CENTER for LARGE LANDSCAPE CONSERVATION

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

Cambodia

Amrita Neelakantan, Sam Williams, Satvik Parashar, Grace Stonecipher, and Jessica DiCarlo

Acknowledgments

Report contributions

Lead country researcher: Amrita Neelakantan
Research design: Jessica DiCarlo
Maps and spatial analysis: Satvik Parashar, Grace Stonecipher, Amrita Neelakantan
Overall review: Jessica DiCarlo, Sam Williams, Amrita Neelakantan

Table of Contents

Tables and Figures

Acronyms

ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
BINGO	Big International NGOs
BRI	Belt and Road Initiative
CBI	Composite Biodiversity Index
CBD	Convention on Biological Diversity
CDB	China Development Bank
CHEXIM	China Export-Import Bank
CICPEC	China-Indochina Peninsula Economic Corridor
CITES	Convention on International Trade of Endangered Species
EAC	Electricity Authority of Cambodia
EDC	Electricité du Cambodge
EIA	Environmental Impact Assessment
ELC	Economic Land Concession
ESIA	Environmental and Social Impact Assessment
FAO	Food and Agriculture Administration
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GMA	Game Management Area
GDANCP	General Department of Administration for Nature Conservation and Protection
ICT	Information and Communication Technology
ICCD	International Convention to Combat Desertification
IUCN	International Union for the conservation of Nature
KBA	Key Biodiversity Area
LI	Linear Infrastructure
MAFF	Ministry of Agriculture, Forestry, and Fisheries
MDG	Millenium Development Goals
MME	Ministry of Mines and Energy
MoE	Ministry of Environment
NBSAP	National Biodiversity Strategy and Action Plan
NSDP	National Strategic Development Plan
PA	Protected Area
PDoE	Provincial Department of Environment
SEA	Strategic Environmental Assessment
SLC	Social Land Concession
UDEC	Use, Development, and Exploitation Concession
UNFCCC	United Nations Framework Convention on Climate Change

Cambodia Factsheet

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

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

Region	Southeast Asia
Capital	Phnom Penh
BRI Corridor	CICPEC
BRI investment ($ in millions)	5,000
Income Status	Lower middle-income status
Population	16,718,971 (2020 estimate)
GDP	USD 25.291 billion
Land Area	181,030 km²
Protected Areas (km²)	32,672 Km sq (n = 23)
Species Richness (ranking)	28
Biodiversity Intactness (ranking)	19
ND-GAIN Country Index; Climate vulnerability (ranking)	147
GDP Growth Rate Projections	1.9% annually in 2021, usually around 7% pre-pandemic
Inequality (Gini Coefficient)	36.6 (medium)
Human Development Index (HDI)	0.594 (2019)
Key exports	clothing, timber, rubber, rice, fish, tobacco, footwear
Other - Historical Legacies and Current Trends	Violent civil war, genocide, colonialism, agenda to become a developed nation, China-friendly currently and for the foreseeable future, ambitious climate change and biodiversity goals achieved (but only on paper).

I. Introduction

The Kingdom of Cambodia occupies 181,030 km^2, with borders defined by mountain ranges and high plateaus. The country is located between Thailand to the west, Vietnam to the east, and Lao PDR to the north (Fig. 1). Part of the Indo-Burma biodiversity hotspot, Cambodia is critical for global conservation (Myers et al., 2000; Souter et al., 2016). The government has designated 23 national protected areas (PAs) that act as the cornerstone of biodiversity conservation in the country. In addition to environmental goals, PAs also provide goods and services on which local populations depend. The vast landscape and fisheries of the Tonle Sap, for example, support at least one million people and provide the largest protein source in the diets of the Cambodian population. The northern plains experience annual flooding so vast that it changes the geography of the Tonle Sap – a great lake that is 2,500 km^2 in the dry season and as large as 16,000 km^2 in the wet season. The annual flooding of the Mekong River also provides rich silt for as many as 220,000 ha of arable land, which supports nearly one-sixth of the smallholder farmer population. Although much of Cambodia's population is rural, the country is experiencing rapid urban expansion (Lohani et al., 2020).

