DEVELOPMENT CORRIDORS PARTNERSHIP

IMPACT ASSESSMENT FOR CORRIDORS: FROM INFRASTRUCTURE TO DEVELOPMENT CORRIDORS

Edited by:
Jonathan Hobbs and Diego Juffe Bignoli

2022

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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05

Environmental Sensitivity Mapping for Corridor Planning

Sylvaine Rols,[1] Leo Murphy,[1] Ragnvald Larsen[3] and Sharon Brooks[1]

[1]UN Environment Programme World Conservation Monitoring Centre, Cambridge, UK

[3]Norwegian Environment Agency, Trondheim, Norway

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)

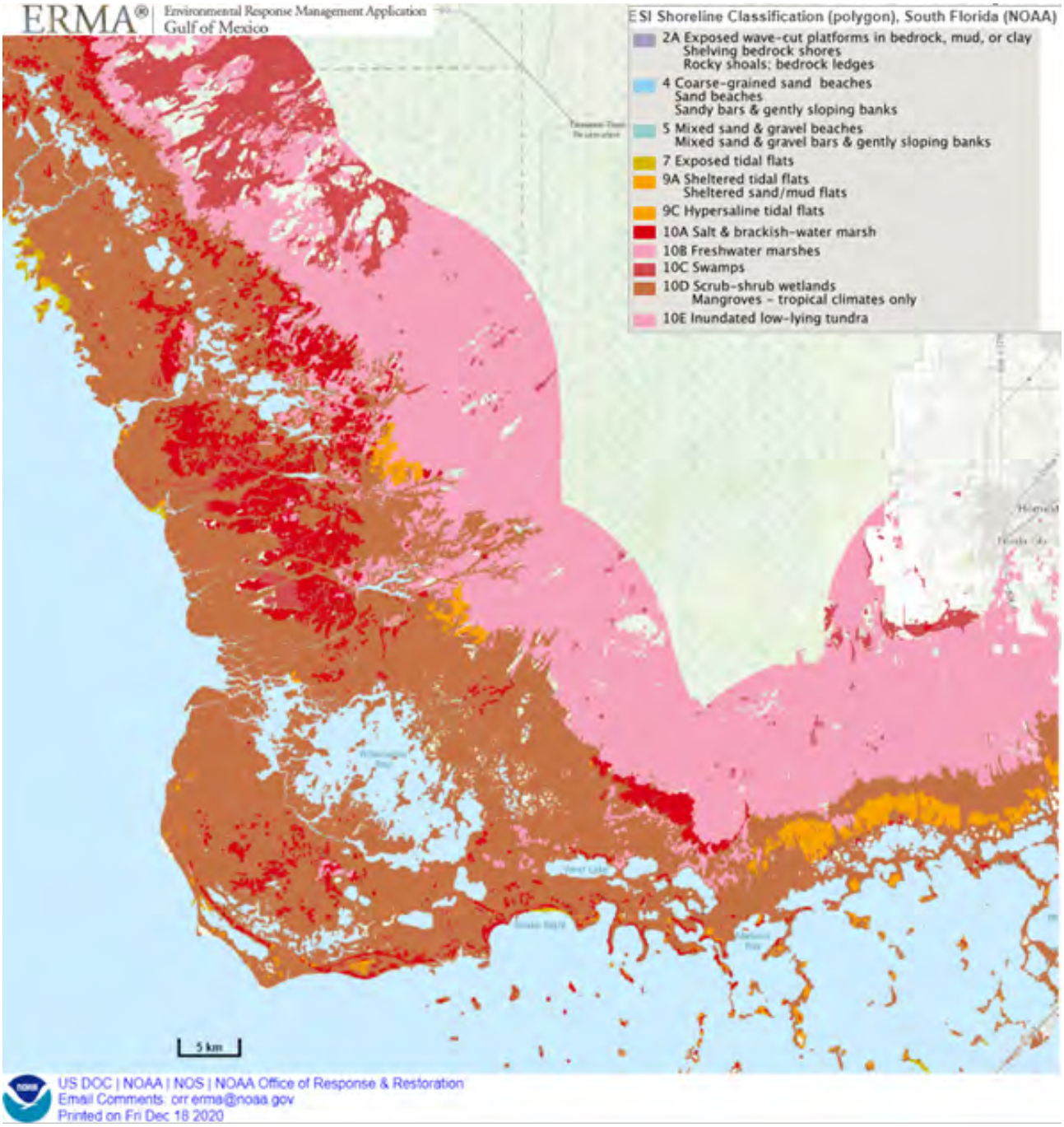
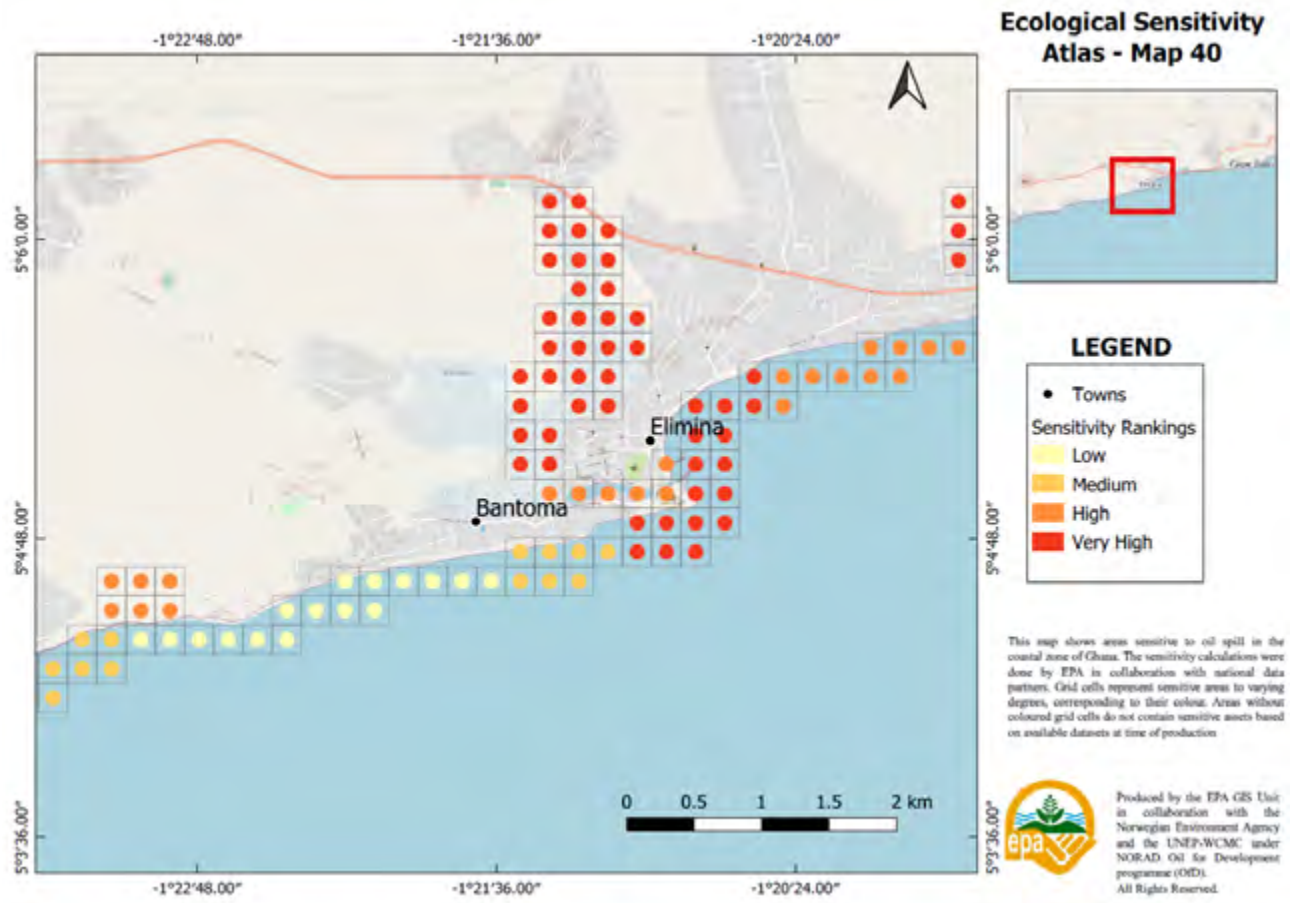


