



## **FOCUS-BRI Country Report**

**Framing Opportunities for Conservation by Understanding Safeguards  
in the Belt and Road Initiative**

# **Nepal**

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## Acronyms

ADB	Asian Development Bank
BRI	Belt and Road Initiative
CBI	Composite Biodiversity Index
CDB	China Development Bank
CDC	Compensation Determination Committee
CHAL	Chitwan-Annapurna Landscape
CHEXIM	China Export-Import Bank
CITES	Convention on the International Trade of Endangered Wild Flora and Fauna
DFID	Department for International Development of the United Kingdom
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EISP	Environmental Impact Study Project
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign Direct Investment
FPIC	Free, Prior, and Informed Consent
GDP	Gross Domestic Product
IMF	International Monetary Fund
IUCN	International Union for the Conservation of Nature
JICA	Japan International Cooperation Agency
KBA	Key Biodiversity Area
LI	Linear Infrastructure
MEA	Multilateral Environmental Agreement
NEA	Nepal Electricity Authority
NGO	Non-governmental Organization
NTCC	National Tiger Coordination Committee (NTCC)
ODA	Official Development Assistance
PA	Protected Area
SDC	Swiss Agency for International Development
SRN	Strategic Road Network
TAL	Terrai Arc Landscape
UN	United Nations
UNFF	United Nations Forum for Forest Secretariat
USAID	United States Agency for International Development
WCCB	Wildlife Crime Control Bureau
WCCCC	Wildlife Crime Control Coordination Committee
WWF	World Wide Fund for Nature

## Nepal Factsheet



Figure 1. Political map of Nepal. Source Nationsonline.org.

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

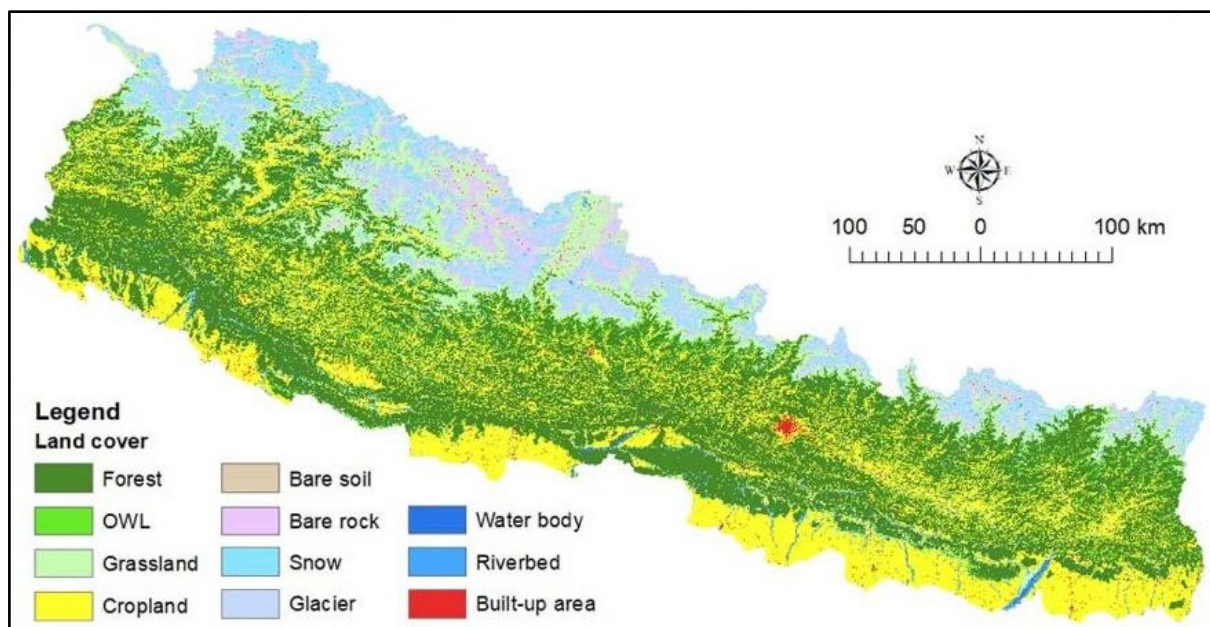
Region	South Asia
Capital	Kathmandu
BRI Corridor	Trans-Himalayan Multi-Dimensional Connectivity Network (Not technically an EC but similar)
BRI investment (\$ in millions)	4,500
Income Status	Low Income
Population	30,378,055
GDP	Per capita US\$ 1191
Land Area	147,516 km <sup>2</sup>
Protected Areas (km <sup>2</sup> )	12,705 km <sup>2</sup>
Species Richness (ranking)	33
Biodiversity Intactness (ranking)	43
ND-GAIN Country Index; Climate vulnerability (ranking)	129
GDP Growth Rate Projections	4%
Inequality (Gini Coefficient)	32.8 (2010-2011)
Human Development Index (HDI)	0.602
Key exports	Palm and soybean oil, woolen carpets, polyester yarn, juices, tea and spices (cardamom), textiles, jute goods, readymade garments, and apparel

## I. Introduction

Situated in the Himalayas, Nepal is landlocked and stretches roughly 1,800 km from east to west and a quarter of that from north to south. It is bordered to the north by the People's Republic of China, and to the east, south, and west by India (Fig. 1). The country is divided into three topological areas: the mountains in the north, the hill and Siwalik regions in the middle, and the Terai (lowland plains) (ADB, 2021). Nepal hosts eight of the world's ten highest mountains, including Mt. Everest, Mt. Lhotse, and Mt. Makalu. The Nepali Himalayan elevation gradient is one of the largest bioclimatic elevation gradients in the world, extending from 67 m in the south to 8,848 m in the north within a mere 200 km, and including tropical, subtropical, temperate, subalpine, and alpine climatic zones (Vetaas & Grytnes, 2002).

Given its varied geographical and climatic conditions, Nepal is considered one of the world's top 20 global biodiversity hotspots and has a well-established network of Protected Areas that includes 12 National Parks, 1 Wildlife Reserve, 1 Hunting Reserve, 6 Conservation Areas, and 13 Buffer Zones extending from lowland Terai to high mountains, covering 23.39% of the total country's land (DNPWC, 2021). As a mega-biodiversity hotspot, it is home to hundreds of endemic wildlife species. These include the Bengal tiger, the Asiatic elephant, one-horned rhinoceroses, clouded leopard, corsac fox, marbled cat, Indian pangolin, Chinese pangolin, red panda, snow leopard, Tibetan fox, and Tibetan wolf.

Nepal's land area is dominated by forests which cover around 6.54 million hectares (44.47% of total land area) followed by 4.22 million hectares of other land<sup>1</sup> (28.88%), 3.22 million hectares of cropland (21.88%), and 0.38 million hectares of grassland (2.60%) (Fig. 2). In addition, settlement and wetland cover of Nepal comprises of 0.17 and 0.18 million hectares, which comprise 1.15% and 1.22% of the total area of the country respectively (Ministry of Forests and Environment, 2019)

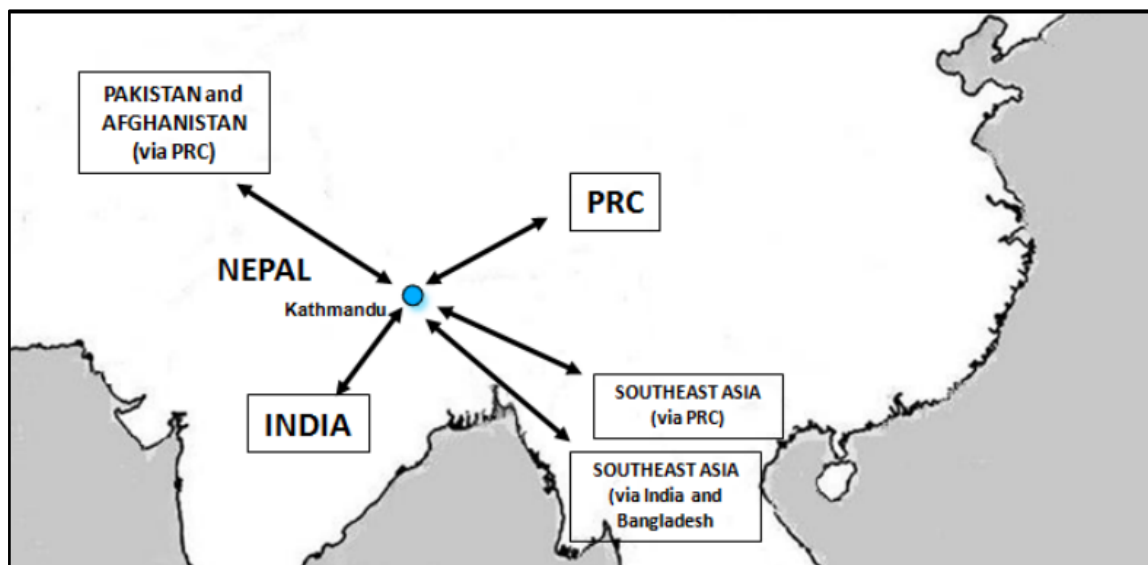


*Figure 2. Land use and land cover in Nepal. Source: ICIMOD, 2021.*

<sup>1</sup> Other categories of land use include bare soil, rock, ice, and all unmanaged land areas that do not fall into any of the other five categories. It allows the total of identified land areas to match the national area, where data are available.