The country's economic development agenda –achieving an average GDP growth rate of 7.7% between 1998 and 2019 – has also depleted natural resources (World Bank, 2022 and Table 1). For example, the subsequent loss is marked by diminishing forest cover from 72% in 1998 to 52% in 2015 (FAO, 2015). In rural areas, mining and agricultural concessions on forest lands are a significant challenge for conservation goals, not only within concessions but also as smallholder farmers are pushed into natural forest areas to subsist (Davis et al., 2015; Travers et al., 2015). Although land concessions for agriculture claim to enhance local livelihoods, they have been critiqued for the tumultuous boom and bust cycles they engender in terms of economic returns (Grimsditch and Henderson, 2009; Neef et al., 2013). Many conservation bodies and organizations have expressed concern regarding the continued existence of globally significant biodiversity in these changing landscapes and the capacities of the Cambodian forest administrators to manage remaining tracts of intact biodiversity areas (Ken et al., 2020; Riggs et al., 2020a). A challenge in Cambodia, mirrored in countries across the globe South, is to implement participatory and inclusive methods for economic growth with minimal destruction of biodiversity.

Linear infrastructure (LI) is one way to accelerate economic development. However, LI affects biodiversity directly (e.g., barriers to movement and habitat loss, for example) and indirectly (e.g., access to remote areas with increases in poaching of faunal species and timber, overall degradation of intact habitats, eroding the resilience of intact ecosystems, etc.) (Clements et al., 2014). In Cambodia, much LI is crucial for market access nationally and internationally and rural electrification. Large infrastructure projects often carry promises of prosperity, not only domestically but for the region as a whole, by allowing Cambodia to export manufacturing and agricultural goods more efficiently.

The Cambodian government's aggressive agenda for economic development and LI is operating alongside national and international commitments to meet biodiversity and climate targets. Cambodia has made considerable progress on many Millennium Development Goals (MDGs). However, much of its population remains vulnerable, with low-skilled labor forming a large proportion of the population and dependence on exploitative industries that drive climate change. Overall political will for biodiversity conservation remains low in practice, especially when we consider decision-making at the local scale. In this report, we situate the global importance of Cambodia's biodiversity and examine the national policy landscape and how to reconcile development projects with conservation goals, including the consequences on and participation of local peoples as critical stakeholders.

"China" in Cambodia

China is Cambodia's largest investor, donor, and one of the country's most influential tourist, trade, and political partners (Chheang & Heng, 2021). Cambodia's relations with China have a long history and are actively and increasingly studied (Pheakdey, 2012; Riggs et al., 2020b; Loughlin & Grimsditch, 2021). On one level, this is unsurprising as Cambodia and China have a relationship that spans eight centuries, and currently, they remain 'good neighbors,' supporting each other politically. Chinese involvement in Cambodia is staggering, with at least US$5 billion in BRI investment, a growing Chinese population within Cambodia's urbanizing landscapes, and support for education and cultural efforts. Mandarin Chinese is Cambodia's second most popular foreign language after English (Pheakdey, 2012).

LI in Cambodia is increasingly connected to China's Belt and Road Initiative (BRI). The country has been an enthusiastic recipient of BRI projects. Cambodia's weak governance capacities, largely rural population, and land concessions allow for rent-seeking and corruption to cause elite capture of many gains that could be more equitably shared. Significant infrastructure and aid-supported development in Cambodia have led to some regions mobilizing rural populations into low-value-added labor in manufacturing industries. In contrast, in others, these very same development projects have led to the loss of land titles, local people losing livelihoods, decreased local well-being, and the destruction of natural resources. These consequences of LI are not restricted to Chinese-supported efforts but mirror the legacies of extensive infrastructure as a political decision across the global South (Alamgir et al., 2017). However, the influence of China in Cambodia is so vast that if future safeguards (social and environmental) are to be implemented more effectively, they will have to be situated in the Chinese support to Cambodia (supply/financing side) as well as from Cambodian stakeholders (demand side).

