



*Photo: Amrita Neelakantan*

**FOCUS-BRI Country Report**  
**Framing Opportunities for Conservation by Understanding Safeguards**  
**in the Belt and Road Initiative**

# Kenya

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## Acronyms

|         |  |
|---------|--|
| ACC     | African Conservation Centre                              |
| ACCESS  | Africa Collaborative Centre for Earth Systems Science    |
| ADB     | African Development Bank                                 |
| AFRICOG | African Centre for Open Governance                       |
| AWF     | African Wildlife Foundation                              |
| BRI     | Belt and Road Initiative                                 |
| CAK     | Conservation Alliance of Kenya                           |
| CBI     | Composite Biodiversity Index                             |
| CCCCF   | County Climate Change Fund                               |
| CDB     | China Development Bank                                   |
| CETRAD  | Centre for Training and Integrated Research              |
| CF-LI   | Chinese Funded Linear Infrastructure                     |
| CHEXIM  | China Export-Import Bank                                 |
| CI      | Conservation International                               |
| CITES   | Convention on International Trade in Endangered Species  |
| CMS     | Convention on the Conservation of Migratory Species      |
| DANIDA  | Danish International Development Agency                  |
| DCP     | Development Corridors Partnership                        |
| DSWT    | David Sheldrick Wildlife Trust                           |
| DWCG    | Dakatcha Woodland Conservation Group                     |
| EAWLS   | East African Wildlife Society                            |
| EMCA    | Environment Management and Coordination Act              |
| ESMS    | Environmental and Social Management System               |
| ESIA    | Environmental and Social Impact Assessment               |
| EWT     | Endangered Wildlife Trust                                |
| FDI     | Foreign Direct Investment                                |
| FoLT    | Friends of Lake Turkana                                  |
| FoNNAP  | Friends of Nairobi National Park                         |
| GIZ     | Gesellschaft für Internationale Zusammenarbeit           |
| IFAW    | International Fund for Animal Welfare                    |
| IFC PS  | International Finance Corporation Performance Standards  |
| ISK     | Institution of Surveyors of Kenya                        |
| IUCN    | International Union for the Conservation of Nature       |
| JKUAT   | Jomo Kenyatta University of Agriculture and Technology   |
| KBA     | Key Biodiversity Area                                    |
| KCCWG   | Kenya Climate Change Working Group                       |
| KCWCM   | Kenya Coalition for Wildlife Conservation and Management |
| KEFRI   | Kenya Forestry Research Institute                        |
| KENHA   | Kenya National Highways Authority                        |
| KFS     | Kenya Forest Service                                     |
| KLA     | Kenya Land Alliance                                      |
| KPA     | Kenya Ports Authority                                    |
| KPLC    | Kenya Power & Lighting Company                           |

|         |   |
|---------|---|
| KRC     | Kenya Railways Corporation                            |
| KVDA    | Kerio Valley Development Authority                    |
| KWCA    | Kenya Wildlife Conservancies Association              |
| KWS     | Kenya Wildlife Service                                |
| LAPSSET | Lamu-Southern Sudan-Ethiopia Transport                |
| LDCA    | LAPSSET Development Corridor Authority                |
| LI      | Linear Infrastructure                                 |
| MEA     | Multilateral Environmental Agreements                 |
| MoE     | Ministry of Energy                                    |
| MoEF    | Ministry of Environment & Forestry                    |
| MoNTP   | National Treasury and Ministry of Planning            |
| MoT&ID  | Ministry of Transport & Infrastructure Development    |
| MoTW    | Ministry of Tourism and Wildlife                      |
| NEMA    | National Environment Management Authority             |
| NLC     | National Lands Commission                             |
| NRT     | Northern Rangelands Trust                             |
| NTFPs   | non-timber forest products                            |
| PA      | Protected Area  |
| POPs    | Stockholm Convention on Persistent Organic Pollutants |
| PPPs    | public-private-partnerships                           |
| SGR     | Standard Gauge Railway                                |
| SOEs    | State Owned Enterprises                               |
| STE     | Save the Elephants                                    |
| TARDA   | Tana & Athi River Development Authority               |
| TCG     | Tsavo Conservation Group                              |
| TCG     | Tsavo Conservation Group                              |
| TNC     | The Nature Conservancy                                |
| TUDOF   | Turkana Development Organization Forum                |
| UNCBD   | United Nations Convention on Biological Diversity     |
| UNCCD   | United Nations Convention to Combat Desertification   |
| UNDP    | United Nations Development Programme                  |
| UNEP    | United Nations Environment                            |
| UNFCCC  | United Nations Framework Convention on Climate Change |
| USAID   | United States Agency for International Development    |
| WWF     | World Wildlife Fund                                   |

## Kenya Factsheet



**Figure 1.** Political map of Kenya. Source: Nationsonline.org.

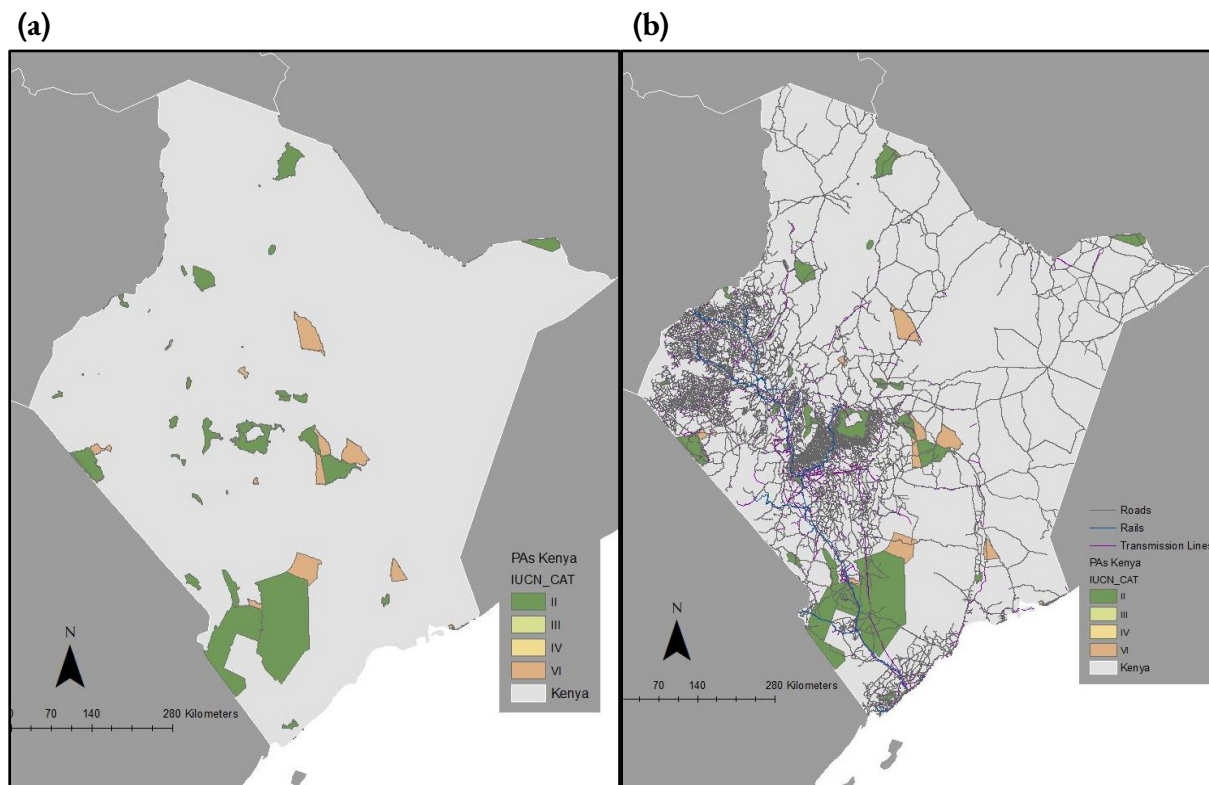
**Table 1.** Kenya country statistics. Information assembled from the Stimson Center, World Bank, and the Convention on Biological Diversity.

