large scale mining and agricultural projects. As an Aryeh Neier fellow with the Open Society Justice Initiative, she worked on anti-corruption research and litigation, and freedom of information projects. She trained as a lawyer at an international law firm, where she worked on finance, energy and infrastructure projects from the firm's London and Singapore offices. She received her law degree from the University of Oxford and her Master of Laws from Columbia Law School. She is admitted to practice law in England and Wales, and New York.

Viktor Rözer. Viktor works as a researcher at the Grantham Research Institute on Climate Change and the Environment at the London School of Economics. As part of the Zurich Flood Resilience Alliance, his work focuses on the quantification of flood impacts, adaptation and incentives to increase investments in pre-event flood resilience. Viktor holds a PhD in Geography and Disaster Risk Research from the University of Potsdam, as well as a master's degree in Hydrology from the Free University of Berlin. He has published widely on the topics of flood risk management, flood resilience and adaptation and has received several awards for his work including the Allianz Climate Risk Award. He previously worked and taught at different universities and research centres in Germany and the US, including the German Research Centre for Geosciences, Columbia University and Humboldt University.

Vinod B. Mathur. After serving for 33 years at the Wildlife Institute of India, including as the Dean (2005-2014) and subsequently as the Director (2014-2019), Vinod B. Mathur was appointed as the 11th Chairperson of India's National Biodiversity Authority (NBA) in 2019. The NBA is a statutory body of the Government of India, for providing advisory and regulatory services on all matters relating to biodiversity conservation and management. He joined the Indian Forest Service (IFS) and topped the 1983-1985 IFS Professional Course at the Indira Gandhi National Forest Academy (IGNFA), Dehradun, and also the XLV Foundational Course at Lal Bahadur Shastri National Academy of Administration (LBSNAA) in 1985. He obtained his doctorate degree from the University of Oxford, UK, 1991. He is the Regional Vice-Chair of the IUCN-World Commission on Protected Areas (WCPA-South Asia) and Member of the International Association of Impact Assessment (IAIA). He has now spent over three decades in actively contributing to a wide range of training, research and academic programmes in the field of biodiversity conservation. He has extensive experience as an international trainer and his special interest include natural resource conservation, heritage conservation, environmental and strategic impact assessment and biodiversity informatics. He has been actively contributing on research-policy interface issues and has been the Regional Vice-Chair (Asia-Pacific Region) of United Nations Intergovernmental Platform on Biodiversity and Ecosystem Services (UN-IPBES) multi-disciplinary Expert Panel (MEP) (2014-2018). He is currently the UN-IPBES Bureau Member (2019-2022) and also the UN–CBD Bureau Member (2019-2021). He is Co-chair of the IPBES Task Force on Policy Support Tools and Methodologies and Member of the IPBES Task Force on Capacity Building. He has also been the Chair of the UN-CBD Informal Advisory Group for developing synergies between seven biodiversity-related conventions. He has been part of the official Indian delegation for CBD and UNESCO World Heritage Committee Meetings since 2006 and has in-depth knowledge about the working of these conventions. He possesses an outstanding scholastic record coupled with strong leadership skills and networking capabilities. He has made significant contribution as a 'Scientific Administrator' and in promoting 'Scientific Research' inter alia through both publications and outreach programmes in the field of biodiversity conservation.