Nepal is diverse not only in landscape but people. It is home to approximately 7.4 million people from 126 ethnic groups, such as the Chhetri (16.6%), Brahman-Hill (12.2%), Magar (7.1%), Tharu (6.6%), Tamang (5.8%), Newar (5%), Kami (4.8%), Musalman (4.4%), Yadav (4%) and Rai (2.3%) (MoFA, 2022). The population primarily relied on an agrarian economy until two decades ago, when it transitioned to service-oriented sectors. Currently, service sectors account for 57% of the economy followed by agriculture (28%) and industry (14%). Since the 1980s Nepal's average GDP growth rate has hovered around 4%, with most growth attributed to service sector labor. However, 66-68% of Nepal's population remains engaged in and dependent on agriculture (FAO, 2022; USAID, 2022).

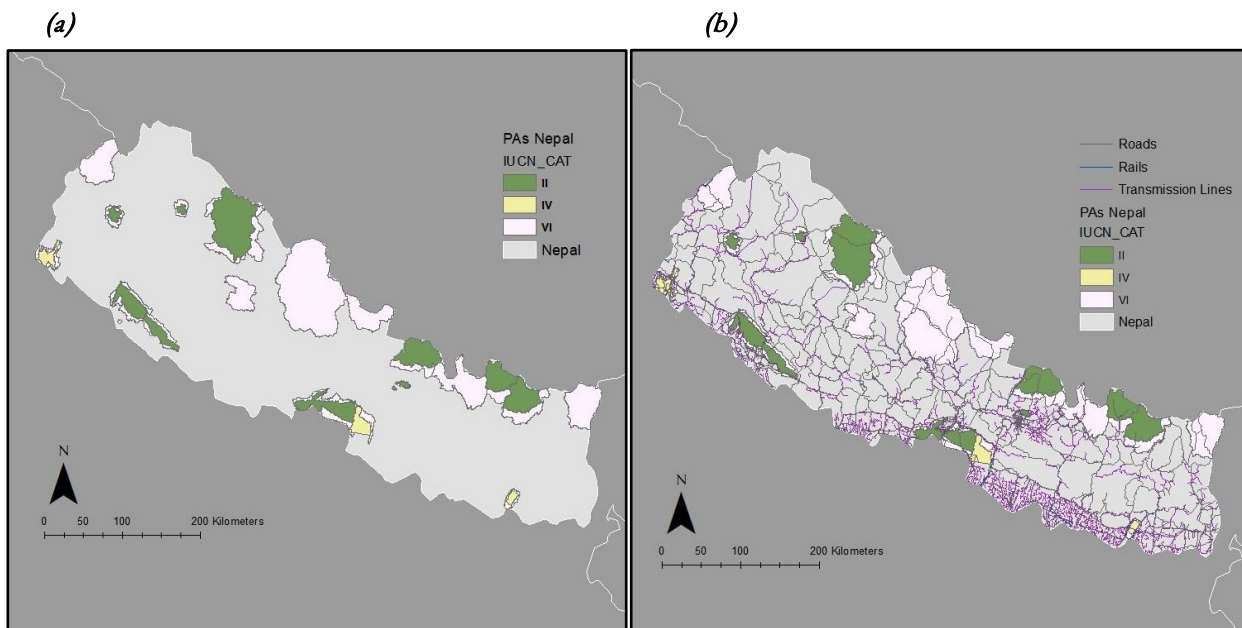
As a landlocked, mountainous country, there is limited connectivity and high dependence on neighboring countries for trade and access to trade routes (Fig. 3.). This increases trading costs, which reduces the competitiveness of Nepali products both domestically and externally. The northern border runs along the high Himalayan range, with about nine border crossings. However, most are not feasible for trade, due to steep, alpine terrain and low-volume roadways, some of which only operate seasonally. Those that are operational have multiple logistical challenges such as limited space for a dry port to coordinate large volumes of traffic. Conversely, Nepal's southern border with India is porous, which leads to large, uncontrolled flows of people and goods. There are 15 mutually agreed crossings of which seven are operational. The closest seaport for foreign trade is Kolkata, which lies 400 km from Nepal's border. This port is very congested and roads leading to it from the Nepal border are in poor condition. The Nepali government has been attempting to diversify its trade and use sea ports in Bangladesh, but there are sensitivities and transit issues with India which have hindered discussions (Rana & Karmacharya, 2014).



**Figure 3.** The strategic location of Nepal, PCR refers to the People's Republic of China. (source: ADBI, 2014)

The road networks in Nepal are thus much denser along the southern border and lowland than in the mountainous north. Many overlap with protected areas (PAs) and parks (Fig. 4). This overlay highlights the extent of the road systems and their prevalence across Nepal's PA system. Roads crisscross these areas, with a higher density of roads outside of PAs.





**Figure 4 (a).** The protected areas in Nepal are categorized according to IUCN classification, where category I is the most regulated and IV is the least; **(b)** Linear infrastructure intrude into protected areas across the country. See Appendix A for Methodology.

## II. Linear Infrastructure Investment Landscape

Linear infrastructure (LI) in Nepal consists of energy transmission and transportation infrastructure. Due to the topographical conditions of the country, roadways are the main mode of transport for the majority of the population. Nepal’s road network comprises the Strategic Road Network (SRN), which includes the national highways and feeder roads that stretch a total length of 73,610 km. This is the longest linear infrastructure network in the country. The country also has a rather dense network of transmission lines (in lowland areas) and 3 large railway development projects spanning the length and breadth of the country. The Nepali government is currently repairing, upgrading, and constructing new roads and highways across the country. Plans for these activities are laid out by the Department of Roads in its annual Statistics of National Highways report (Government of Nepal, 2021).

### Railways

The Nepalese Railway sector was established in 1927, with three narrow gauge railway lines spanning 151 km to connect economically important provinces for the movement of timber and other commodities. However, due to the unprofitability of the railway and issues in operations over the decades, ownership of the railway routes was passed on to multiple agencies before shutting down completely. The Nepali government, however, maintained the ambition of installing railway tracks and establishing operational railway routes across Nepal and have also instituted a Department of Railways (in July 2011) and more recently, the Nepal Railway Company Limited (in 2019) for overlooking railway development projects. The ministry of physical planning and construction has set a target to develop 4,000 km of railway tracks in the next 20 years. These proposed railway projects are in various stages of planning and development including completion of feasibility studies, land acquisition processes, and clearing of forest areas for laying tracks.

There are three main railway projects proposed in Nepal:

1. East - west railway project (1,056km)
2. Kathmandu- Kerung railway (72km)

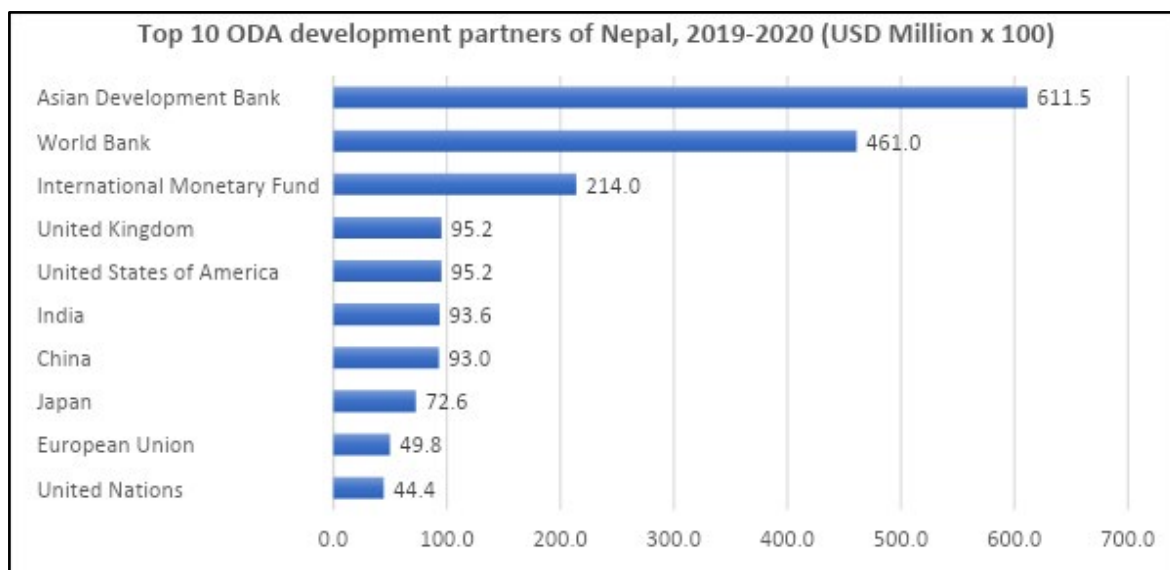
The Kathmandu - Kerung railway project is the Nepalese route for a larger 600 km long project connecting Kathmandu to Shigtse. It is a Chinese-funded project where the feasibility study has also been undertaken by Chinese agencies. The total length of the project is almost 600 km with 72 km in Nepal and about 527 km in China. The project is aimed at increasing accessibility for a population of more than 1 billion people in Nepal and China and the estimated cost of the project is approximately US\$2.93 billion.