Governance overview

Cambodia is a constitutional monarchy with 20 provinces and four municipalities. The government remains a dominant employer, but pay scales tied to low revenue are inadequate: government employees often take on private jobs and are open to corruption, which may stymy development efforts (Slocomb, 1979). Cambodia has displayed weak governance capacity to avert damage to remaining forest landscapes and wildlife areas. However, the government is motivated to meet international commitments for climate change and biodiversity (Fig. 2). Significant efforts have been undertaken to decentralize governance, increase participation, and remove barriers between coordinating government departments. However, these efforts exist primarily on paper and within policy frameworks. In practice, low capacity and political will allow individuals to shape landscape management to their benefit, mainly through high levels of rent-seeking and corruption.
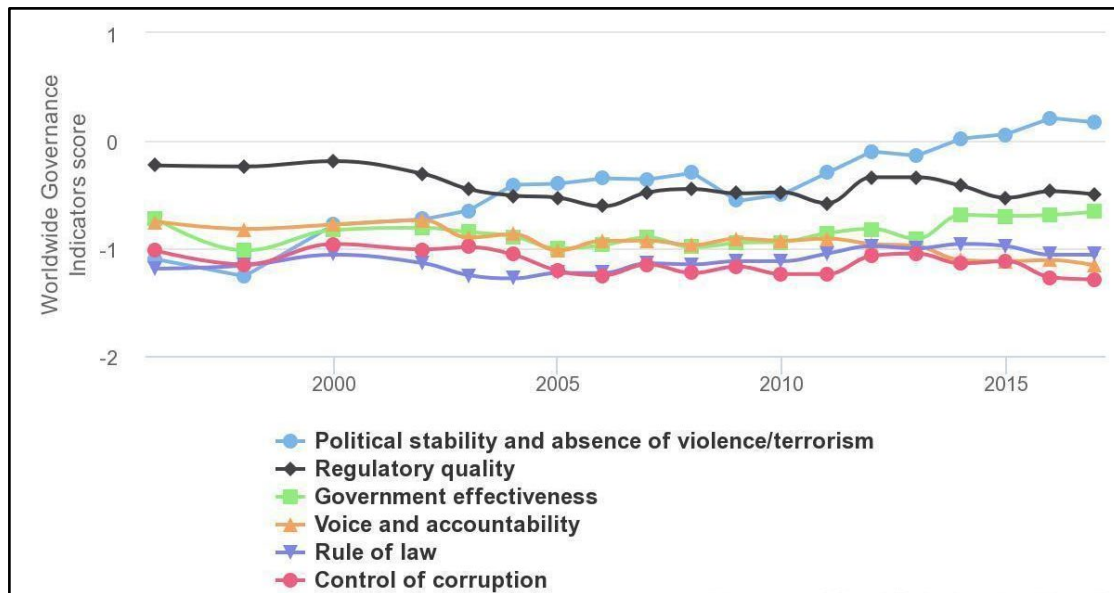
Figure 2. *Cambodia quality of governance trend statistics: Cambodia's WGI scores from 1996-2017. Source: World Bank. Available here: https://opendevelopmentcambodia.net/topics/government/.*

Land Concessions in Cambodia

Much of Cambodia's biodiverse forest has been lost to land concessions granted for non-forestry uses. Land tenure and titling are vital challenges, and the implementation of land laws remains inadequate. The Cambodian Land Law uses market-based land distributive reforms (titling, administration, taxation, land markets) to improve tenure security and access to land. Regulations lack important landscape management considerations for wildlife and human well-being. As detailed below, land concessions have become the primary vehicle for these reforms. Central to concessions is the demarcation of lands as private holdings, state public (forests, rivers, etc.), state private (utilized for state land-use decisions and economic activities), indigenous community lands, and monastery lands. Although the Land Law is supported nationally and internationally to address legacies of historical violence and the exclusion of indigenous people, it has yet to make significant reparations or improve land tenure issues in Cambodia.