|  |   |
|--|---|
| Region   | Sub-Saharan Africa  |
| Capital  | Nairobi   |
| BRI Corridor   | Proposed  |
| BRI investment   | US\$ 9,000 million  |
| Income Status  | Lower middle  |
| Population   | 53,771,300 (2020)   |
| GDP  | 101 billion (2020)  |
| Land Area (km <sup>2</sup> )                           | 569,140   |
| Protected Areas (km <sup>2</sup> )                     | 72,890  |
| Protected Areas (percent)                              | 12.42%  |
| Species Richness (ranking)                             | 26  |
| Biodiversity Intactness (ranking)                      | 62  |
| ND-GAIN Country Index; Climate vulnerability (ranking) | 143   |
| GDP Growth Rate Projections                            | 5.1% by 2023  |
| Inequality (Gini Coefficient)                          | 0.445   |
| Human Development Index (HDI)                          | 0.601   |
| Key exports  | Tea, horticultural products, coffee, petroleum products, fish, cement |

## I. Introduction

Located in eastern Africa, the Republic of Kenya was proclaimed an independent state in 1964. Today, it is home to more than 53 million people (Kenya National Bureau of Statistics, 2019), with a steadily growing economy at 4.9% annually, much of which is due to the development of linear infrastructure such as roads and railways (Republic of Kenya, 2015) (Fig. 2). Kenya's natural resources have been pivotal to national prosperity and serve as a vital economic engine for agriculture, tourism, energy, trade, and other sectors.

Kenya is also endowed with extraordinary biodiversity with 25,000 species of animal and 7000 plants having so far been described and conserved within formally protected areas (Republic of Kenya, 2015) (Fig. 2). Kenya clearly recognizes the importance of its natural heritage to national wellbeing, ensuring environmental sustainability is represented in the Constitution (2010). Additionally, the national development blueprint, entitled *Kenya Vision 2030*, aims to create “a globally competitive and prosperous nation with a high quality of life by 2030” (Government of the Republic of Kenya, 2007), and includes the flagship project Securing the Wildlife Corridors and Migratory Routes Initiative.



**Figure 2.** (a) There are multiple types of Protected Areas in Kenya affording varying degrees of protection to multi-use landscapes. Highest protection afforded to IUCN categories I and II. This map only shows formally recognized protected areas and does not consider community and private conservancies which may also serve as refuges for wildlife. (b) PA map overlaid with existing infrastructure, which already compromises multiple protected areas. We consider only roads, rails, and transmission lines as linear infrastructure for this study, see Appendix A.



As east Africa's largest economy and considered strategically well-positioned along the Indian Ocean and Lake Victoria trade routes, Kenya is an especially appealing place for Chinese investment in connective infrastructure. Additionally, investment from China has allowed Kenya to tackle several ambitious infrastructure projects. As China's state media Xinhua put it "Kenya has created a conducive policy and regulatory environment to attract foreign direct investments from China and revitalize growth of key sectors like manufacturing, financial services, and ICT" (Huaxia, 2021). BRI funding has enabled the expansion of the Mombasa port, added an additional port in Lamu, and the installation of the Standard-gauge railway ("Belt and Road in Kenya," 2021), which is meant to connect the Mombasa port to Kisumu port on Lake Victoria. Although these projects are ongoing, questions remain regarding their overall sustainability, terms of contracting, and development processes. Many Kenyans have raised concerns over the true benefits of BRI to the Kenyan people, and the rhetoric of the initiative operating as a 'debt trap' is consistent throughout many local news sources, even though this narrative has been debunked in academic circles (Brautigam, 2020; Rithmire, 2021; Royal Institute of International Affairs et al., 2020).

## II. Linear Infrastructure Investment Landscape: BRI and Chinese activities in Kenya

The economic shock of the COVID-19 pandemic has led to Kenya indicating a high risk of debt distress, however, the International Monetary Fund states that Kenya's current debt is sustainable and its risk rating is likely to decline as the world adapts to the presence of COVID-19 (Fedelino et al., 2021).

China is Africa's most prominent creditor, holding 20 percent of the continent's debt ("Reshaping African Agency in China-Africa Relations," n.d.). Kenya is one of the ten countries that make up 60 percent of China's development finance globally (Ray et al., 2021). As of 2021 Kenya owes Eximbank, CDB, the Chinese Government, and CIDCA US\$9 billion, of which six billion is earmarked for the transport sector (China Africa Research Initiative and Boston University Global Development Policy Center, 2021). Debts to China currently make up 1/3 of Kenya's total debt, making China the nation's second-largest creditor after the World Bank (Herbling, 2021). For details on Kenya's external public debt from 2015 - 2019, see Table 2.

China and Kenya maintain a bilateral economy and trade agreement with Kenya's main exports including coffee, tea, and leather goods and imports including electronic appliances, trade tools, textiles, building materials, and medicinal drugs, among other items (*Bilateral Relations Between China and Kenya*, n.d.). While this bilateral trade value has increased in recent years, some decry the import of goods from China to Kenya, which offers cheaper alternatives for consumers but may negatively impact local producers (Farooq et al., 2018).

**Table 2.** Kenya’s external public debt as of 2020. Prepared jointly by the staff of the International Development Association (IDA) et al., 2020.

|                           | 2015        |            | 2016        |            | 2017        |            | 2018        |            | 2019        |            |
|---------------------------|-------------|------------|-------------|------------|-------------|------------|-------------|------------|-------------|------------|
|                           | US\$bn      | Share      | US\$bn      | Share      | US\$bn      | Share      | US\$bn      | Share      | US\$bn      | Share      |
| Multilateral creditors    | 7.3         | 46.5       | 7.6         | 41.2       | 8.2         | 35.8       | 8.6         | 32.1       | 10.2        | 33.4       |
| Bilateral creditors       | 4.7         | 29.8       | 6.3         | 33.8       | 7.6         | 33.3       | 8.8         | 32.8       | 10.1        | 33.0       |
| Commercial creditors      | 3.6         | 22.7       | 4.5         | 24.2       | 6.9         | 30.1       | 9.2         | 34.4       | 10.2        | 33.1       |
| Others (supplier credits) | 0.2         | 1.0        | 0.1         | 0.8        | 0.2         | 0.7        | 0.2         | 0.6        | 0.2         | 0.5        |
| <b>Total</b>              | <b>15.8</b> | <b>100</b> | <b>18.5</b> | <b>100</b> | <b>22.8</b> | <b>100</b> | <b>26.7</b> | <b>100</b> | <b>30.7</b> | <b>100</b> |

Source: Kenyan National Treasury.

### III. Kenya’s Biodiversity Landscape

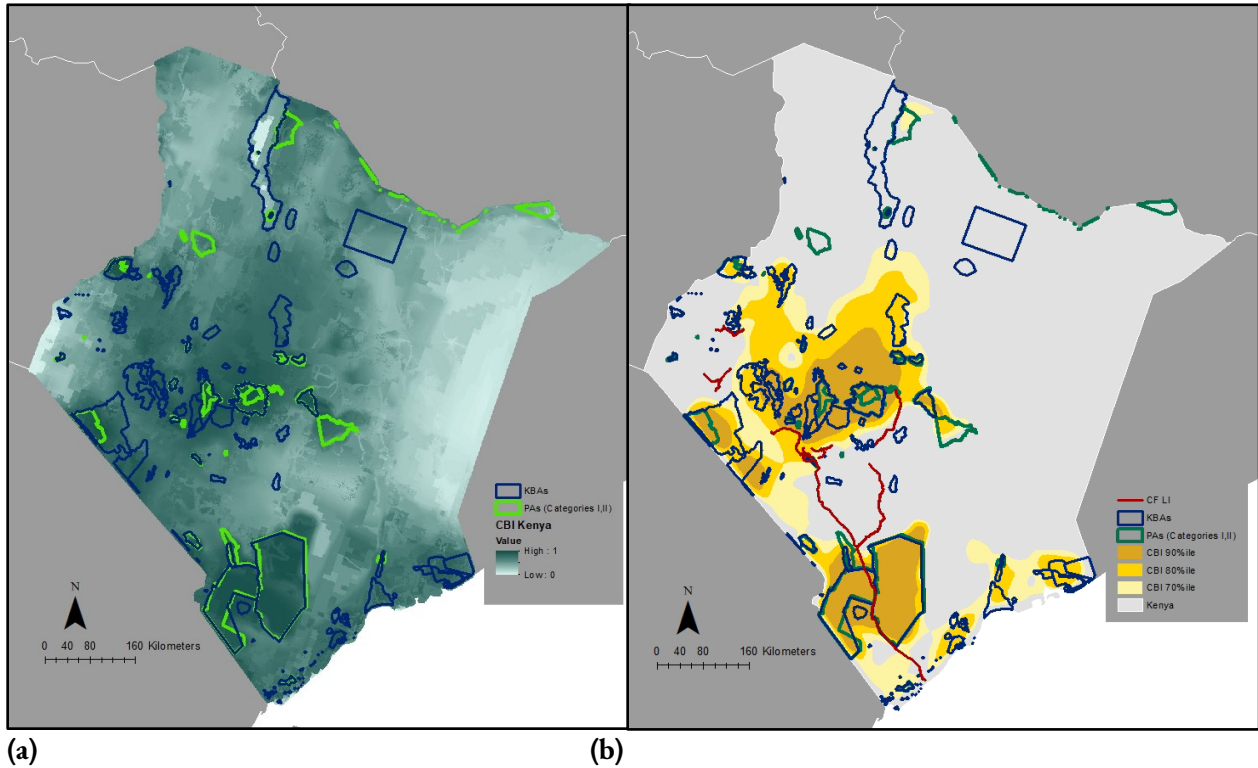
#### Summary of biodiversity and conservation efforts

