



**DEVELOPMENT  
CORRIDORS  
PARTNERSHIP**

# **IMPACT ASSESSMENT FOR CORRIDORS: FROM INFRASTRUCTURE TO DEVELOPMENT CORRIDORS**

Edited by:  
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**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.

Expert Organisations:



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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 through 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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# 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 biooceanic 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

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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-lyá 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 characteristic 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

graphical 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.<sup>178</sup> 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,



*Bañados Izozog*

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.



*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

<sup>178</sup> Information and description from the Ramsar Sites Information Service. <https://rsis.ramsar.org/es/rs/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.

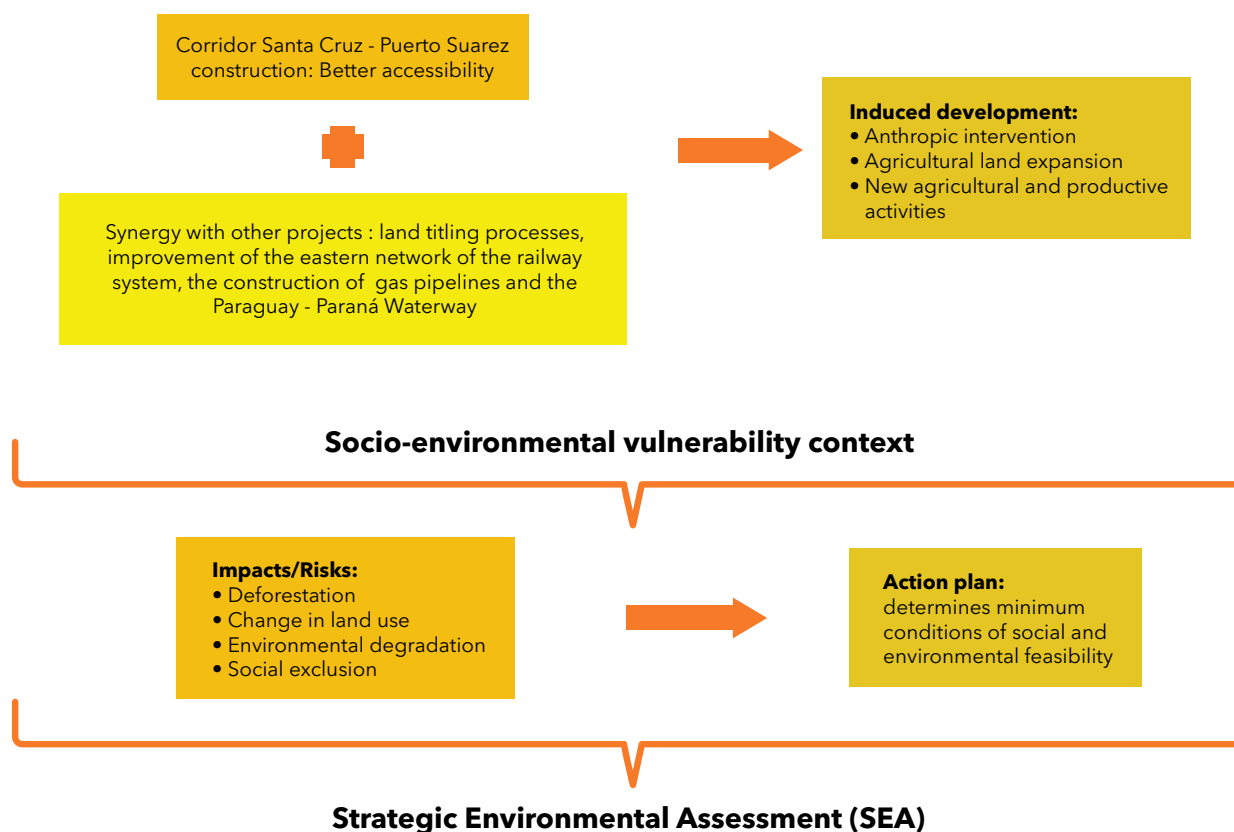
Likewise, the construction and subsequent operation of the Santa Cruz-Puerto Suarez corridor had both positive and negative synergy impacts, with other projects taking place in the region, such as the improvement of the eastern network of the railway system, the construction of gas pipelines to export 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 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-lya 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<sup>179</sup> 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.<sup>180</sup>

## 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 extension 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/>