Understanding land concessions and their characteristics are vital to understanding present-day Cambodia's conservation and development efforts (Diepart, 2015; Fig. 3). There were two main types of concessions outlined in the Land Law. First, Economic Land Concessions (ELCs) allow for the clearing of lands for "development activities" (agriculture, industry that is tied to rural livelihoods, etc.) on a long-term lease. Second, Social Land Concessions (SLCs) are viewed as a vehicle for social good and are created with a specific community or social purpose. SLCs typically allow beneficiaries to cultivate the land and reside under related land titles. Cambodia put a moratorium on economic land concessions in 2012, which is still in place, so ELCs are no longer the primary cause of displacement they once were. The 2001 Land Law included provisions for other concessions – for example, the Use, Development, and Exploitation Concessions (UDECs) – but it does not govern them, and the regulatory frameworks remain underdeveloped.
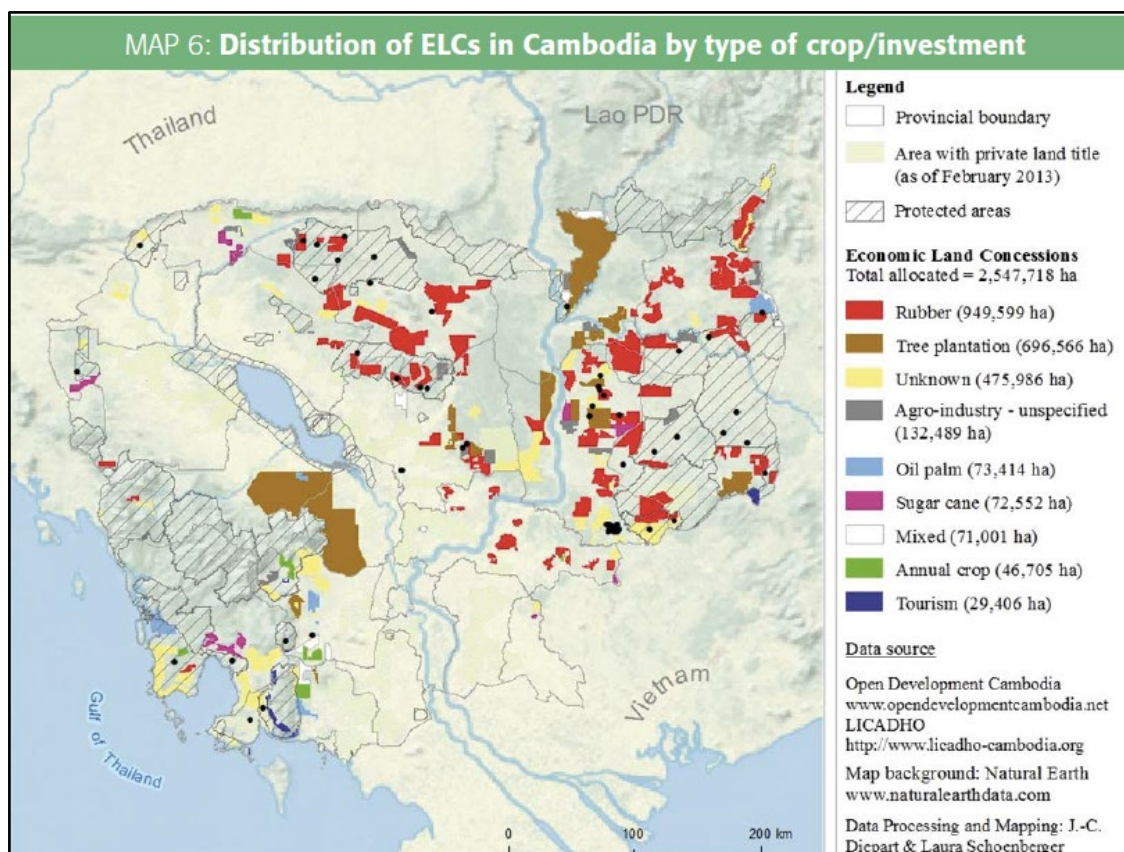
MAP 6: Distribution of ELCs in Cambodia by type of crop/investment

Legend

- ☐ Provincial boundary
- Area with private land title (as of February 2013)
- ▨ Protected areas

Economic Land Concessions
Total allocated = 2,547,718 ha

- Rubber (949,599 ha)
- Tree plantation (696,566 ha)
- Unknown (475,986 ha)
- Agro-industry - unspecified (132,489 ha)
- Oil palm (73,414 ha)
- Sugar cane (72,552 ha)
- Mixed (71,001 ha)
- Annual crop (46,705 ha)
- Tourism (29,406 ha)

Data source

Open Development Cambodia
www.opendevelopmentcambodia.net
LICADHO
http://www.licadho-cambodia.org
Map background: Natural Earth
www.naturalearthdata.com
Data Processing and Mapping: J.-C. Diepart & Laura Schoenberger

Figure 3. Map of Cambodian ELCs by type of crop/investment. Source: Diepart, 2015.