Approximately 8% of Kenya’s terrestrial habitat is formally designated as protected area (PA) for conservation. The PAs consist of 23 terrestrial National Parks, 28 terrestrial National Reserves, four national sanctuaries, four marine National Parks, and six marine National Reserves (*Kenya Wildlife Service, 2021*). Parks do not allow consumptive uses, only tourism and research are permitted. Reserves, on the other hand, allow for greater utilization by local communities such as fishing, grazing, or collection of firewood and non-timber forest products (NTFPs). Community conservancies also lend another 4% of the protected areas of Kenya, with over 100 conservancies covering more than 15 million acres (*Community-Led Conservation Grows in Kenya, n.d.*).

Approximately 65% of Kenya’s megafauna exist outside of government-administered PAs (Western et al., 2009). With so much of the country’s wildlife located outside of PAs, it is likely that LI development will have a detrimental impact on biodiversity without proper avoidance of key wildlife corridors and habitat or the installation of properly placed mitigation measures. Wildlife located outside of protected areas is also subject to increased interaction with communities, thus increasing the chances of human-wildlife conflict. In recent years, Kenya has seen a drastic increase in livestock numbers in rangelands and an equally drastic decline in wildlife numbers (Ogutu et al., 2016). Rapid human growth and its ramifications for Kenya’s rangeland ecosystems highlight the inadequacy of protected areas alone to support viable wildlife populations. To combat this issue, conservancies have become a strategic means to protect wildlife, with more than 160 established in the last 20 years (Tyrrell et al., 2020). There has also been increased support for conservation public-private partnerships (PPPs), which can be utilized to create conservancies and wildlife sanctuaries outside of PAs and support local communities through Payments for Ecosystem Services (PES). Community-led tourism initiatives should be noted by funders as a key point of engagement.

Kenya is home to 67 Key Biodiversity Areas (KBAs) (Fig. 3a), all of which are also considered Important Bird Areas (IBAs, Gacheru et al., 2021). A 2021 report by Nature Kenya (Gacheru et al., 2021) associated the deterioration of some KBAs with an increase in infrastructure development projects which infringed on KBAs located outside of protected areas, further reducing and degrading habitat (Fig. 3b). It was noted during a key informant interview with one avifauna expert that systematic studies of bird mortality are woefully underfunded in Kenya. To date, there has been limited research on the impacts of power lines on birds, with most occurrences recorded incidentally. Due to the lack of systematic and reliable data, this interviewee feels that it is hard to engage officials in the issue of bird collisions and electrocutions as the result of poorly routed or

constructed powerlines, which have contributed to the drastic declines of raptor populations over the past 40 years (Ogada et al., 2022).

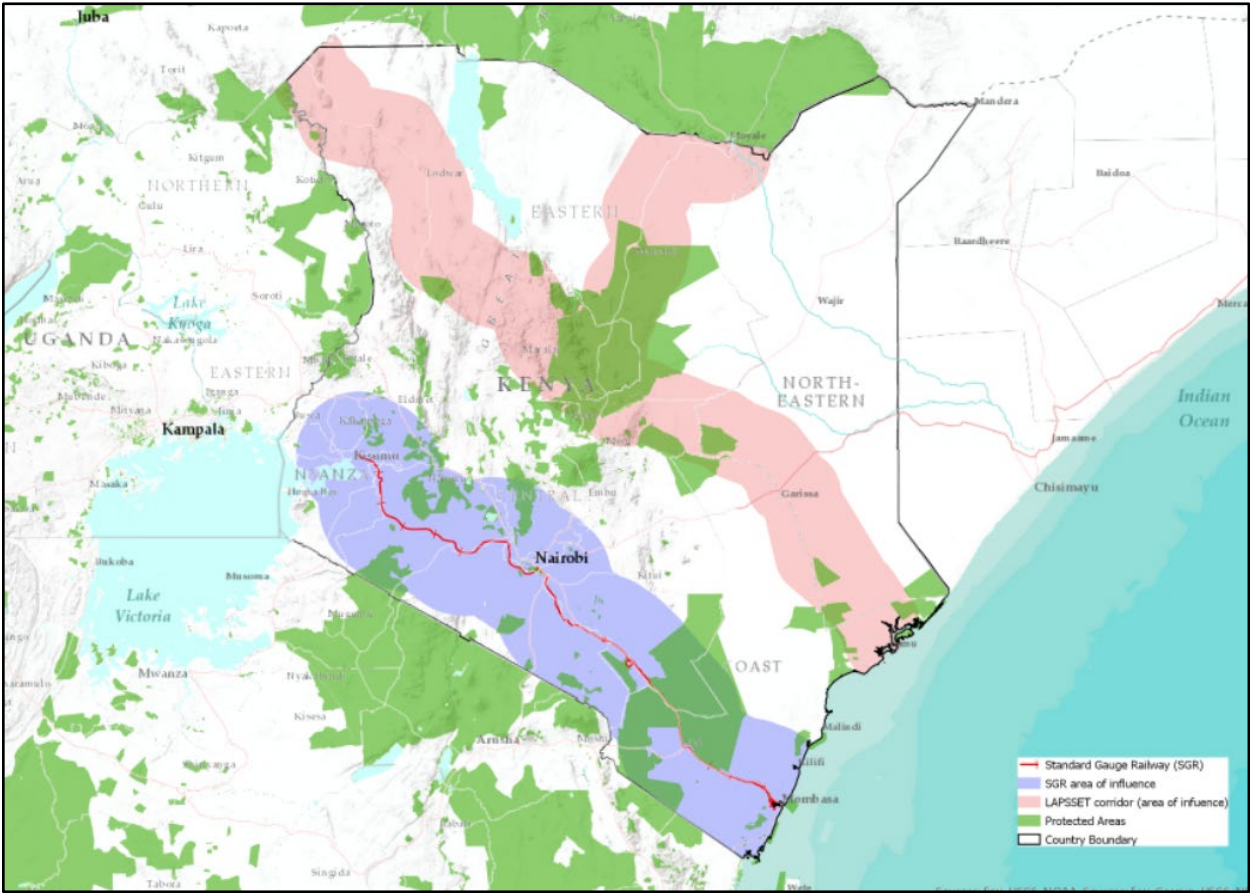


**Figure 3.** Kenya’s core biodiversity areas and Chinese-funded linear infrastructure. (a) Key Biodiversity Areas (KBAs) cover more areas of conservation importance (as determined by high Composite Biodiversity Index [CBI] values - see Appendix A) than PAs with the highest protection IUCN categories i and ii. (b) Chinese-funded linear infrastructure (CF LI), including roads, rails, and transmission lines, as captured by Custer et al. (2021). CF LI is cutting into and across CBI cores - mostly in areas with low protection but high biodiversity importance.