Figure 5.2 Draft excerpt from the 2021 Environmental Sensitivity Atlas for the Coastal Zone of Ghana (Environmental Protection Agency 2021). Sensitivity of ecological assets to oil spills was ranked from low to very high using the MESA methodology



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

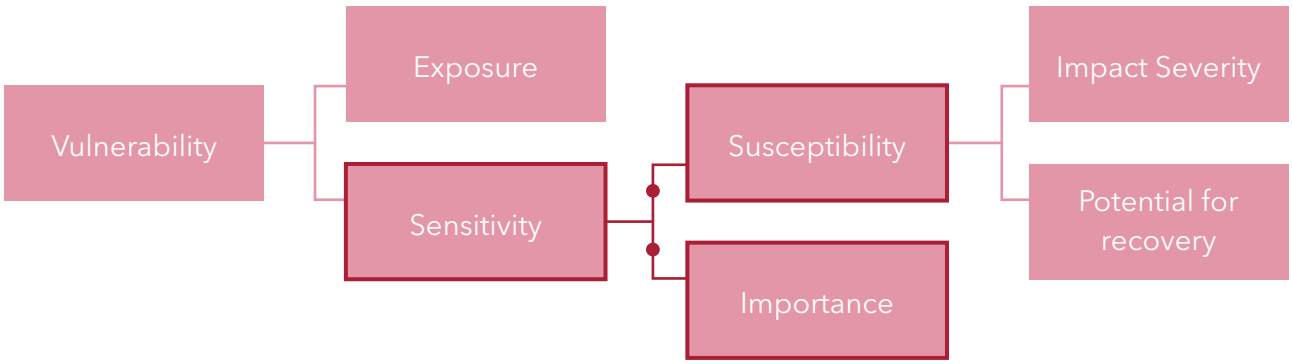
Finance Corporation Performance Standard 6's guidance note (International Finance Corporation 2019), and sensitivity is referred to throughout the Cross Sector Biodiversity Initiative (2015) mitigation hierarchy guidance (see Chapter 4). Sensitivity of a biodiversity feature is often presented independently 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