II. Linear infrastructure investment landscape

According to the Asian Development Bank (ADB) (2017), meeting infrastructure needs in Southeast Asia by 2030 will require US$2.7 trillion to be invested in transport, energy, telecommunications, and water-related infrastructure. This amount is approximately six percent of the region's GDP, and costs will be higher for countries with more significant infrastructure deficits. Thus, Cambodia is at the center of the ABD's assessment, while Thailand and Vietnam are considered more developed with fewer infrastructure needs. Regionally, 86% of projected investments are in the energy and transport sectors. If projects account for environmental safeguards and resilience in the face of climate change (considering many Southeast Asian countries are highly susceptible to flooding damage), costs are likely to increase (ADB, 2017). Cambodia's national budget and private investments combined amount to approximately 2.5% of GDP, highlighting a significant gap in realizing infrastructural needs.
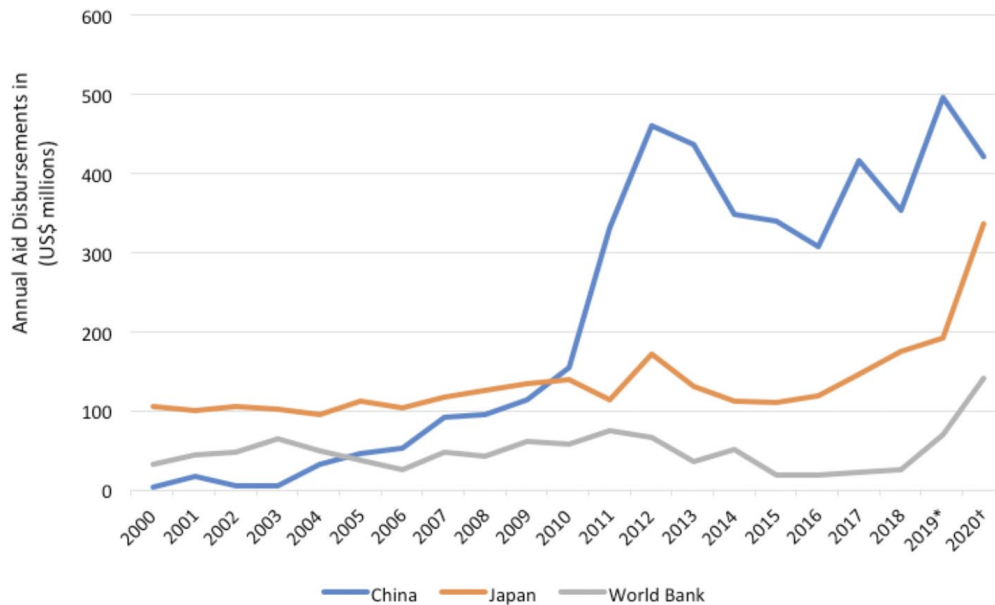
Figure 4. *Annual aid disbursements to Cambodia. China is the majority funder in Cambodia and specifically in the case of linear infrastructure.*

Source: Asian Development Bank estimates.