Prior to the COVID-19 pandemic, Kenya’s rich biodiversity helped support a booming tourism industry which contributed to more than 13% of GDP (Davidson & Ihwagi, 2017). The importance of biodiversity is emphasized in the national development plan *Kenya Vision 2030*, with a flagship project focused on the identification and protection of key dispersal corridors and prioritization of their protection. Industry is also heavily reliant on Kenya’s biodiversity, with agricultural products as a main export.

Infrastructure development to bolster Kenya’s economy has coalesced around the designation of two mega-development corridors (geographical areas identified as priority for investments to spur economic growth and development): the Lamu Port and Lamu-Southern Sudan-Ethiopia Transport (LAPSSET) and the Standard Gauge Railway (SGR). Both are outlined in the National Spatial Plan 2015-2045 (Fig. 4) (Government of the Republic of Kenya, 2015). These development corridors aim to increase access to remote areas and facilitate the growth, development, and expansion of urban centers. Recently, a coalition of experts from Kenya, the UK,

and China engaged in a collaborative partnership called the *Development Corridors Partnership* (DCP) to increase capacity and ensure that development corridor projects in East Africa are based on sound science and informed decision-making. Studies from the DCP have identified a multitude of possible impacts from these mega-development corridors, including loss of biodiversity, increased water scarcity, deforestation, land-use changes, and impacts to climate resiliency (DCP Kenya, 2019).



**Figure 4.** Map of the Lamu-South Sudan-Ethiopia Transport Corridor (LAPSSET) and the Standard Gauge Railway (SGR). Source: DCP 2019.

## IV. Country policy and planning landscape for biodiversity & infrastructure

### National and international commitments to conserve biodiversity

Kenya has a robust legal landscape when it comes to the protection of biodiversity and the environment and is a signatory to several Multilateral Environmental Agreements (MEAs) (Table 3).

**Table 3.** MEAs related to the environment on which Kenya is a signatory

|  |
|--|
| United Nations Convention on Biological Diversity (UNCBD)                |
| United Nations Convention to Combat Desertification (UNCCD)              |
| United Nations Framework Convention on Climate Change (UNFCCC)           |
| Stockholm Convention on Persistent Organic Pollutants (POPs)             |
| Convention on International Trade in Endangered Species (CITES)          |
| African Convention on The Conservation Of Natural Resources;             |
| Ramsar Convention on Wetlands  |
| Convention for the Protection Of The World Cultural And Natural Heritage |
| Convention on the Conservation of Migratory Species (CMS) (1979)         |

### Relevant Kenyan laws and decrees surrounding biodiversity and infrastructure safeguards

The 2010 constitution emphasizes the proper management of the environment for the future and Kenya Vision 2030, its development plan, aims for “*a clean, secure and sustainable environment.*” (Government of the Republic of Kenya, 2007). Prior to the 2010 constitution, the state enacted the Environment Management and Coordination Act (EMCA; 1999). The EMCA created a system for conducting environmental impact assessments, which are required prior to the implementation of any projects that have the potential to cause significant harm to the environment as specified in the Act’s second schedule. The EMCA was amended in 2015 and remains the main legal framework for managing the environment. The conditions for EIA, monitoring, audits, and environmental-quality standards are all outlined within the EMCA.

Kenya has a wide variety of policy, laws, regulations, and strategies that direct management and protection of the environment, biodiversity, and infrastructure development. Relevant policies, laws, strategies, and plans are listed in Table 4. The government has done a commendable job integrating biodiversity and the environment into many of its policies. However, multiple interviewees cite that corruption, lack of expertise, short timelines, and lack of funding are truly where the state’s biodiversity protections can get swept away.

**Table 4.** Legal landscape for protection of the environment during infrastructure development.

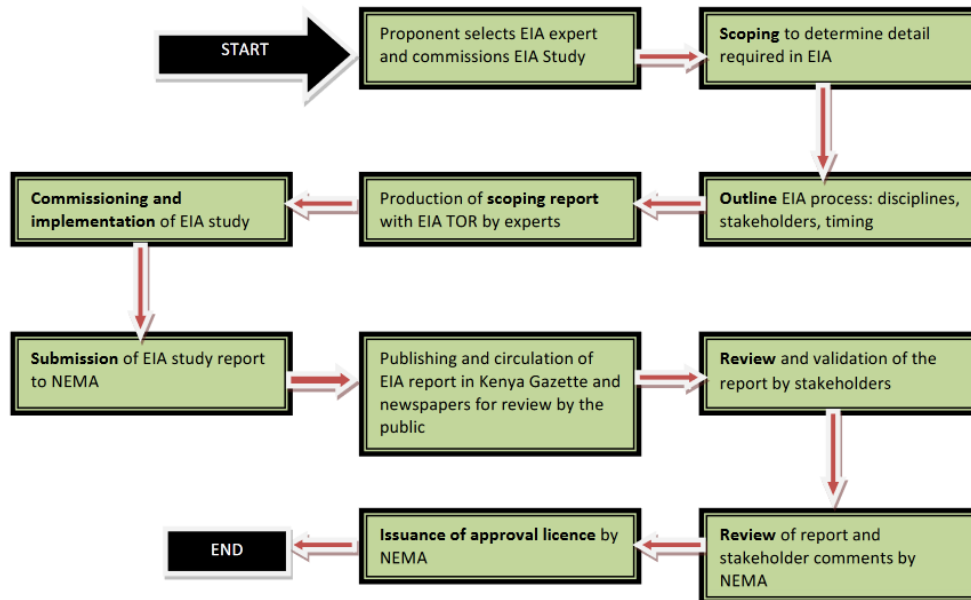
|  |
|--|
| 1. Government Contracts Act (1956)                                       |
| 2. Bretton Woods Agreements Act (1963)                                   |
| 3. Environmental Management and Coordination Act (1999 and Amend. 2015)  |
| 4. Investment Promotion Act (2004)                                       |
| 5. United Nations Development Assistance Framework for Kenya (2004-2018) |

|   |
|---|
| 6. Roads Act (2008)   |
| 7. Kenya Vision 2030 (2008)   |
| 8. National Trade Policy (2009)   |
| 9. National Climate Change Response Strategy (2010)                           |
| 10. Agriculture Sectoral Sector Development Strategy 2010-2020                |
| 11. Policy Statement on Public Private Partnerships (2011)                    |
| 12. Tourism Act (2011)  |
| 13. Urban Areas and Cities Act (No. 13 of 2011)                               |
| 14. National Government Loans Guarantee Act (No. 18 of 2011)                  |
| 15. Environment and Land Court Act (No. 19 of 2011)                           |
| 16. Public Private Partnerships Act (2013)                                    |
| 17. National Broadband Strategy (NBS) for Kenya (2013-2017)                   |
| 18. Kenya's Foreign Policy (2014)   |
| 19. Kenya Forest Policy (2014)  |
| 20. National Environment Policy (2014)  |
| 21. World Bank Group Country Partnership Strategy for Kenya (2014-2018)       |
| 22. National Climate Change Adaptation Plan (2015-2030)                       |
| 23. National Spatial Plan (2015-2045)   |
| 24. Climate Change Act 2016: The Climate Change Act (No. 11 of 2016)          |
| 25. Community Land Act (2016)   |
| 26. Kenya's Nationally Determined Contribution (NDC) (2016)                   |
| 27. Water Act (2016)  |
| 28. Blue Economy Strategy (2017)  |
| 29. Energy Bill (2017)  |
| 30. Executive Order: The Nairobi Metropolitan Area Transport Authority (2017) |
| 31. National Climate Change Action Plan (2018-2023)                           |
| 32. National Climate Change Framework Policy (2018)                           |
| 33. National Climate Finance Policy (2018)                                    |
| 34. County Public Participation Guidelines                                    |
| 35. Green Economy Strategy and Implementation Plan (GESIP)                    |
| 36. Industrial and Commercial Development Corporation                         |
| 37. Kenya Country Strategy Paper 2014-2018/African Development Bank 2014-2018 |
| 38. Kenya National Biodiversity Strategy and Action Plan (NBSAP) 2019-2030    |
| 39. Kenya's Industrial Transformation Programme                               |
| 40. Nairobi Integrated Urban Development Master Plan (NIUPLAN)                |
| 41. Northern Corridor Master Plan   |
| 42. Vision 2030 Development Strategy for Northern Kenya and other Arid Lands  |

## The ESIA process in Kenya

Kenya complies with the International Finance Corporation Performance Standards (IFC PS), and as such requires that a development project complete an Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management System (ESMS). Managed by the National Environmental Management Authority (NEMA), ESIA's are utilized to identify and evaluate the potential social and environmental effects associated with a project. If negative effects are identified, then the company or group administering the impact assessment is required to outline the proper procedures for mitigation, propose alternatives, and ensure adequate management and monitoring post-construction.