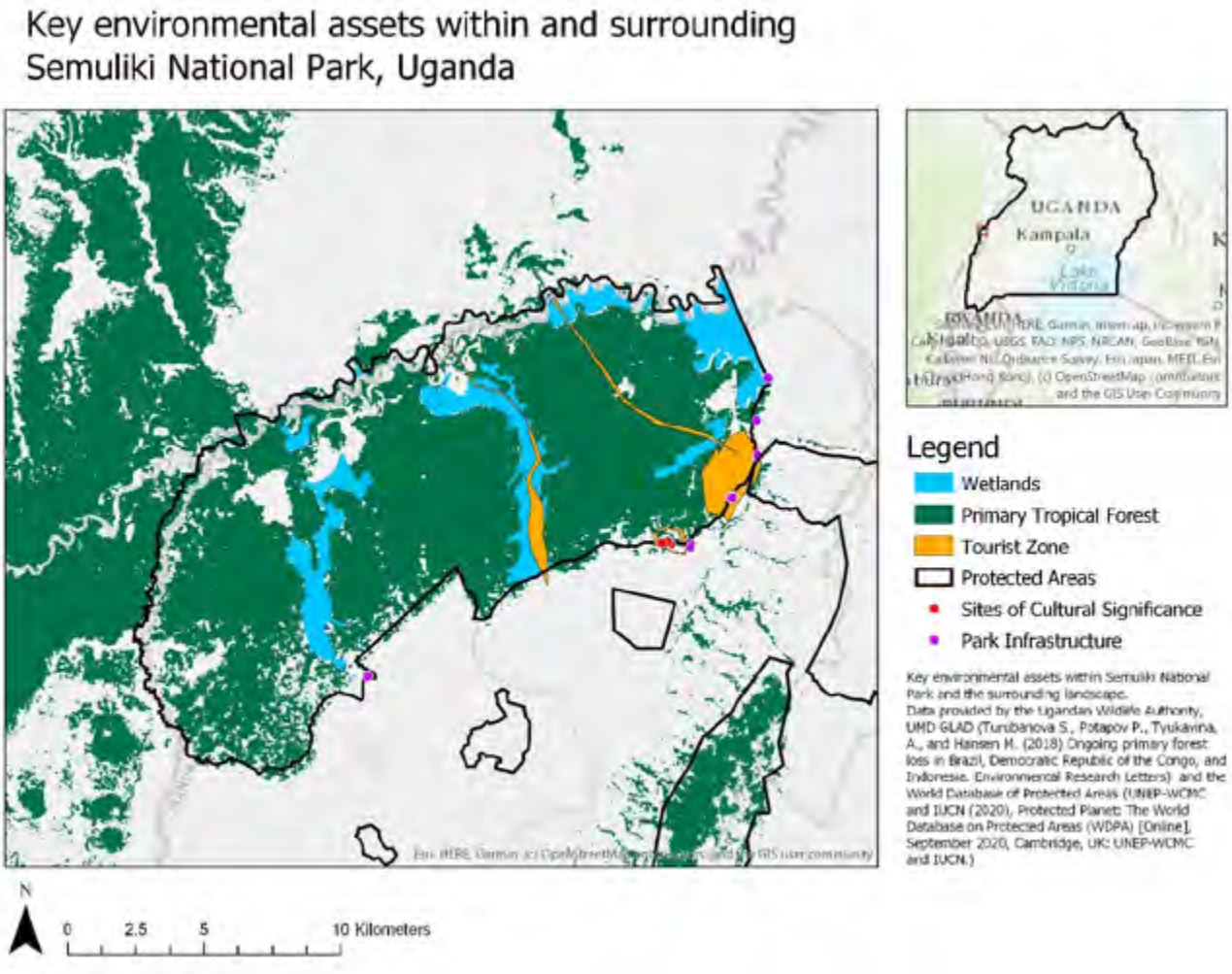
ESM can be used by both governmental authorities and project proponents. However, a publicly available and government-endorsed sensitivity atlas provides an opportunity to bridge any potential gaps in knowledge between the public and private sectors. It can also align understanding of sensitivity with 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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