3. Raxaul–Kathmandu Railway (135.8 km)

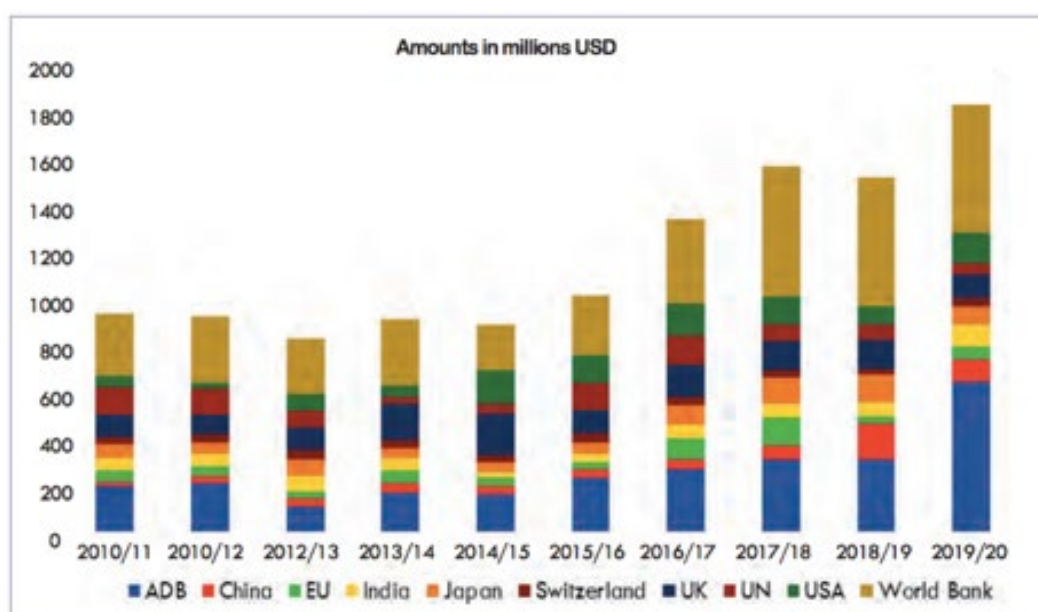
## **Roads**

Historically, Nepal has depended on foreign investment for the implementation of its national development plans. The major investors and financiers include multilateral organizations, such as the World Bank and Asian Development Bank (ADB), as well as international governmental institutions including the United States Agency for International Development (USAID), the Swiss Agency for Development and Cooperation (SDC), the Japan International Cooperation Agency (JICA) and the Department for International Development of the United Kingdom (DFID)(Murton & Plachta, 2020). In addition to these, India and the People's Republic of China have also been very important funders for Nepal, especially for a large majority of regional cooperation and integration connectivity projects (Rana & Karmacharya, 2014).

In 2019-20, the Official Development Assistance (ODA) disbursements in Nepal were calculated to be US\$2,002.8 million, 26.9% more compared to the previous year's ODA of US\$1,578.5 million. Fig. 5 lists Nepal's top ten development partners as reported in the 2019-2022 Development Cooperation Report (Ministry of Finance, 2019). The top disbursing multilateral partners were the ABD, the World Bank, the International Monetary Fund (IMF), the European Union, and the United Nations (UN) (Fig. 6). The top disbursing bilateral partners were the United States of America, the United Kingdom, India, China, and Japan (Fig. 6). While ODA increased in 2019/20, almost 26% of the total amount ( $\approx$  US\$512.9 million) was disbursed specifically for COVID-19 response and recovery. It is also worthwhile to note that 69.9% of the ODA were loans, while 18.7% were provided as grants or through technical assistance (11.3%).



**Figure 5.** The amount and proportion of ODA from bilateral and multilateral development partners. Source: Compiled by the author from Development Cooperation Report (Ministry of Finance, 2019).

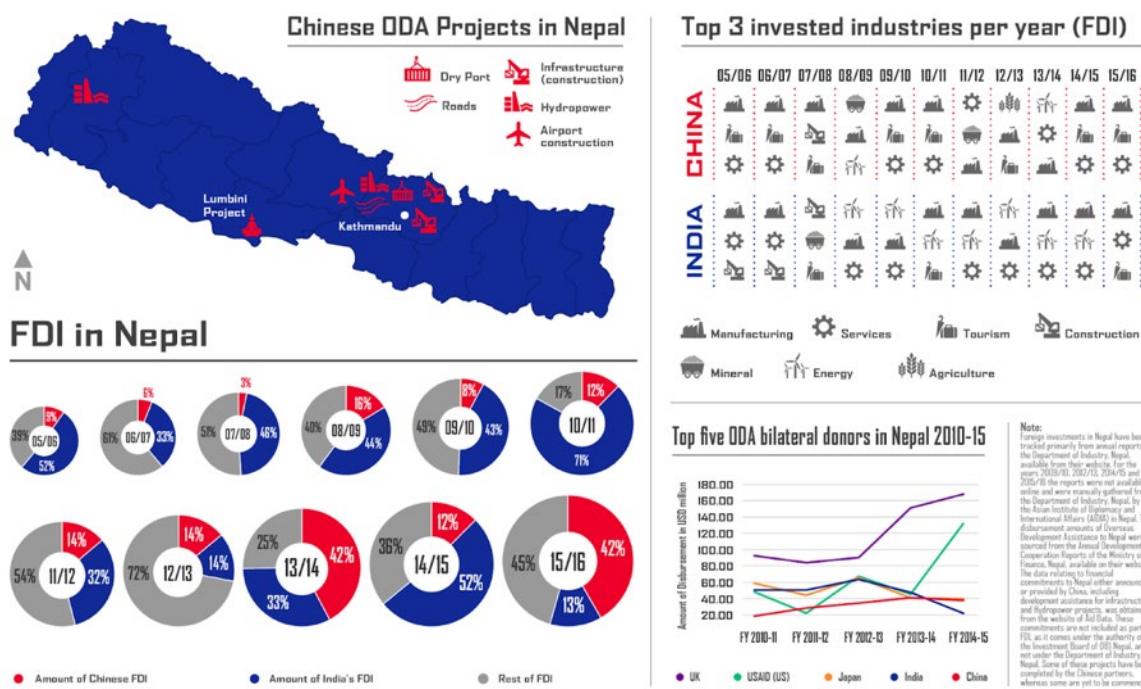


**Figure 6.** Trends of ODA over a decade of the top ten highest-disbursing partners. Source: Development Cooperation Report (Ministry of Finance, 2019).

### BRI Activities in Nepal

Nepal and China have a history of bilateral exchanges and cooperation. Due to its geostrategic location between two of the fastest growing economies of the world – India and China – Nepal is in a position of both challenge and opportunity. On one hand, Nepal has been able to secure investments from both India and China. Despite different sizes and geopolitical sensitivities, Nepal and China maintain an outward image of cordiality. Nepal's diplomatic relations with China were established in 1955, after the Chinese Communist Party annexed control over Tibet. This was followed by the signing of a series of boundary treaties and protocols for international cooperation including numerous bilateral commitments to infrastructure development. Nepal's National Planning Commission's five-year development plans were initially (1956) largely based on models established by Soviet and Chinese Communist governments.

China's support of Nepal following the devastating 2015 earthquakes played a major role in the reconfiguration of the political and economic relations between the two countries. Multiple trade and commercial roads were blocked due to the earthquake and landslides, and as a result, the Chinese and Nepali governments opened multiple emergency routes. China also provided significant aid and humanitarian relief to Nepal. In June 2015, at the International Conference on Nepal's Reconstruction, the Chinese Foreign Minister committed RMB 4.7 billion (US\$480 million) for infrastructure repair and development across Nepal. Furthermore, this period closely paralleled extreme tensions between Kathmandu and Delhi, which escalated due to a fuel blockade and ethnic conflict in southern Nepal in the fall of 2015. This encouraged closer ties and engagement with China and Chinese actors, as a means of counterbalancing the nation's historic dependency on India. Chinese investments in 15/16 made up for 42% of Nepal's total FDI, 30% more than the previous year while India's investment reduced by 39% (Fig. 7).