On paper, Kenya follows a robust protocol for the preparation of ESIA (Fig. 5), ensuring that projects comply with all relevant Kenyan laws as well as international standards including the World Bank Guidelines, African Development Bank Operational Safeguards, and the Equator Principles. Whenever a contradiction exists between regulatory frameworks, the ESIA is supposed to follow the more stringent requirement.



**Figure 5.** Integrated EIA development process in Kenya. Note: PPP – Policies, Plans and Programmes Source: Olago, 2012.

Projects for which an ESIA identifies social effects are then required to follow the stakeholder engagement processes mandated by Kenyan law. These include, for example, an Informed Consultation and Participation process. Ideally, this process allows affected communities to have a voice in the development process and raise grievances prior to project implementation. However, interviewees cited the often poor ways in which engagement is conducted. Due to the nature of large-scale linear infrastructure, which spans huge areas of the country, many communities are left out of the stakeholder participation process. Interviewees shared that while stakeholder engagement is always conducted, it may only be done with specific groups, particularly those that are likely to support the development, or only represent a small portion of community groups affected. These types of discriminatory practices are especially problematic in Kenya, which frequently experiences inter-ethnic

conflicts frequently spurred by political outcomes (Balaton-Chrimes, 2021). There is no specific legislation on the protection of Indigenous Peoples in Kenya, and the country has yet to adopt the United Nations Declaration on the Rights of Indigenous Peoples.

### **What safeguards are in place by Chinese funders in Kenya when building LI?**

Although Kenya maintains strict policies on biodiversity protection in relation to infrastructure development, interviewees all expressed doubt that on-the-ground realities match the stringent policies currently in place. They suggest that this is largely due to a few bad actors in positions of power and prevalent corruption within government institutions.

*There is a lot of corruption, they know the loopholes. That is why we find most of the China-funded projects ignore the safeguards. They don't do best practice per se. What we've seen here, and especially in my experience with Standard Gauge Railway, the environment component or social component is ignored.*

- Anonymous Interviewee

Additionally, all interviewees noted that the companies that were awarded construction contracts appeared to be more influential than the funders financing the projects. Chinese construction companies are frequently awarded contracts over local contractors and have often been accused of forgoing proper safeguards and not following best practices for protecting biodiversity. This is an interesting statement from interviewees as it directly opposes the level of influence and power of these companies which was identified in the Development Corridors Scoping Study conducted by DCP (DCP Kenya, 2019).

All interviewees agreed that biodiversity safeguards for linear infrastructure development are present but need stronger oversight to ensure that recommendations are followed and that money is available for oversight and monitoring activities. There is also a need for increased capacity building for planners, engineers, and government officials.

### **Funding mechanisms for climate mitigation in Kenya**

Through *Kenya Vision 2030*, the country has committed to creating a financial pathway towards climate resiliency in the form of the Climate Change Action Plan, which at its inception was estimated to cost US\$2.75 billion per year (Nzau, 2014). Kenya also pioneered a mechanism to increase finance for climate action at a local level utilizing the County Climate Change Fund (CCCCF). This fund is aimed at county governments enacting climate projects which have been identified and prioritized by local communities (Orindi et al., 2020). The CCCCf encompasses mitigation measures and aims to influence national climate policies, all with a bottom-up approach that encourages participation and ownership in community-driven climate priorities. See Table 5 below for details on Kenya's financial landscape for climate change.



**Table 5.** Kenya’s financial landscape for climate change. Source: Nzau, 2014.

| Sources of climate finance                 | Intermediaries                                       | Economic and financial instruments                              | Financial planning systems and institutional arrangements                  | Uses and users of climate finance                       |
|--|--|---|--|---|
| International and national public finance  | Multilateral banks<br>Bilateral agencies             | Power purchase agreements                                       | Expenditure and budgetary frameworks, without budget code                  | Adaptation<br>Mitigation                                |
| International and national private finance | National agencies<br>National financial institutions | Warranties<br>Guarantees  | Ministry of Environment, Water and Natural Resources (coordinating agency) | Government<br>Development partners                      |
| Carbon finance                             |  | Insurance<br>Carbon offset flows                                |  | Private sector<br>Non-governmental organisations (NGOs) |
| Voluntary climate finance                  |  | Grants<br>Concessional loans<br>Capital: equity, debt financing |  |   |

## V. Project Profiles:

### Standard Gauge Railway

The standard gauge railway (SGR) is the most prominent BRI project in Kenya and the most expensive infrastructure project since independence, with the current price tag sitting near US\$4.7 billion (“Belt and Road in Kenya,” 2021). This project alone increased Kenya’s debt by 750% between 2014 and 2019 (Carrai, 2021). The new SGR runs along the route of the previous narrow-gauge Uganda Railway, which was constructed during the British colonial era. The railway between Nairobi and Mombasa opened in 2017, but getting to that point was so fraught with controversy that the Export-Import Bank of China declined to fund the final phase from Nairobi to the port of Kisumu (“Reshaping African Agency in China-Africa Relations,” n.d.). From 2017-2020 the SGR was unprofitable, accruing over US\$200 million in operating losses within three years. This was due in part to an operating contract with China Road and Bridge Corporations subsidiary, Afristar, which was recently terminated - operations are currently being transferred to the Kenya Railways Corporation (*Kenya Railways to End SGR Contract with Afristar - International Railway Journal*, n.d.; “Reshaping African Agency in China-Africa Relations,” n.d.).

The SGR project has also been embroiled in the debt-trap diplomacy narrative, which swept up Kenyans and the world when it was revealed that the Mombasa port was utilized as collateral for the SGR loan. The procurement process for the SGR was also fraught with issues, for instance, the China Rail and Bridge Corporation (CRBC) was selected to conduct the feasibility study, and others were barred from doing so. The tendering of subsequent contracts also ignored established competitive bidding processes and were offered directly to Chinese firms. Following years of litigation and media reporting, in 2020 a court of appeals ruled that the SGR was illegal, further intensifying the scrutiny of Kenya-China relations. The SGR was completed at the time of this ruling, but it did set a new precedent for increased government transparency.

The environmental impacts of the SGR are still being assessed, but it is apparent that the ESIA for this project had inadequate stakeholder engagement and lacked sufficient safeguards to protect the environment. A recent study indicates that the project had a significant impact on soil erosion, flooding, sedimentation of waterways,

habitat destruction, and direct impediments to wildlife movement (Nyumba et al., 2021). Despite the inclusion of wildlife underpasses and culverts along the SGR portion crossing through Kenya's Tsavo National Parks, preliminary studies indicate that further mitigation is needed to reduce the effects of noise barriers and minimize illegal human settlements. Kenya's endangered savanna elephants are utilizing crossings mostly at night, a behavioral response indicating stress and some individuals are not utilizing the structures at all (Okita-Ouma et al., 2021). Long-term monitoring guidelines for the SGR (and future development projects) need to be considered to ensure that mitigation and improvements are implemented in a timely manner by responsible agencies (Ambani & Mulaku, 2021).

### **Lamu Port**

A new deep-water port is currently being constructed in Lamu as part of Kenya's US\$23 billion Lamu Port-South Sudan-Ethiopia Transport (LAPPSET) project which aims to meet the infrastructure needs of expanding cities including roads, electricity, and fiber-optic installations. Constructed by the China Communications Construction Company (the same parent organization that built the SGR) the first three berths have recently been completed at the cost of US\$367 million, and 29 more berths are planned in total (Mishra, n.d.). The construction of this second port has been billed as a way to reduce economic dependency on the port of Mombasa, which has faced increased volume in recent decades. The economic viability of the port still remains uncertain, with many citing Lamu's deficient infrastructure and concern over the impacts on Lamu Old Town, a UNESCO World Heritage Site. It also raises the question of why the Kenyan government would want to push business into Lamu from Mombasa, despite the recent construction of the SGR railway meant specifically to move goods inland from Mombasa port.