Figure 5. *Funding sources for investments in road development. China is the majority funder in Cambodia, both generally and in the case of linear infrastructure (here, roads). Source: ADB 2017.*
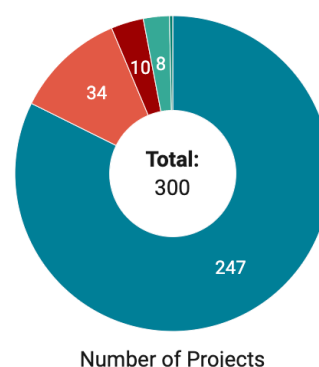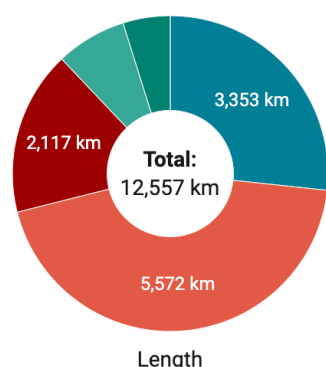
Most funding for infrastructure in Cambodia comes from sources in China, while Japan and Korea are also significant investors (Fig. 4 and 5). Additionally, the World Bank and ABD are vested in Cambodia's development, and the European Union and individual European countries have provided aid. However, Chinese FDI supersedes all other entities. China funds Cambodian development across sectors, especially those vital to continued economic growth in Cambodia – textiles, manufacturing, construction, telecommunications, and energy. Approximately 70 percent of all roads and bridges in Cambodia are funded through Chinese loans (Chheang & Heng, 2021) (See Box 1). See Table 2 for infrastructure in Cambodia that has been funded by China's two international policy banks: China Export Import Bank and China Development Bank.

"Cambodia's foreign direct investment in 2019 totaled nearly US$3.6 billion. The National Bank of Cambodia reported that 43% of this investment came from China, up from 15% of total FDI in 2017 and far higher than any other major investors like South Korea (11% of FDI in 2019), Vietnam (7%), Singapore (6%), and Japan (6%). A significant expansion of power generation capacity is required to meet Cambodia's rapidly growing demand for electricity. While the Kingdom's transportation network is evolving and expanding quickly, it lacks connectivity to many key economic centers domestically and cross-border connections to regional hubs like Ho Chi Minh City and Bangkok" (Stimson Center, 2021).

Linear Infrastructure in Cambodia (km), 2021

Canal · National Road · National Road Upgrade · Railway · Railway Upgrade

Length — Total: 12,557 km (3,353 km; 5,572 km; 2,117 km)

Number of Projects — Total: 300 (247; 34; 10; 8)

This chart shows the number and length of currently operational linear infrastructure projects in Cambodia.
Source: Stimson Mekong Infrastructure Tracker, supported by USAID and The Asia Foundation, 9/21/2021 • Embed • Created with Datawrapper

The information available from: https://www.stimson.org/2021/cambodia-country-profile/

Table 2. CDB and CHEXIM infrastructure loans to Cambodia 2008-2019. Source: GDPC, Boston University.

Project	Type	Borrower	Lender	Signed	Total (USD millions)
Highway, Street, Bridge Construction	Highway, Street, Bridge Construction	Public	CHEXIM	2014	120.00
Rehabilitation Project of the National Road No 57B	Highway, Street, Bridge Construction	Public	CHEXIM	2009	92.09
Construction of National Road No 59	Highway, Street, Bridge Construction	Public	CHEXIM	2011	78.87
The enlargement of Cambodian National Road No. 6	Highway, Street, Bridge Construction	Public	CHEXIM	2013	242.00
Rehabilitation of National Road 62 & National Road 210	Highway, Street, Bridge Construction	Public	CHEXIM	2008	57.80
National Road No.3 Construction Project from Phnom Penh (Chom Chao)-Bek Kus-Kampot Town	Highway, Street, Bridge Construction	Public	CHEXIM	2018	215.00
Construction of national road No. 44	Highway, Street, Bridge Construction	Public	CHEXIM	2013	78.19
Rehabilitation of Cambodia National Road No.62	Highway, Street, Bridge	Public	CHEXIM	2010	53.56