**Figure 7.** Chinese investments in Nepal from 2005-2016. Source: Gateway House, 2016; Accessed from: <https://www.gatewayhouse.in/chinese-investments-nepal-2/>.

Nepal was an early signatory to China's Belt and Road Initiative (BRI) in 2014. According to the Nepali National Bank, China is the nation's second-largest investor with approximately US\$255 million in FDI. More than 99% of Chinese FDI is concentrated in the manufacturing sector (primarily cement industries), hydropower, and related infrastructure (Nepal Rastra Bank, 2021). The dominant sectors for Chinese investment include hydropower, transport (roads, highways, bridges, railways), other infrastructure (transmission lines, ports), and industries (Asian Institute of Diplomacy and International Affairs, 2018).

Overall, Nepal is very accepting of Chinese investments and collaboration with Chinese actors, especially under the framework of the BRI in sectors including infrastructure, economic development, services, technology transfer, cultural collaboration, and tourism (Duwadi, 2020). The government of Nepal expects that BRI investments will not only help build infrastructure, but also shape the economic landscape of the country by developing local industries and improving living standards for low-income groups. Between 2008 and 2019, China had signed energy and transport infrastructure project worth US\$4452.85 millions (Table 2). As per Nepal's Aid Management System, China has already disbursed over US\$755 million out of USD\$1607 that was committed for various projects (Table 3).

**Table 2. CDB and CHEXIM infrastructure loans to Nepal 2008-2019**

Project	Type	Borrower	Lender	Signed	Total (USD millions)
West Seti Hydropower Project (Chinese Covering 75% of the Cost)	Hydroelectric	SOE	CHEXIM	2015	1350.00
Budhigandaki Hydroelectric Project	Hydroelectric	Public	CHEXIM	2017	2500.00
Trishuli-3A project	Hydroelectric	SOE	CHEXIM	2011	151.70
Upper Trishuli III Dam	Hydroelectric	Public	CHEXIM	2011	200.00
Pokhara International Airport	Air Transportation	Public	CHEXIM	2016	215.96
MA 60 and Y12 air crafts purchase	Air Transportation	SOE	CHEXIM	2016	35.19
				Total: US\$4452.85	

**Table 3. Current Chinese investments in Nepal. Source: [Ministry of Finance, Aid management system.](#)**

Project Name	Sector	Donor	Commitments (USD)	Disbursements (USD)
WASH ,Skill Development and Education Support	Education	China Foundation for poverty Alleviation	1,055,990	958,092
Upper Trishuli 3A Hydroelectric Project	Electricity	China	211,279,825	160,948,453
Upper Trishuli 3A - Kathmandu 220kV Transmission Line and 132kV Line Bay Extension Works Project	Hydro Electricity	China	24,335,542	13,684,691
Tatopani Frontier Inspection Station Project	Commerce, Economic Affairs	China	13,637,514	13,718,628
Targeted cash assistance for Nepal's Reconstruction	Peace And Reconstruction	China	10,000,000	5,093,531
Syaprubesi Rasuwagadhi Road Project	Road Transportation	China	32,544,379	8,509,453
South- South and Triangular Cooperation Project: Improving maternal and women's health services in Nepal in development and humanitarian contexts	Health	China, United Nations Population Fund	637,500	595,682
Rural Water Supply and Education Support Program	Drinking Water	China Foundation for poverty Alleviation	322,375	0
Procurement of Aircrafts from China ( 1 MA 60 3 Y12E )	Tourism	China	30,950,910	32,050,894
Post-Disaster Reconstruction Aid Project Plan	Earthquake Reconstruction	China	483,137,602	12,663,652
Pokhara Regional International Airport	Air Transportation	China	212,916,857	118,028,183
Nepal National Armed Police Academy	Home Affairs	China	32,624,831	26,956,161
Medical Equipment for National Ayurveda Research and Training Center	Health	China	0	2,479,433
Medical Equipment for B.P. Koirala Memorial Cancer Hospital	Health	China	0	2,254,030

Livelihood Recovery for Peace (LRP) Project	Others - Economic	China, Individual donor (private), Korea International Cooperation Agency, United Nations Children's Fund, United Nations Development Programme	23,427,364	20,692,998
Improvement of Kathmandu Ring Road in Nepal	Road Transportation	China	34,509,884	33,154,069
Emergency Relief Goods (Three Batches)	Housing	China	22,546,181	22,546,181
Emergency Petrol Products	Commerce	China	0	1,771,486
Emergency Medical Supplies and Epidemic Prevention Supplies	Health	China	3,220,883	3,220,883
Economic and technical cooperation (small projects)	Earthquake Reconstruction, Others - Economic	China	299,837,274	125,389,359
Donation of security equipment	Home Affairs	China	3,831,135	4,241,228
Comprehensive Disaster Risk Management Programme (CDRMP)	Livelihood	China, Department for International Development, European Union, India, Japan, Korea International Cooperation Agency, United Nations Development Programme, United Nations International Strategy for Disaster Reduction, World Bank Trust Funds	32,594,713	32,112,567
Budgetary Support (China)	Energy	China	133,219,143	113,219,143
Banepa polytechnic school	Education	China	1,028,099	1,316,644
			1,607,658,001	755,605,441

### III. Biodiversity Landscape and Protected Regions in Nepal

Nepal is home to diverse flora and fauna and massively varied ecosystems that range from the lowland Terai region to the Himalayas. The diverse climatic and geographic conditions have favored a high diversity of flora and fauna in Nepal. Although Nepal occupies only 0.1% of the global area, it harbors 3.2% and 1.1% of the world's known flora and fauna, respectively.

Nepal is home to nearly 5 percent of all mammals, harboring 208 species. Among these, 9 species are critically endangered, 25 are endangered, 14 are vulnerable, and 7 are near threatened, according to the IUCN Red List. Additionally, 867 species of birds are recorded in Nepal and many of the forest birds inhabiting the depleted tropical, subtropical, and lower temperate forests are threatened. The Convention on the International Trade of Endangered Wild Flora and Fauna protects 50 species of mammals, 108 species of birds, 2 species of crocodiles, 2 species of Sauria, 8 species of serpents, 17 species of turtles and tortoise, 2 species of amphibian, and 3 species of butterfly found in the country. Some of the most charismatic species of conservation concern are the royal Bengal tiger, greater one-horned rhinoceros, Asian wild elephant, snow leopard, Himalayan musk deer, Himalayan black bear, Indian pangolin, Chinese pangolin, large Indian civet, swamp deer, and nilgai. Among reptiles, the Asiatic rock python, gharial crocodile, marsh crocodile, and monitor lizard are found in Nepal (Department of Road, 2022).

Protected areas (PAs) in Nepal are categorized into six types: National Parks, Strict Nature Reserves, Wildlife Reserves, Hunting Reserves, Conservation Areas, and Buffer Zones (Table 4). In addition, ten Ramsar sites<sup>2</sup> were also declared in Nepal between 1988 and 2008 (Bhandari, 2009).

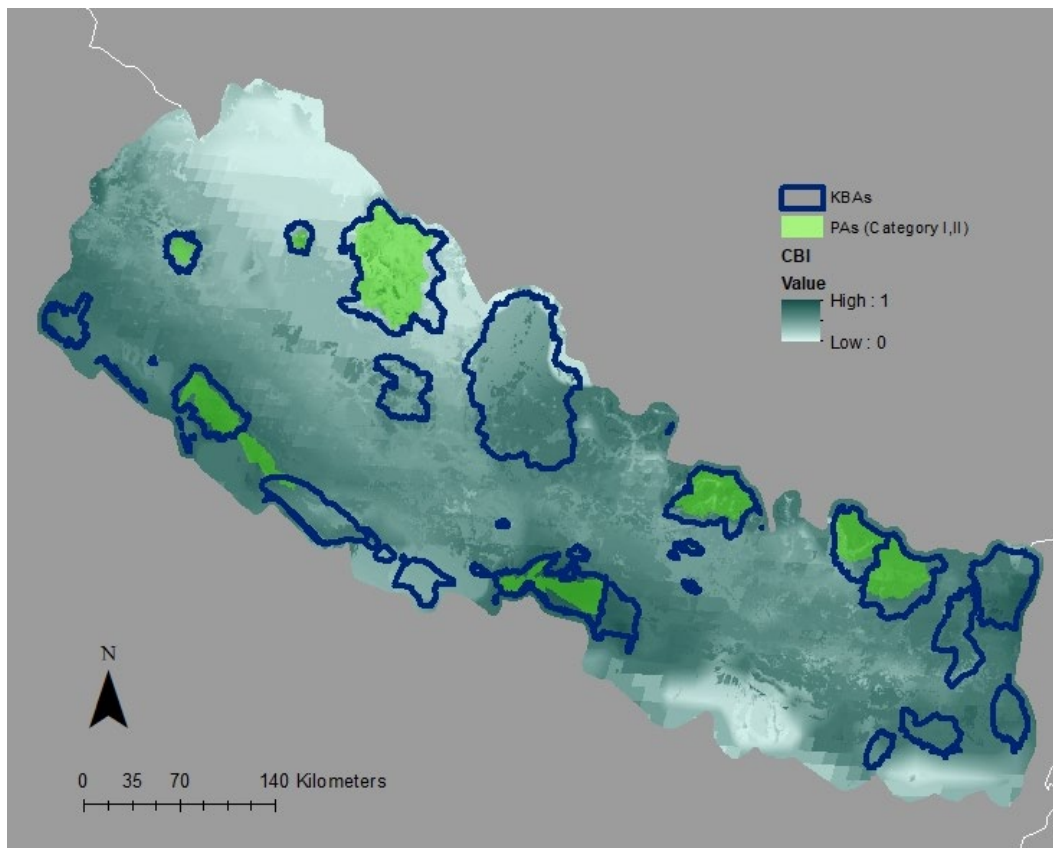
**Table 4.** Categories and scope of PAs in Nepal. Source: DNPWC, 2015.