The construction of the port will impact mangrove forests, a key environmental component for climate resilience (Alongi, 2008). The Lamu river delta, archipelago, and southern Tana River delta just to the south are home to 50% of the country's mangrove forests (South African Institute of International Affairs (SAIIA), 2021). Construction will also disrupt artisanal fishing, which provides income for nearly 70% of Lamu's populace (*Disquiet over Lamu port project*, 2012).

In response to the construction of Lamu port, a coalition named 'Save Lamu' was formed and their submitted response to the *Environmental Impact Assessment Study Report for Construction of the First Three Berths of the Proposed Lamu Port and Associated Infrastructure* is a comprehensive assessment of a poorly conducted ESIA. Save Lamu criticized stakeholder engagement as well as the baseline biodiversity assessment saying:

*"The ESIA report fails to provide the necessary information for appropriately considering alternatives in design and implementation of the project, as well as mitigation measures that will effectively address the negative impacts on the environment and social fabric of the community. Indeed, there are concerns that the expertise of the ESIA consultants is highly lacking, given the significant gaps in the ESIA – both as to procedure (and guessing, or not even addressing impacts, insufficiently addressing and asking for public comment) and as to substance. On analysis of the above concerns, we firmly believe that the Lamu Port will have significant and irreparable damage to the people of Lamu and their environment and unique ecosystems if implemented as is" – Save Lamu (Save Lamu, 2013).*

Much like the SGR railway, the Lamu Port has been shrouded in controversy, with limited transparency by government officials and little to no meaningful stakeholder engagement. As 29 more berths remain to be built,

Lamu and northern Kenya should be a key focus of funding for environmental safeguards as further development appears inevitable.

## VI. Understanding stakeholders and power dynamics

Kenya's policies on biodiversity and climate are relatively robust, and clearly the breakdown of safeguards comes from realities on the ground. Kenya has a very active contingent of non-profits, coalitions, and academic institutions which are well positioned to combat corruption and hold government, financiers, and project contractors to the highest standards of biodiversity and climate protection. With a broad suite of players involved in linear infrastructure projects, Kenya is home to many experts and organizations working diligently to ensure wildlife and climate are protected. The recently completed work by the [Development Corridors Partnership](#) (a 4-year research project which ended in 2021) offers a wide range of materials and insights, including a comprehensive list of key stakeholders and their relative power and influence over development projects (DCP Kenya, 2019). Below is a list of key stakeholders most relevant to linear transport infrastructure.

### Government

- Ministry of Transport & Infrastructure Development (MoT&ID)
- Ministry of Environment & Forestry (MoEF)
- Ministry of Energy (MoE)
- Ministry of Tourism and Wildlife (MoTW)
- National Treasury and Ministry of Planning (MoNTP)
- LAPSET Development Corridor Authority (LDCA)
- Kenya Forest Service (KFS)
- Kenya Wildlife Service (KWS)
- Kenya Ports Authority (KPA)
- Kenya National Highways Authority (KENHA)
- National Environment Management Authority (NEMA)
- National Lands Commission (NLC)

### SOEs

- Kenya Railways Corporation (KRC)
- Kenya Power & Lighting Company (KPLC)

### Finance

- African Development Bank (ADB)
- Gesellschaft für Internationale Zusammenarbeit (GIZ)
- Danish International Development Agency (DANIDA)

### Research

- Jomo Kenyatta University of Agriculture and Technology (JKUAT)
- International Centre for Research in Agroforestry
- Centre for Training and Integrated Research (CETRAD)
- Kenya Forestry Research Institute (KEFRI)
- Katiba Institute of Kenya

- Institution of Surveyors of Kenya (ISK)

### **Community**

- Kenya Wildlife Conservancies Association (KWCA)
- Tana & Athi River Development Authority (TARDA)
- Tsavo Conservation Group (TCG)
- Turkana Development Organization Forum (TUDOF)
- Kerio Valley Development Authority (KVDA)
- Friends of Lake Turkana (FoLT)
- Friends of Nairobi National Park (FoNNAP)
- East African Wildlife Society (EAWLS)
- Community Action for Nature Conservation
- South Nandi Biodiversity Conservation Group
- Dawida Biodiversity Conservation Group
- Mida Creek Conservation and Awareness Group
- Dakatcha Woodland Conservation Group (DWCG)
- Kijaba Environmental Volunteers
- Friends of Kinagop Plateau
- Mt. Kenya Biodiversity Conservation Group

### **International NGO**

- International Fund for Animal Welfare (IFAW)
- United Nations Development Programme (UNDP)
- United States Agency for International Development (USAID)
- Conservation International (CI)
- International Union for the Conservation of Nature (IUCN)
- The Nature Conservancy (TNC)
- United Nations Environment (UNEP)
- World Wildlife Fund (WWF)
- Endangered Wildlife Trust (EWT)

### **National NGO and Civil Society Organizations**

- Tsavo Conservation Group (TCG)
- Kenya Climate Change Working Group (KCWCM)
- Save the Elephants (STE)
- African Conservation Centre (ACC)
- Africa Collaborative Centre for Earth Systems Science (ACCESS)
- Kenya Land Alliance (KLA)
- African Wildlife Foundation (AWF)
- David Sheldrick Wildlife Trust (DSWT)
- African Centre for Open Governance (AFRICOG)
- Conservation Alliance of Kenya (CAK)
- Northern Rangelands Trust (NRT)
- Kenya Coalition for Wildlife Conservation and Management (KCWCM)

## VII. Recommendations

The following are recommendations for stakeholder engagement specifically, sorted by group, on how they can help ensure ESIA's are rigorous, transparent, community-engaged, and publicly available. In the boxes following are broader recommendations for influencing the implementation of linear infrastructure development in Kenya.

### Government of Kenya

- The Kenyan government must hold all foreign direct investment (FDI) projects accountable for meeting the minimum requirements of the ESIA process and ensure a transparent process.
- Ensure financing of projects includes a budget for land acquisition and compensation to ensure parties are properly and equitably compensated.
- Continued educational transfer between Chinese companies and Kenyan workers. Increasing the capacity of the local labor force and ensuring continued available labor to meet hiring requirements.

### Research Institutions

- Research institutions in Kenya are ready to engage in infrastructure development initiatives but often lack funding.
- Creating neutral ground opportunities for collaboration between government, contractors, and research institutions is key to ensuring their involvement in future projects. Support of conferences such as the African Conference on Linear Infrastructure and Environment.

### CSOs, NGOs, Communities

- Kenya's NGOs are eager to engage in LI development, but interviewees representing these NGOs have expressed that Kenya's government does not often reciprocate. Offering capacity-building and collaborative platforms which intermingle stakeholders is key to breaking down institutional silos and increasing cooperation.

### **Priority Recommendations in Kenya**

- Research on subsequent Standard Gauge Railways impacts on ecosystems to influence the construction of new routes.
- For transmission line focused efforts:
  - Systematic research on the impacts of power lines to vulnerable species in Kenya (specifically raptors and cranes) to significantly increase baseline data which can be used to inform future infrastructure project funders. Partners ready to engage include the Center, the Peregrine Fund, and National Museums of Kenya.
  - Sensitivity mapping to further inform mitigation of power line development utilizing methodology similar to that of Paquet et al. (2022).
  - Our key informant from an avifauna-focused NGO also suggests the creation and dissemination of best practices for reducing the impacts of power lines on wildlife with focused capacity building efforts with government, county, and private stakeholders.
- Focused and well-funded capacity-building workshops within three key organizations, Kenya Highways Authority, Kenya Railways Authority, and Kenya Power & Lighting Company, on the importance of biodiversity and existing best practices for protection and mitigation during development.
- Increase the state of knowledge of impacts to wildlife by roads and railways within Kenya. This could be done by coordinating with existing research institutions and NGOs to implement a citizen science effort to increase information about data deficient areas. African Conservation Centre has previously expressed interest in working with the Center for Large Landscape Conservation to implement its citizen science roadkill data collection application, ROaDS (Roadkill Observation and Data System).
- Financial support of the African Conference on Linear Infrastructure and Environment (ACLIE) which offers an opportunity for disjunct stakeholders to engage with one another and catalyze collaboration.