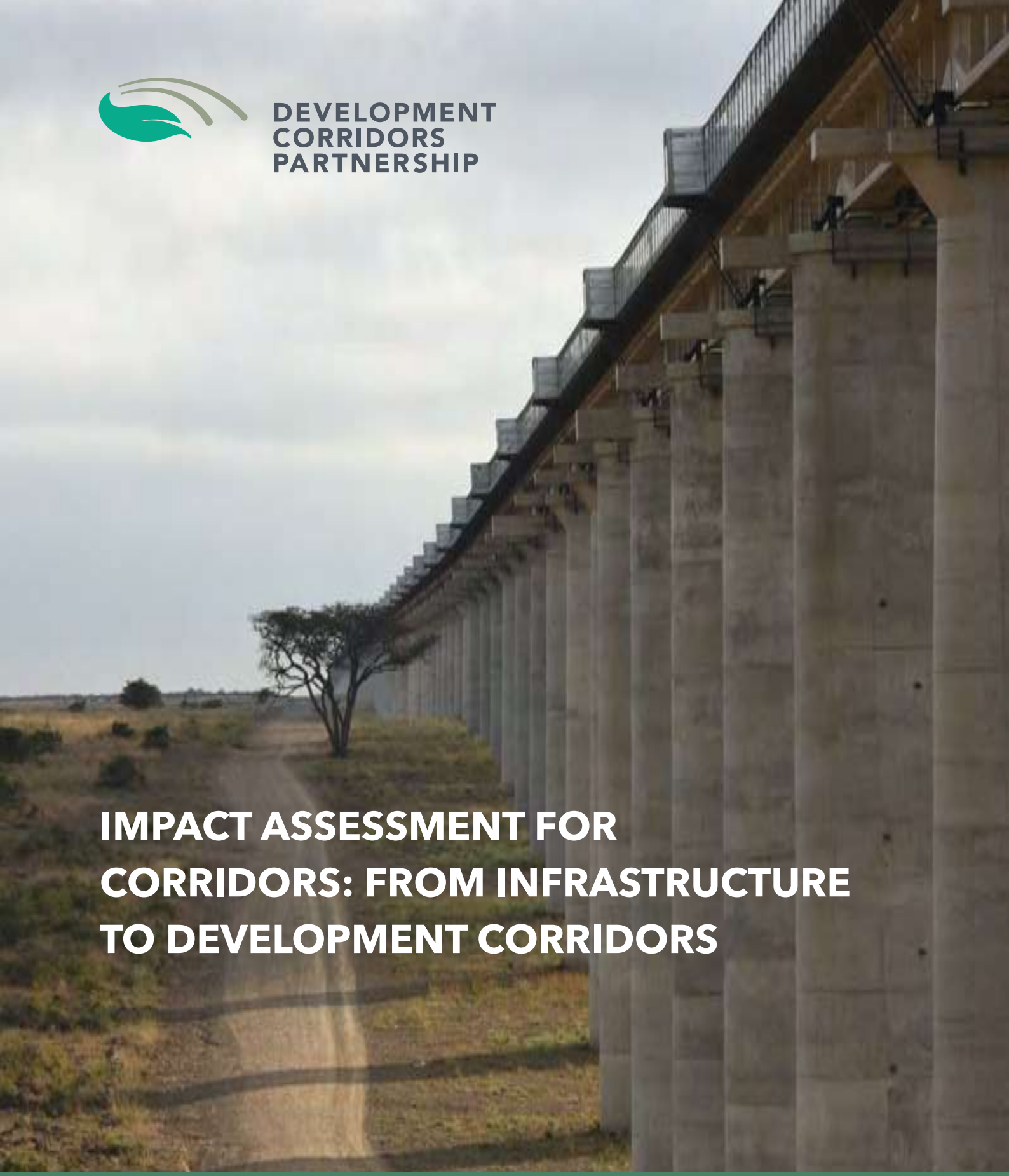
Wendy Collinson. manages the Wildlife and Transport Programme at the Endangered Wildlife Trust (EWT), a South African-based NGO, where she is driving initiatives that address the now-recognized threat of linear infrastructure (namely, roads and railways) in South Africa. She has 16 published scientific papers in peer-reviewed journals and has given over 50 presentations at national and international conferences. As the co-organizer of the African Conference for Linear Infrastructure and Ecology (ACLIE), Wendy sits on several other international conference committees, as well as the IUCN's Transport Working Group. Wendy is also a Research Associate at the South African Research Chair in Biodiversity Value & Change, School of Mathematical and Natural Sciences, University of Venda, Thohoyandou, South Africa.

Xinyue Zhang. Xinyue Zhang is an Assistant Professor of the Climate Change Lab, Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences (CAAS). She holds a PhD in Natural Geography from College of Urban and Environmental Sciences, Peking University. Her research interests involve the investigation of below-ground ecological processes and how these processes respond to climate change, with the focus on carbon and nitrogen cycling. Her aim is to reveal the mechanism of below-ground processes responses to climate change by gathering evidence from meta-analysis and manipulated experiments. With the goal of making the findings of her research relevant to support national mitigation and adaptation, she has been actively involved in research projects that aim to bridge agro-ecosystems and climate change.

Xue Han. Dr. Xue Han is an associate professor in the climate change lab, Institute of Environment and Sustainable Development in Agriculture (IEDA), at the Chinese Academy of Agricultural Sciences (CAAS). Her research interests focus on soil-plant system responses to elevated CO_2 and farming management in Free-Air Carbon dioxide Enrichment (FACE) experiments, as well as exploring potential adaptation options for agriculture. She has more than 22 publications in international peer-reviewed journals that solicited 438 reads, 55 citations, impact points of 33.15 and Research Gate score of 19.21. She was co-author of the 3rd and 4th national assessment report on climate change in China. She has participated in several international projects related with climate change, such as Sino-UK, Sino-Australian projects.

Prof Yinlong Xu. Yinglong leads the Innovation Research Team on Climate Change Adaptation situated at the Climate Change Lab, Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences (CAAS). He is a Member of the Executive Council of China's Innovation Method Society (2019-2023), Deputy Editor of Climate Resilience & Sustainability in Beijing, PR China. He leads work on carbon-neutral tea production in China, funded by the UN FAO (Food and Agriculture Organization of the United Nations) in 2018. Previously, he served as a Chief Scientist of China's 12th five-year national R&D research Project Developing China's Climate Change Adaptation Methodology and Constructing Comprehensive Adaptation Technology System (2013-2016), Chief Scientist of China's Ministry of Agriculture Project, 'Advancing China's Climate Change Adaptation Technology' (2011-2015), was a Technical Coordinator of a joint China-UK-Swiss project: 'Adapting to Climate Change in China (2009-2013)' and Co-chair of China's National Assessment Report on Climate Change: Impacts & Adaptation. He is a Coordinating Lead Author of China's Ministry of Science and Technology's report, 'Studies on National Strategy of Climate Change Adaptation'.

Yong He. Yong He received his PhD from the College of Resources and Environmental Sciences, China Agricultural University. His main research aim is to make agricultural systems more climate smart. Based on his research interests, he has led and participated in several research projects sponsored by Agriculture and Agri-Food Canada (AAFC), National Natural Science Fund (NSFC), and National Key Research and Development of China. He is the winner of the young talents project at the Chinese Academy of Agricultural Sciences, and a member of Agricultural Model Inter-comparison and Improvement Project (AgMIP) expert working group.



DEVELOPMENT CORRIDORS PARTNERSHIP

IMPACT ASSESSMENT FOR CORRIDORS: FROM INFRASTRUCTURE TO DEVELOPMENT CORRIDORS

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