Protected Areas	Definition	Number of PAs	Area (km <sup>2</sup> )	IUCN Category
National Park	Area designated for conservation, management, and sustainable use of the natural environment, flora, and wildlife	10	10,853	II
Wildlife Reserve	Area set aside for management and conservation of wildlife and their habitats	3	1,118.37	IV
Hunting Reserve	Area for management of wildlife resources by issuing a license for harvesting of wild animals	1	1,325.27	IV
Conservation Area	Area set aside for conservation and biodiversity and natural environments, and for sustainable use of NRs by local communities	6	15,425.95	IV
Buffer Zone	Surrounding/peripheral areas of national parks and wildlife reserves, where local communities have access to natural resources on a regular basis to reduce the pressure on the core areas	13	5,721.29	IV

Figures 8 and 9 demonstrate that high biodiversity areas are spread throughout the country. While the most stringently regulated PAs do align with some areas in our CBI cores and Key Biodiversity Areas (KBAs), the majority of these vital landscapes are not classified as IUCN Category I or II PAs. This mismatch further supports the importance of safeguarding large development projects across the country, beyond PA boundaries. Although available data shows most of the Chinese Funded LI outside of important

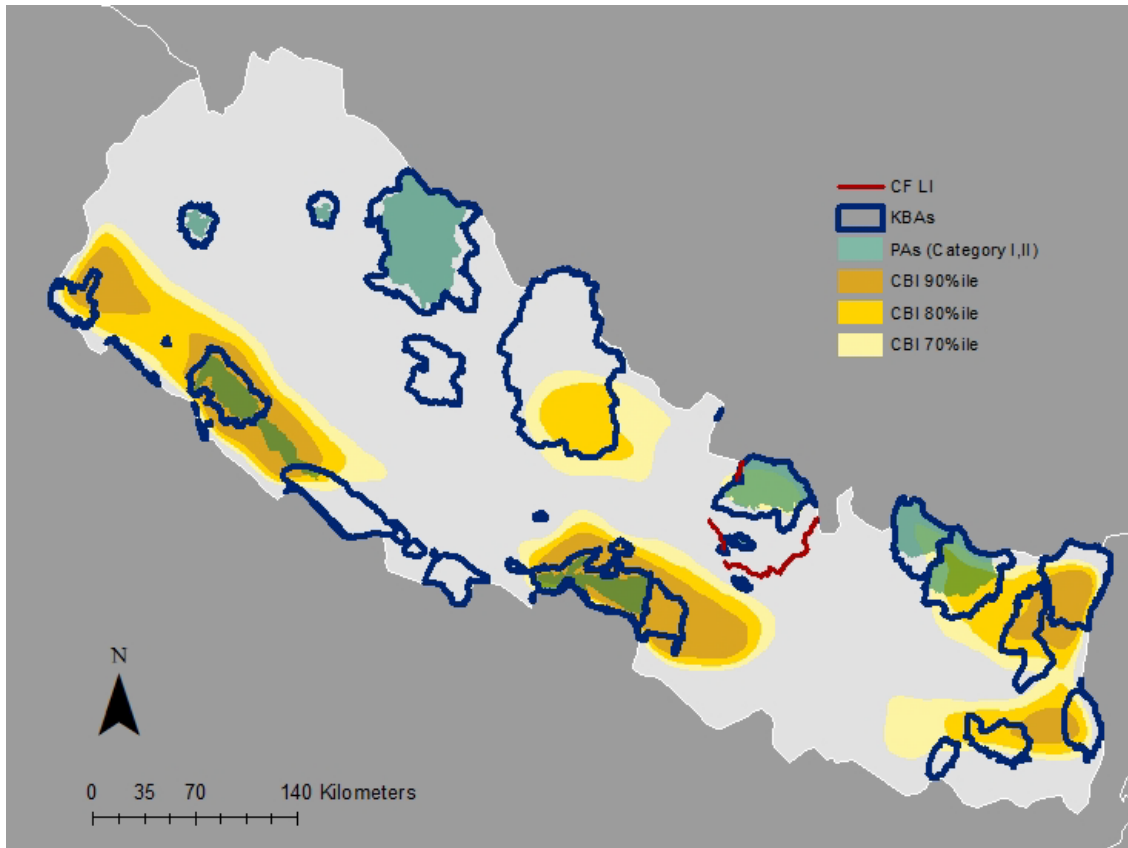
<sup>2</sup> A Ramsar site is a wetland area that has been designated to be of international importance under the Ramsar Convention, which is also known as the Convention on Wetlands. It was established in 1971 by UNESCO as an intergovernmental environmental treaty.

biodiversity data (Fig. 9), it may under-represent the actual number of Chinese LI projects. Prevalence of existing LI in the important biodiversity data (Fig. 9), highlights that the biodiversity safeguards have not been sufficient in these areas. This may indicate significant chances of more LI developments in these areas.



**Figure 8.** In Nepal, Protected Areas (PAs) with the highest protection (at IUCN Category II) and (Key Biodiversity Areas) KBAs overlap to a great degree and cover some (Composite Biodiversity Index (CBI) cores.





**Figure 9.** Chinese-funded linear infrastructure, as captured by Custer et al., 2021, is overlaid with PAs and KBAs. Very likely underrepresented spatial data here underplays threats to wildlife from BRI projects. Many areas of CBI cores remain unprotected. Methodology and further analysis in Appendix A.

The government of Nepal recognizes that the success of long-term conservation requires interventions that include entire landscapes rather than only specific species. However, designated PAs are often not complete ecological units. The emergence of ‘landscape-level’, or ‘landscape-scale’ conservation in 2017 marked a shift in Nepal’s system of PA management. Nepal was one of the first countries to officially recognize that the dispersal of megafauna requires large tracts of varied habitat and that landscapes with heterogeneous habitats and ecosystems have more biodiversity because they include species found in several different sites or protected areas, i.e. the ‘beta-diversity effect’ (Sharma and Chettri, 2005). As of 2016, the Government of Nepal had implemented conservation programs in five landscapes: Terai Arc Landscape, Sacred Himalayan Landscape, Kailash Sacred Landscape, Chitwan Annapurna Landscape, Kanchenjunga Landscape (Ministry of Forests and Soil Conservation, 2016).

**Box 1 Spotlight: Infrastructure development impacts on the Terai Arc Landscape**

The Terai Arc Landscape (TAL) covers 51,002 km<sup>2</sup> across southwestern Nepal and Northwestern India. In Nepal, it covers 24,710.13 km<sup>2</sup> in 18 districts. TAL hosts a total of 6 protected areas (three national parks, two wildlife reserves, and one conservation area) comprising over 75 percent of the remaining forests of lowland Nepal. In addition to providing habitat to large mammal species such as tiger, greater one-horned rhinoceros, swamp deer, and Asian elephant, TAL supports 85 species of mammals, 565 species of birds, 47 species of reptiles and amphibians, and more than 125 species of fish.

Despite its ecological diversity and conservation importance, the landscape also has a large number of

infrastructure present including highways, transmission lines, and large-scale irrigation projects. As per the Ministry of Forests and Soil Conservation, several new large linear infrastructure projects are also planned for development in the landscape which are likely to have serious ecological and socioeconomic implications (Ministry of Forests and Soil Conservation, 2015). These projects, as currently planned, will cut through protected areas and wildlife corridors, and will not only encourage people to clear and settle critically important forest areas but also displace people, thereby disrupting their livelihoods and social relationships (WWF Nepal, 2014). The mega hydroelectricity projects and dams planned upstream from the Terai are also anticipated to have cascading impacts downstream by affecting the flow regimes of major rivers and diminishing environmental flows.