### **Longer-term visions for biodiversity conservation in Kenya**

- Increased government transparency practices. All interviewees suggested that biodiversity conservation may be overlooked or inappropriately valued due to corruption within opaque government actions. Financial lenders may need to implement additional oversight of projects to ensure compliance by officials.
- Creation of more specific language within the Environmental Management Act, which is the legal baseline for public participation during project planning.
- Capacity building in collaboration with the Institution of Surveyors of Kenya (ISK) which governs core participants in land/corridor acquisition for infrastructure projects to ensure that land, developments, livelihoods, and ecological features are properly valued.
- Capacity building for government officials: creating a stronger base of knowledge at the upper echelon of the decision-making process is needed.

- Capacity building for project planners, engineers, and project contractors: bolstering literacy on the importance of environment and climate is needed at all levels of project actors.
- Facilitated collaboration: Communication and siloed project decisions were frequently raised as a main issue when safeguarding biodiversity. There needs to be funding for the creation of coalitions and collaborations which ensure all relevant parties are in contact throughout the project life cycle.
- Further training for professionals carrying out ESIA's, and for regulators reviewing them
- Increased funding for academic projects which can direct early career scientists into this arena
- Capacity-building trainings on how to conduct effective and meaningful stakeholder engagement – with a focus on government entities
- Accessible and free training on global best practices for safeguarding wildlife and biodiversity from the impacts of linear infrastructure.

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## Appendix A: Methodology

The complexity of LI project development and safeguarding means that understanding local and regional cultural, political, historical, and environmental conditions is essential. The FOCUS BRI research process was developed to ensure consultation with the experts in their fields and locations, who also either constitute or represent overlooked or marginalized perspectives. To this end, the project relied on key informant interviews, focus groups, and the field expertise of its team members. Below, we detail our methodology across two key contributions of FOCUS BRI:

### 1. Country Case Studies

#### A. Country Selection

Country selection played an important role in defining project bounds and ensuring that goals may be effectively and efficiently met. Countries without involvement with the BRI (as evidenced by an MoU) were removed from our list, leaving 140 countries (as of September 2021). Next, we decided to focus our efforts in Africa and Asia, which represent the majority of BRI investment. Additionally, CLLC maintains a widespread professional network, decades of combined experience, and ongoing programmatic work in these regions. To further narrow the list, a dataset of indicators was built around the key selection criteria, including:

1. Level of Chinese investment
2. Biodiversity
3. Existing network and stakeholder connections
4. Climate vulnerability

With different metrics populated for each category and remaining country, we developed a function to combine and rank countries, which resulted in a prioritized list. We then selected twelve countries from the top 30, with an eye toward a diverse and representative suite of country case studies.

#### B. Case Study Development

The twelve country cases were developed through two main methods: a desk-based research process and key informant interviews. We opted to conduct in-depth reviews of relevant secondary data prior to carrying out interviews. In this way, researchers became familiar with the country context, the relevant bodies of work, and potential interviewees who are actively involved in work related to either environmental or biodiversity conservation or infrastructure development. This process consisted of a secondary literature review guided by a research template, to ensure consistency and efficiency across the country cases. The literature review captured relevant academic work and gray literature pertaining to biodiversity issues, Chinese infrastructure development and relations, and national policy and implementation landscapes for biodiversity protection and LI project development. The following briefly summarizes the report sections:

1. **Introduction** - including country context, relations with China, and broader transboundary issues.
2. **Linear infrastructure investment landscape** - including statistics, projects, type of projects, and agencies involved.
3. **Biodiversity landscape** - describing the biodiversity characteristics and hotspots, national conservation spaces and policy frameworks, and the key work focused on conserving biodiversity.

Agrobiodiversity considerations were also noted where relevant.

4. **Country policy and planning landscape for biodiversity and infrastructure** - the national environmental and biodiversity laws and regulations, ESIA processes, actors in charge and their role, and especially the way these pieces play out in the context of large LI projects.
5. **Exemplary projects** - describing illustrative projects, whether successes or failures, to add texture to the above information.
6. **Understanding stakeholders and power dynamics** - highlighting the network of stakeholders and the degree and ways in which these stakeholders can influence processes.
7. **Recommendations** - gathered from research and interviews; what interventions and investments can best improve LI development outcomes for biodiversity, local communities, and climate, and how might they proceed.

Following the secondary literature review, interviews were organized and conducted by the country research lead. To connect with interviewees, leads contacted existing CLLC connections in the country, relied on personal networks, and reached out to voices identified as especially relevant in these fields in-country. Interviewees thus consisted of actors from the academy, non-governmental organizations, government, the private sector, or communities. We aimed to gather 3-5 key informant interviews to ground the research, add texture to the information, fill gaps and connect to resources, and share their expert opinions on barriers, opportunities, and more.

Interviews followed a semi-structured template, tailored to the informational needs of the specific report and interviewee. The main sections of the interviews were:

1. Introduction to the FOCUS project, interview, and purpose.
2. The current country “landscape” of implementation processes, actors, and resources.
3. Understanding the formal and informal spaces for coordination and inclusion of diverse stakeholders and interests into these processes.
4. The barriers to safeguard implementation and how to overcome them.
5. Any additional/more specific questions
6. Concluding remarks

Interviews were recorded for ease of transcription and information gathered during interviews was then integrated into reports. Upon the completion of individual country case studies, a process of synthesis was initiated to uncover the trends and common threads found across these twelve countries and within each region (Africa, Central Asia, Southeast Asia). These findings were then incorporated into the summary report.

## 2. Spatial Context and Mapping

### A. Context maps

We used ARCmap 10.8 and R Studio 2021.09.1+372 to develop all maps for this project. The aim of the first set of maps was to provide contextual detail by capturing the intersections between protected areas (PAs) and existing infrastructure in a given country. To visualize the diversity of PA uses within a country, we classified them according to the IUCN categories (Ia, Ib, II, III, IV, V, and VI). These categories are internationally

recognized standards that classify PAs according to their management objectives. All PA polygons were acquired from the World Protected Areas layer found on the Protected Planet clipped to country boundaries (Table A). To add existing linear infrastructure (LI) line shapefiles for each LI type (roads, rails, and transmission lines) were clipped to the countries' borders. These layers were overlaid with the PAs to highlight the intersection of LI and PAs. The Global Roads Open Access Data Set (gROADS) (CIESIN - Columbia University, and ITOS - University of Georgia, 2013), a global road layer for 1980-2010, was used to represent the road network. The railway layer was acquired from the World Food Program's global railway dataset, which was last updated in 2017. For the transmission lines, we used Aderne et al's (2019) dataset, which was last updated in 2019 (Table A). A more updated road layer (up to 2018), the Global Roads Inventory Project (GRIP) roads dataset was clipped to the country boundary and is represented in a separate map. The higher density of roads in the GRIP dataset often overshadows railways and transmission lines if visualized on the same map with PAs. We include the more recent dataset to highlight that spatial data needs regular updating to reflect continued LI construction and that our maps offer problem setting context but underrepresent the extent of LI interacting with wildlife habitat.

### **B. Composite Biodiversity Index and cores**

We created a Composite Biodiversity Index (CBI) to identify regions of high biodiversity. To develop a CBI layer for each country, we applied a method created by Dr. Tyler Creech for the Center for Large Landscape Conservation. Dr. Creech created the CBI based on nine existing biodiversity indices related to species richness, endemism, abundance, intactness, ecological condition, rarity, and complementarity. The value of CBI ranges from 0 (lowest biodiversity value) to 1 (highest biodiversity value). We selected three percentile cut-offs from the CBI layer, representing biodiversity richness areas by 70th, 80th, and 90th percentile, which we refer to as biodiversity cores. For more details of the CBI methodology, see the LISA project spatial annex<sup>1</sup>. The amount of overlap between PAs and CBI is of importance to spatial planning for LI as not all CBI areas have formal protection but provide for connected wild populations. To demonstrate this point, we overlay PAs from IUCN Categories Ia, Ib, and II, (i.e., areas with higher protection regulations and supported by country environmental and biodiversity laws), Key Biodiversity Areas (KBAs) - which enjoy wide acknowledgement as important for long-term conservation of wildlife though are not always formally protected, - and CBI. We acquired KBAs from Birdlife International (updated 2021) and clipped them to the respective country's boundaries. We then overlaid the resulting PAs and KBAs over the CBI layer to highlight protection provided to important biodiversity areas.