### **Box 2 Spotlight: Infrastructure development in the Chitwan Annapurna Landscape**

The Chitwan-Annapurna Landscape (CHAL) that is partially within the Sacred Himalayan Landscape (SHL) spans across Bhutan in the east to Nepal's Kali Gandaki River in the west. It contains seven major sub-river basins including: Trishuli, Marsyandi, Seti, Kali Gandaki, Budi Gandaki, Rapti, and Narayani, and is itself bounded by the Gandaki river basin. CHAL is an important migratory route for birds and is home to endangered species like snow leopard, red panda, and Himalayan black bear (WWF Nepal, 2021). In addition to rivers and critical wildlife species, CHAL is also home to over four million people, many of whom live in very remote places with limited access to markets.

As per the Ministry of Forests and Soil Conservation, CHAL has several large infrastructure development projects at various stages of development and operation. These projects include an array of linear, transport, and energy infrastructures and planned settlements for urban expansion. Due to the presence of the major sub-river basins, the Chitwan Annapurna Landscape is also becoming a hub of major hydropower projects. According to the Nepal Electricity Authority, there were more than 36 hydropower projects at different stages of construction or planning on the rivers of the Gandaki river basin, at least 22 of them were major projects. This has led to increased siltation in the freshwater bodies, affecting aquatic life, hydropower operations, downstream deposition, river cutting, and flooding. Moreover, conservationists anticipate that once installed, transmission lines of various capacities will add to the linear infrastructure in the landscape and may disrupt ecological connectivity and environmental flows in the river systems (Government of Nepal Ministry of Forests and Soil Conservation, 2015).

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

### **National and international commitments to conserve biodiversity**

Nepal has a robust legal landscape for the conservation of biodiversity and environment and is a signatory to several Multilateral Environmental Agreements (MEAs)(Table 5).

**Table 5.** *International commitments to conserve biodiversity in Nepal*

<b>Name of Convention</b>	<b>Date Signed</b>
Convention on Wetlands of International Importance (Ramsar)	17 Apr. 1998
Convention on International Trade in Endangered Species of Wild Flora and Fauna	16 Sep. 1975
Convention for the Protection of the Worlds Cultural and Natural Heritage (UNESCO)	20 Sep.1978
United Nations Convention on Climate Change	31 Jul. 1994
Convention on Biological Diversity	21 Feb. 1994
Vienna Convention for the Protection of the Ozone Layer	04 Oct. 1994
United Nations Convention to Combat Desertification	13 Jan. 1997
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes & Their Disposal	13 Jan. 1997
Plant Protection Agreement for South East Asia and Pacific Region	12 Aug. 1965
Agreement on the Network of Aquaculture Centers in Asia and the Pacific	04 Jan. 1990

In addition to signing international conventions, the government of Nepal has also enacted numerous policies, laws, regulations, and strategies that direct management and protection of the environment, biodiversity, and infrastructure development.

## **Relevant Nepali legal provisions surrounding biodiversity and infrastructure safeguards**

### **1. Environmental Impact Assessment**

Environmental Impact Assessments (EIA) are a tool for incorporating environmental concerns in the project formulation stage of development plans and projects. EIAs were first incorporated here in the early 1980s, under the Sixth National Development Plan (1980-85). The Environmental Impact Study Project (EISP), which was responsible for developing necessary instruments for integrating EIAs into infrastructure development projects, was initially nested under the Department of Soil Conservation in 1982. However, with the growing global awareness about the interactions of environment and development in the late 1980s, the government of Nepal enunciated a number of environmental conservation-related policies in the seventh plan (NPC, 1985-90) and made necessary arrangements by means of a series of guidelines, rules, and regulations that guided project development for industry, tourism, water resources, transportation, urbanization, agriculture, and forestry sectors.

Over the course of the next three decades (1990-2020), EIA policy in Nepal was revised and revisited multiple times to expand the scope of the assessments to include more sector-specific guidelines and stakeholders in the assessments and decision-making processes. The 2002 revision is especially noteworthy as it emphasized not only the involvement of local bodies, communities, the private sector, non-governmental organizations (NGOs), and other government agencies in the process, but also specific mentions of biodiversity and its conservation during development projects in remote areas.

Although often perceived to be a cumbersome process for project proponents, the interviewees of this study were of the opinion that EIA has remained one of the most crucial policy safeguards for the environment and biodiversity from adverse impacts of all development projects in Nepal. Unlike in many developing countries in Asia, where EIA is effective only on paper, the process in Nepal is considered by interviewees to

be effectively implemented and allows for a number of external stakeholders to put forward their opinions on how a project progresses.

## **2. National Forest Policy 2019**

Nepal's National Forest Policy, 2019 aims to enhance sustainable forest management and improve the productivity of all types of forests. It is the main law regulating the management and conservation of forests. The policy includes many progressive provisions, including those for community-based forest management, forest protection, and enterprise development. It is part of the Forestry Sector Strategy (2016-25), which focuses on the sustainable management of forests and flows of ecosystem goods and services. The Forest Act also explicitly states: "No part of the national forest can be used in a manner that changes the land-use of the forest area without prior approval from the government," thus mandating a formal clearance process for all projects within forest areas. The act also lists conditions under which the government can approve development projects. For example, when there is no alternative to using the forest area for the project; if the investment plan is approved by the Investment Board; if it is a project of national pride; and, if the EIA finds that the plan will not result in significant adverse environmental effects. To ensure that the environmental impacts of a proposed development are minimized and mitigated, the act also mandates that project proponents replant the same area of forest in a location adjacent to the National Forest, which is also near the project site and situated in the same geographical and ecological belt.

## **3. Landscape-level management plans**

In addition to a mandatory detailed EIA and adherence to the Forest Act, each conservation landscape in Nepal has its own framework and management plan, many of which were jointly developed with the IUCN and WWF. These plans include processes for conservation decision-making at the landscape level. The landscape approach helps managers to make decisions and to facilitate the planning, negotiation, and implementation of activities across a whole landscape. It integrates top-down planning with bottom-up participatory approaches to implementation. All projects seeking environmental clearance inside protected areas are mandated to incorporate these management plans during the impact assessment processes.

## **4. Guidelines for the Construction of Eco-friendly Linear Infrastructure (2022)**

In April 2022, the government of Nepal endorsed the wildlife-friendly linear infrastructure guidelines-2078 to balance the growing demand for infrastructure and its environmental impacts. The guidelines specifically highlight LI impacts on biodiversity and provide suggestions for wildlife-friendly practices for surrounding infrastructure construction, maintenance, and mitigation. The guidelines purport to provide "a compendium of best practices, designs, drawings with basic technical guidance, procedures and parameters for integrating wildlife-friendly elements into conceptualizing, pre-construction, designing, construction, operations, maintenance or mitigation of wildlife-friendly structure." In this way, they are intended to provide guidance for engineers, planners, and other users to learn and incorporate design principles, data, standards, and specifications for linear structures and thereby help design and construct wildlife-friendly, sustainable LI.

List of relevant policies and legislations related to environmental safeguard in Nepal

- National Climate Change Policy, 2019
- National Environment Policy, 2019
- National Transport Policy, 2001
- National Water Resource Policy, 2020
- Forest Act, 2019
- Forest Rules, 2022

- Environmental Protection Act, 2019
- Environmental Protection Rules, 2022
- Railway Act, 2021
- Public Road Act, 1974

### **Implementation of laws and safeguards**

The prolonged and turbulent political transition in Nepal, along with the frequent changes and ongoing political vacuum at the local-government level, have had adverse impacts on governance at the national and local levels. While Nepal has rules and regulations in place to safeguard biodiversity and the interests of communities, especially surrounding the development of infrastructure, these safeguards have not necessarily been implemented effectively. Through discussions with key informants, we found that the lack of implementation was often due to the limitations of legal mechanisms in the country. With the ongoing changes in policies, governments, and other government bodies, the situation had come to a point where the extent to which a project development process will follow protocol completely depends on the specific people involved at various stages of development and whose interests were at stake. The EIA policies, although robust, have also been viewed as an obstruction to development (especially by politicians), who would take it into their hands to grant approvals to expedite the construction processes. One interviewee who has extensive experience and expertise in the developmental policy space in Nepal also recalled some instances where the local politicians have constructed wide rural roads in some of the most fragile mountain areas.