Finally, to identify where Chinese-funded projects intersect with PAs and top percentile CBI cores, we looked to Chinese-funded LI in the AidData dataset within each country. AidData captures projects with development, commercial, or representational intent that are supported by official financial and in-kind

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<sup>1</sup> USAID ((U.S. Agency for International Development). 2021. Annex 1: Spatial analyses of linear infrastructure threats to biodiversity in Asia. *In*: Building a foundation for linear infrastructure safeguards in Asia. Authors: Creech T, Stonecipher G, Bell M, Clevenger AP, Ament R. Prepared by Perez, APC for Contract no. AID-OAA-I-15-00051/AIDOAA-TO-16-00028, ESS WA#13. U.S. Agency for International Development, Washington, DC. 98 pp.

commitments (or pledges) from China between 2000 and 2017, with implementation details covering a 22-year period (2000-2021) (Table A). Given the inconsistent sharing of data, dearth of publicly available geospatial information for LI projects, and many disparate institutions involved, AidData’s list is one of the most comprehensive and publicly available to date. We filtered results to include only roads, rails, and transmission projects. The layer for Chinese-backed LI was overlaid with PAs, KBAs, and the three percentile cores, summarizing the impact of such LI on biodiversity-rich regions and the incidences of Chinese LI impinging on PAs.

### C. Summary statistics from our analyses (Appendix B)

We converted CBI cores for each percentile (70th, 80th, and 90th) to polygons, then calculated the area of each polygon using the ‘Calculate Geometry’ tool in Arcmap. Each of the cores was clipped to the category I and II PA boundaries, resulting in layers representing the overlap of each core with PAs. The area of the overlap layers was similarly calculated using the ‘Calculate Geometry’ tool. We then determined the percentage of the PA overlap area with the total core area. We then clipped AidData’s LI layer to each country boundary. The length of each of the line attributes within the clipped layer was calculated using the ‘Calculate Geometry’ tool. The linear length of each LI type (roads, rails, and transmission lines) was calculated using the ‘summary statistics’ function. We repeated this process for each of the percentile cores by clipping the LI to each core boundary in the first step. Finally, the Chinese LI layer was also clipped using the PA (Category I and II) polygons. The length of each of the line attributes within the clipped layer was calculated using the ‘Calculate Geometry’ tool. The length of road for each of the LI type (roads, rails, and transmission lines) was calculated using the ‘summary statistics’ function.

**Table A.** Datasets used to visualize protected areas and linear infrastructure in each of the 12 countries chosen for FOCUS-BRI

| Dataset                      | Year Last Updated | Geographic Scale                 | Dataset Format           | Source  | Data Download link  |
|------------------------------|-------------------|----------------------------------|--------------------------|---|---|
| World Protected Areas (WDPA) | 2021              | Global (separated by continents) | Vector polygon shapefile | UNEP-WCMC and IUCN (2021)   | <a href="https://protectedplanet.net">Explore the World's Protected Areas (protectedplanet.net)</a>   |
| gROADS                       | 2010 (1980-2010)  | Global                           | Vector lines shapefile   | CIESIN - Columbia University, and ITOS - University of Georgia( 2013) | <a href="https://www.globio.info/download-grip-dataset">https://www.globio.info/download-grip-dataset</a>   |
| GRIP Road Data               | 2018              | Global                           | Vector lines shapefile   | Meijer et al. (2018)  | <a href="https://sedac.ciesin.columbia.edu/data/set/groads-global-roads-open-access-v1">https://sedac.ciesin.columbia.edu/data/set/groads-global-roads-open-access-v1</a> |

|                              |      |        |                           |   |  |
|------------------------------|------|--------|---------------------------|---|--|
| Global Transmission Lines    | 2019 | Global | Vector lines shapefile    | Arderne, Christopher, Nicolas, Claire, Zorn, Conrad, & Koks, Elco E. (2019). Data from: Predictive mapping of the global power system using open data [Data set]. In Nature Scientific Data (1.1.0, Vol. 7, Number Article 19). Zenodo. <a href="https://doi.org/10.5281/zenodo.3538890">https://doi.org/10.5281/zenodo.3538890</a> | <a href="https://data.humdata.org/dataset/global-railways">Data from: Predictive mapping of the global power system using open data   Zenodo</a> |
| Global Railway               | 2017 | Global | Vector lines shapefile    | World Food Program/ Humdata   | <a href="https://data.humdata.org/dataset/global-railways">https://data.humdata.org/dataset/global-railways</a>                                  |
| Key biodiversity areas - KBA | 2021 | Global | Vector polygon shapefile  | BirdLife International (2021)   | <a href="https://github.com/aiddata/china-osm-geodata">Key Biodiversity Areas GIS Data Request</a>   |
| Chinese development projects | 2021 | Global | Vector polygon shapefiles | Custer et al., 2021 - AidData   | <a href="https://github.com/aiddata/china-osm-geodata">https://github.com/aiddata/china-osm-geodata</a>  |

### Limitations

This project was exploratory and survey-oriented in nature. It is intended to be a first step that sketches the biodiversity, infrastructural, and local policy landscapes in each country. As such, it was also intended to raise important and possibly overlooked questions and issues for funders to direct their money. Given the scale and scope of this project, there were several limitations. First, it would be practically impossible to detail the complete policy landscape of each country, as they are both vast and constantly evolving over time. Second, we used spatial data to set the context for this project. Due to data limitations, our maps are likely very conservative. They do not include spatial data for planned LI, nor the expansion of existing LI. Instead, we highlighted only existing LI to showcase how biodiversity is currently impacted. Finally, due to the exploratory nature of this project, we gathered information to address particular foci in our reports and, thus, our methods did not lead to a comprehensive review.

## Appendix B: Spatial Data Tables

The following tables provide summary information for the spatial analysis of PAs, biodiversity areas, and Chinese-funded LI.

### PAs (IUCN categories I and II) and CBI cores overlap

| Kenya   | 70th Percentile Core | 80th Percentile Core | 90th Percentile Core |
|---|----------------------|----------------------|----------------------|
| CBI Core Area (km <sup>2</sup> )                | 174124               | 116137               | 56243                |
| Overlap with Protected Areas (km <sup>2</sup> ) | 29357.6              | 26807.5              | 22073.2              |
| Percentage of CBI core within PAs (%)           | 16.8602              | 23.0827              | 39.2461              |

### Chinese funded LI across Kenya

The CF LI dataset was clipped by Kenya's boundaries and line length of each LI Mode was calculated.

| LI Mode           | Length |
|-------------------|--------|
| Road (km)         | 414.02 |
| Rail (km)         | 608.88 |
| Transmission (km) | 180.13 |

### Length of Chinese funded LI within PAs (IUCN categories I & II) in Kenya

The CF LI dataset was clipped within the PA (Category - I, II) boundaries.

| LI Mode          | Length     |
|------------------|------------|
| Road (km)        | 1.9        |
| Rail (km)        | 111.448063 |
| Transmission(km) | 0          |

### Length of Chinese funded LI within CBI Cores in Kenya

The CF LI dataset was clipped by boundaries of every percentile core and line length of each LI Mode within each core was calculated.

| LI Mode           | 70th Percentile Core | 80th Percentile Core | 90th Percentile Core |
|-------------------|----------------------|----------------------|----------------------|
| Road (km)         | 105.951414           | 59.95382             | 0                    |
| Rail (km)         | 385.028797           | 281.554209           | 168.973515           |
| Transmission (km) | 48.974499            | 28.6385              | 11.258               |