The strategy in Nepal, much like politics around the world, is to implement projects in order to be re-elected. However, in Nepal politicians and other powerful actors commonly circumvent the law with no, or minor, repercussions. For example, in the aftermath of the 2015 earthquakes, whoever constructed or rebuilt roads received not only public commendation but also the requisite popularity for a permanent seat in government. Fortunately, this appears to be changing, at least for some of the larger, national interest projects. There has, however, been a shift within EIA processes in which experts, civil society organizations, and other stakeholders have been provided a seat at the table for final decision-making on green approvals and clearances. Although an improvement, project proponents continue to exploit loopholes within environmental safeguards. As a practitioner, and an EIA review committee member, one of our interviewees pointed to several cases where the project proponents were required to reassess the impacts and redo detailed assessments to ensure project impacts on the environment were duly considered.

## **V. Project profile: Marsyangdi Electric Corridor**

The following information about the Marsyangdi Electric Corridor is adapted from the Accountability Counsel's (2021) Nepal community case.

### **Project Description**

- A number of large hydropower projects with a total planned capacity of 2,000 MW along with transmission lines have been installed or proposed around the Marsyangdi river and its tributaries in Lamjung and Manang. These projects transfer electricity to Kathmandu and India.
- These projects are a part of a 220 kV high-voltage transmission line project called the Marsyangdi Corridor which is proposed by the Nepal Electricity Authority (NEA) and is funded by the European Investment Bank (EIB) and Asian Development Bank.
- Two hydropower projects in the area have already seriously impacted the river's flow:
  - The 2008 German-funded 72 MW Middle Marsyangdi project in Bhotteodar
  - The 2016 Chinese Sinohydro funded 50 MW Upper Marsyangdi, a project in Bhulbhule

Despite rigorous environmental and social due diligence policies of the EIB and the ADB, consultations with the local community members living adjacent to the transmission line and whose land falls under the transmission wires, were not conducted appropriately about the transmission line project, and the other related hydropower projects.

### **Community concerns**

- Inadequate compensation
- Economic impacts of the 220 kV Marsyangdi Corridor - land under or near transmission lines would become less desirable and lose value.
- Forest dependence: Communities residing in the vicinity of the forests are dependent on the forest resources for their livelihoods. Installation of the transmission lines involves widespread felling of the trees in the path of the transmission line leading to cascading ecological and economic impacts for the communities.
- Sound pollution and visual pollution.
- Due to Nepal's severe weather conditions, the project also poses well documented risk of electrocution and toppling of towers leading to death and damage to property.

### **Advocacy**

- Communities set up a Free, Prior, and Informed Consent (FPIC) & Rights Forum, a district-level umbrella organization of several village-level committees, composed of people affected by hydropower projects in Lamjung.
- In October 2018, a formal [complaint](#) was filed by the a group of people from the Lamjung communities at the [Complaints Mechanism of the EIB](#),
- A report that stated that the initial environmental examination (IEE) conducted for a portion of the Marsyangdi Corridor was deficient on many fronts based on research conducted by scientists from the Environmental Law Alliance Worldwide(ELAW) was also submitted along with the official complaint.
- Complaint mechanism staff visited Lamjung in March 2019 and met 700+ affected community members post which meetings with with the project promoter and relevant government authorities were conducted.
- An Initial Assessment Report, published in July 2019, recommending mediation to resolve communities' issues.
- The FPIC & Rights Forum agreed to participate in a mediation process, but the NEA refused to participate.
- In October 2020, the FPIC & Rights Forum published an FPIC Protocol and providing concrete guidance to the EIB and NEA on designing an FPIC process.

**Outcome:** In April 2021, the EIB published its Conclusions Report, finding that the bank must take urgent steps to uphold Indigenous communities' right to FPIC. The report vindicates concerns communities have been raising for years, including that a mandatory FPIC process was not conducted. It finds the EIB provided funding to the NEA even though conditions for disbursement were not fulfilled and recommends the EIB only provide further financing for the Marsyangdi Corridor if the project company meets certain social and environmental benchmarks.

## VI. Understanding stakeholders and power dynamics

### Spaces for cross-sectoral coordination among government agencies

Nepal's 2019 voluntary national report submitted to the United Nations Forum for Forest Secretariat (UNFF) states that a number of policies and plans within the environment and forest conservation sector in Nepal have provisions for cross-sectoral and multi-level coordination and collaboration.

Some of these policies along with the area for coordination and collaboration are listed below:

- **National Forest Policy 2019** - ensures coordination among stakeholders in policies and law-making along with their implementation, monitoring, and evaluation.
- **National Biodiversity Coordination Committee:** under the Minister of Forests and Environment, this body provides policy guidance to biodiversity conservation and for reporting to Convention on Biological Diversity.
- **National Agroforestry Policy 2019:** has a provision for an Inter-ministerial Agroforestry Coordination Committee chaired by the Secretary of the Ministry of Agriculture and Livestock Development.
- **Nepal National REDD+ Strategy:** A multi-stakeholder forum has been formed for decision-making relating to REDD+ in Nepal
- **Forest Protection Plan 2013:** Has a Central Forest Protection Committee which chaired by the Minister, Ministry of Forests and Environment, and constitutes members from other ministries, Nepali Army, Nepal Police, and Armed Police Force to ensure coordination and collaboration among relevant government and non-government organizations and civil society to for the protection of forests.
- **The National Planning Commission:** is a multi-member organization that coordinates multiple government agencies in planning (long-term as well as annual) and monitoring of forestry plans and programs.
- Additionally, there are institutions such as the Wildlife Crime Control Coordination Committee (WCCCC) the Wildlife Crime Control Bureau (WCCB), and the National Tiger Coordination Committee (NTCC) at the policy level, central implementation level, and district level respectively, which involve a number of government organizations.

**Stakeholders in the infrastructure planning and development process can be broadly divided into the following:**

Department of Roads		
Planning And Design Branch	Foreign Cooperation Branch	Maintenance Branch
Geo-Environment & Social Unit Monitoring And Evaluation Unit Road And Traffic Unit Roads Sector Skills Develop. Unit Highway Management Information System Unit	Road Project Managers	5 Regional Road Directorates 25 Divisional Road Offices

<b>Government Line Agencies</b>					
<i>Ministry of Physical Planning and Transport</i>		<i>Ministry of Local Development</i>	<i>Ministry of Culture, Tourism and Civil Aviation</i>	<i>Ministry of Forest and Environment</i>	<i>Other government line agencies</i>
Nepal Roads Board (a supervisory role)	Department of Transport Management	Ministry of Federal Affairs and General Administration	Department of Archaeology	Department of Forest and Soil Conservation  Department of National Parks and Wildlife Conservation	Ministry of Energy Water Resources and Irrigation  Nepal Electricity Authority / Department of Electricity Development  Nepalese Army

<b>Other Stakeholders</b>				
<i>Consultants</i>	<i>Contractors</i>	<i>Community</i>		<i>Private Investors</i>
Environmental or EIA consultants  Social/SIA consultants  Technical and Engineering Consultants  Legal Consultants	Construction Implementing Contracts	Rural Municipality  District Coordination Committee  Municipalities	Community Based Organizations  NGOs  Local Constructive Forums  Compensation Determination Committee (CDC)  Road Neighbors  Political Leaders	Private Investors Under Build Operate And Transfer (BOT)  Private Investors Under Build Own Operate And Transfer (BOOT)



## VII. Recommendations

### **1. Translate and collate existing resources and dashboards for broader public access**

Various government ministries in Nepal and international funding agencies have already set up resources and portals for project monitoring. These resources host information ranging from spatial data layers, development project plans, funding schedules, and more, and could be collated into a single toolkit or portal with access to all stakeholders. An important next step would be to mandate all actors within the project planning processes (i.e., EIA agents, policymakers, and civil society organizations) to not only refer to the portal, but also contribute to it by updating new layers, research, and data, to ensure that information on the portal remains updated and relevant.

### **2. Create coordination spaces for interdepartmental interactions**

The preceding portal could be one way to ensure this coordination space exists. Other ways include developing local- or landscape-level working groups including developers, contractors, and conservation practitioners to enable the implementation of existing policies, rules, and safeguards. Nepal has landscape-level management plans developed by conservation agencies and forest department personnel. However, there is no certainty that other stakeholders – mostly project planners, infrastructure developers, or EIA consultants – are in close coordination with these groups. Thus, smaller, localized working groups would allow each stakeholder a seat at the table and ensure the effective translation of policies and plans into action. These working groups could also act as local bodies ensuring the implementation of treaties and conventions ratified by the national government, for instance, the Convention on Biological Diversity.

### **3. Clarify EIA processes and make them more accessible**

The EIA process in Nepal – documents on which are available only in Nepali – is perceived to be extremely complicated and lengthy by most practitioners. While the process has undergone some recent amendments – details of the same are not accessible since all of Nepal’s policy is in the local language. A vital first step is thus translating regulatory documents into pertinent languages, English and Chinese for example. Moreover, while Nepal does not have any legally recognized mechanisms for dispute resolution or redressals, section 33 of the Environmental Protection Act gives the citizens a right to directly file a complaint to the authorities at the local government for any environmental damage caused by any party. It also authorizes the local government to impose a “reasonable” fine or compensation for damages. But environmental disputes of this kind often go into multiple cycles of claims and counterclaims mainly as “indirect impacts” of a project are not quantified in the EIA process and thus cannot be proven. Due to such loopholes, most environment-related disputes initiated by communities that are not directly impacted as per the EIA tend to drag on for a long time (The Asia Foundation, 2021). Thus, active outreach on EIA by means of training programs on demystifying the process for a range of stakeholders including local communities could be extremely beneficial for safeguarding biodiversity as well as public interests during infrastructure development.

### **4. Clarify and streamline project planning processes**

Currently, there are various starting points for a project, depending on what it is and who is initiating it. Projects are often initiated by local politicians who might not be familiar with national development plans, planning regulations, etc. International funders tend to follow a different process. If project proposal and planning processes could be explicitly charted out for each potential pathway, impact and influence strategies would have more guidance and could be more strategic and effective.

<b>SHORT TERM (6 months – 1 year)</b>	<b>MEDIUM TERM (1 year – 3 years)</b>
<ul style="list-style-type: none"> <li>● Translate relevant policy documents (EIA amendments, notifications on building roads in PAs, etc).</li> <li>● Develop a dashboard with spatial information and potential projects.</li> <li>● Demystify project development, e.g., Create flow charts/illustrations to represent project development phases with relevant stakeholders under each phase. Develop this information for the various pathways to project creation (i.e. international funders, BRI, local politicians, etc.).</li> <li>● Undertake assessments to identify the main actors for landscape level working groups for coordination</li> </ul>	<ul style="list-style-type: none"> <li>● Develop and advocate for making use of a conservation and development data portal mandatory for clearance processes</li> <li>● Build the capacity of various stakeholders for the most effective use of the portal</li> <li>● Develop and popularize mechanisms for various stakeholders to populate portal with updated information from their sector</li> <li>● Assist the formation of local/landscape level working groups</li> </ul>

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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 the 70th, 80th, and 90th percentile, which we refer to as biodiversity cores. For more details on the CBI methodology, see the LISA project spatial annex<sup>3</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 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.

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<sup>3</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/AID-OAA-TO-16-00028, ESS WA#13. U.S. Agency for International Development, Washington, DC. 98 pp.

### 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="#">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.globe.info/download-grip-dataset">https://www.globe.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="#">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="#">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 from the spatial analysis.

### PA<sub>s</sub> (IUCN categories I and II) and CBI cores overlap

Nepal	70th Percentile Core	80th Percentile Core	90th Percentile Core
CBI Core Area (km <sup>2</sup> )	44151	28852	14717
Overlap with Protected Areas (km <sup>2</sup> )	5102.9	3251.73	2537.78
Percentage of CBI Core within PA <sub>s</sub> (%)	11.5578	11.2704	17.2439

### Chinese funded LI across Nepal

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

LI Mode	Length
Road (km)	139.567133
Rail (km)	0
Transmission (km)	23.4858

### Chinese funded LI within PA<sub>s</sub> (IUCN categories I & II) in Nepal

The CF LI dataset was clipped within the PA<sub>s</sub> (Category - I, II) boundaries.

LI Mode	Length
Road (km)	1.27632
Rail (km)	0
Transmission (km)	0

### Length of Chinese-funded LI within CBI Cores in Nepal

The 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)	6.16498	0	0
Rail (km)	0	0	0
Transmission (km)	0	0	0

## Appendix C: Protected areas in Nepal

1. Chitwan National Park – 952.63 km<sup>2</sup> (367.81 sq mi)
2. Sagarmatha National Park – 1,148 km<sup>2</sup> (443 sq mi)
3. Langtang National Park – 1,710 km<sup>2</sup> (660 sq mi)
4. Rara National Park – 106 km<sup>2</sup> (41 sq mi)
5. Khaptad National Park – 225 km<sup>2</sup> (87 sq mi)
6. Shey Phoksundo National Park – 3,555 km<sup>2</sup> (1,373 sq mi)
7. Bardiya National Park – 968 km<sup>2</sup> (374 sq mi)
8. Makalu Barun National Park – 1,500 km<sup>2</sup> (580 sq mi)
9. Shivapuri Nagarjun National Park – 159 km<sup>2</sup> (61 sq mi)
10. Banke National Park – 550 km<sup>2</sup> (210 sq mi)
11. Shuklaphanta National Park – 305 km<sup>2</sup> (118 sq mi)
12. Parsa National Park – 637 km<sup>2</sup> (246 sq mi)
13. Koshi Tappu Wildlife Reserve – 175 km<sup>2</sup> (68 sq mi)
14. Annapurna Conservation Area – 7,629 km<sup>2</sup> (2,946 sq mi)
15. Kanchenjunga Conservation Area – 2,035 km<sup>2</sup> (786 sq mi)
16. Manaslu Conservation Area – 1,663 km<sup>2</sup> (642 sq mi)
17. Blackbuck Conservation Area – 15.95 km<sup>2</sup> (6.16 sq mi)
18. Api Nampa Conservation Area – 1,903 km<sup>2</sup> (735 sq mi)
19. Gaurishankar Conservation Area – 2,179 km<sup>2</sup> (841 sq mi)
20. Dhorpatan Hunting Reserve – 1,325 km<sup>2</sup> (512 sq mi)
22. Bishazari Tal – 3,200 ha (12 sq mi)
23. Ghodaghodi Tal – 2,563 ha (9.90 sq mi)
24. Gokyo Lake Complex – 7,770 ha (30.0 sq mi)
25. Gosaikunda – 13.8 ha (34 acres)
26. Jagdishpur Reservoir – 225 ha (0.87 sq mi)
27. Kosi Tappu Wildlife Reserve – 17,500 ha (68 sq mi)
28. Mai Pokhari – 90 ha (220 acres)
29. Phoksundo Lake – 494 ha (1.91 sq mi)
30. Rara Lake – 1,583 ha (6.11 sq mi)
31. Lake Cluster of Pokhara Valley – 261.1 km<sup>2</sup> (100.8 sq mi)

## Appendix D: List of Environmental Protection related Laws for IEE and EIA in Nepal

Environmental Protection Act (EPA), 1997 and Environment Protection Rules (EPR), 1997, which made IEE/EIA mandatory for the governmental as well as the private sector projects if they fell under specific schedules of EPR
Provision of IEE/EIA in Sectoral Law
Forest Act, 1993 calls for carrying out IEE/EIA of the development proposals if they are to be implemented in the forest areas and/or passes through the forest area
National Parks and Wildlife Conservation Act, 1973 contains a number of environment-friendly provisions and prohibit activities that will have adverse impacts on the environment.
Forest Rules, National Parks Rules, and Conservation Area Management Rules
Aquatic Animal Protection Act, 1961 and First Amendment, 1998 (AAPA)
Water Resources Act 1993
Electricity Act, 1993 also contains provisions to minimize soil erosion, floods, air pollution and damage to the environment while producing and transmitting electricity (Section 24)
Sectoral Acts with environmental considerations supporting the EPR (1997) and EPA (1997)
Explosive Material Act, 2018; Public Road Act, 2031; Road Board Act 2002; Plant Protection act 2029 (1972); Land Acquisition Act 2034*(1997); Local Government Implementation Act, 2017; Buffer Zone Management Regulation 1992; Himalayan National Park Regulations, 1979; Solid Waste Management Act/Rule 2017*; Labour Act 2017 and Labour Rules 1993*; Child Labour Act 2056* (*Nepali years)
National Conservation Strategy (NCS) 1990
National EIA Guidelines for Nepal 1992
Sectoral policies and laws related to roads or linked with the EPA or EPR (1997) (indicated by Nepali years)
Department of Road (DOR) Environmental Management Guideline 2054; Environmental Assessment in Road Sector 2057; Land acquisition, Rehabilitation and Resettlement Policy (Purbadhar Bikas Ayogana Ka Lagi Jagga Prapti, Punarbas Tatha Punarstapana Sambandhi Niti 2071); Roadside Geotechnical Problem: A practical guide to Their Solution 2066 (2009); Interim Guideline for Enhancing Poverty Reduction Impact of Road Projects 2064; Environmental Social Management Framework ( ESMF) 2064; Reference Manual for Environmental and Social Aspect of Integrated Road Development 2060 (2003); Reference Manual and Site Handbook for Roadside Bio-engineering 2059 (2002); Nepal Biodiversity Strategy 2059 (2002); Department of Road Policy and Strategy 2061; Guideline for Inspection and Maintenance of Bridge Vol.1; Design Standard of Feeder Roads 2053; Environment Standards of Diesel Generator; National Bridge Standards