	Construction				
Phnom Penh Loop Line Phase 2	Electric Power Distribution	Public	CHEXIM	2013	75.86
Expansion of National Road No. 6	Highway, Street, Bridge Construction	Public	CHEXIM	2011	70.25
Kirirom III Hydropower Plant	Hydroelectric Power Generation	Public	CHEXIM	2008	47.10
Stung Tatay Hydropower Project Main Project	Hydroelectric Power Generation	Public	CHEXIM	2010	540.00
Lower Stung Russey Chrum/Orussei Hydropower Project	Hydroelectric Power Generation	Public	CHEXIM	2013	412.00
Extension of Cambodia National Road No. 76	Highway, Street, Bridge Construction	Public	CHEXIM	2012	89.27
Rural Power Grid Extension Project Phase 2	Electric Power Distribution	Public	CHEXIM	2014	90.00
Rural Power Grid Extension Project Phase 3 and 4	Electric Power Distribution	Public	CHEXIM	2014	90.00
Rural Power Grid Extension Project Phase 5 and 6	Electric Power Distribution	Public	CHEXIM	2016	100.00
230kV Power Transmission Project Phase II for Cambodian National Grid	Electric Power Distribution	Public	CHEXIM	2017	123.00
5th Cambodia-China Friendship (New Chroy Changvar) Bridge	Highway, Street, Bridge Construction	Public	CHEXIM	2011	27.50
Rural Power Grid Extension Project Phase 1	Electric Power Distribution	Public	CHEXIM	2009	53.56
Expansion of Cambodia National Road No. 5	Highway, Street, Bridge Construction	Public	CHEXIM	2012	56.80
Construction of national road No. 214	Highway, Street, Bridge Construction	Public	CHEXIM	2012	113.00
115kV Transmission Line and Substation from Phnom Penh to Bavet Project	Electric Power Distribution	SOE	CHEXIM	2009	475.00
Staung River Basin Water Resources Development Project Phase I	Water, Sewage and Other Systems	Public	CHEXIM	2013	329.75
2017 Loop network in southwest regions and the rest of eastern regions	Electric Power Distribution	Public	CHEXIM	2017	180.00
2015 Loop network in southwest regions	Electric Power Distribution	Public	CHEXIM	2015	90.00
Vaico Irrigation Project	Water, Sewage and Other Systems	Public	CHEXIM	2013	100.00
Expansion of National Road No. 51	Highway, Street, Bridge Construction	Public	CHEXIM	2017	40.90
Siem Reap New International Airport, Siem Reap	Scheduled Air Transportation	Public	BDC, CCB, CDB, CHEXIM, ICBC	2013	880.00
Chroy Changvar-Thnal Keng Section - National Road 6 (Widening)	Highway, Street, Bridge Construction	Public	CHEXIM	2011	70.25
					Total:US$ 4991.75

III. Cambodia's Biodiversity Landscape

Cambodia is part of the Indo-Burma biodiversity hotspot, signaling its importance to global biodiversity, and many of the species found here are likely endemic to the region, if not the country or habitat (Myers et al., 2000). The country has over 8,260 plant species (10% of which are likely endemic, and more are being discovered), more than 250 species of herpetological fauna (amphibians and reptiles), 874 fish species, and more than 500 bird species (Table 3). The Cambodian coastline is also known for pristine marine environments, including corals and seagrass forming refuges for tropical marine fish and other marine species. Explorations continue to identify new species, a signature of biodiversity hotspots worldwide. Species thought to be lost have been rediscovered (for example, the Siamese crocodile).

Table 3. *Biodiversity in Cambodia by taxa. Source: https://opendevelopmentcambodia.net/topics/biodiversity/*

Taxon	Total known species	On IUCN Red List as endangered, threatened, or vulnerable
Mammal species	123	37
Bird species	545	36
Fish species	874	N/A
Reptile species	88	13
Amphibians	63	12
Vascular plant species	2,308	38
Hard coral	24	N/A
Soft coral	14	N/A
Seagrass	10	N/A

There are seven management regions for biodiversity, which are comprised of various formal and informal protection types: the (1) south-western coastal ranges and marine waters, (2) northern plains, (3) north-eastern forest, (4) Kampong Cham, (5) Mekong Delta region, (6) Tonle Sap floodplain, and (7) north-western region. Although they are not all formally protected by Cambodian agencies, these regions are identified as critical in the National Report on Protected Areas and Development of Cambodia (ICEM, 2003). Figure 6 illustrates the Key Biodiversity Areas (KBAs), Important Bird Areas (IBAs), and protected areas that span these seven regions.
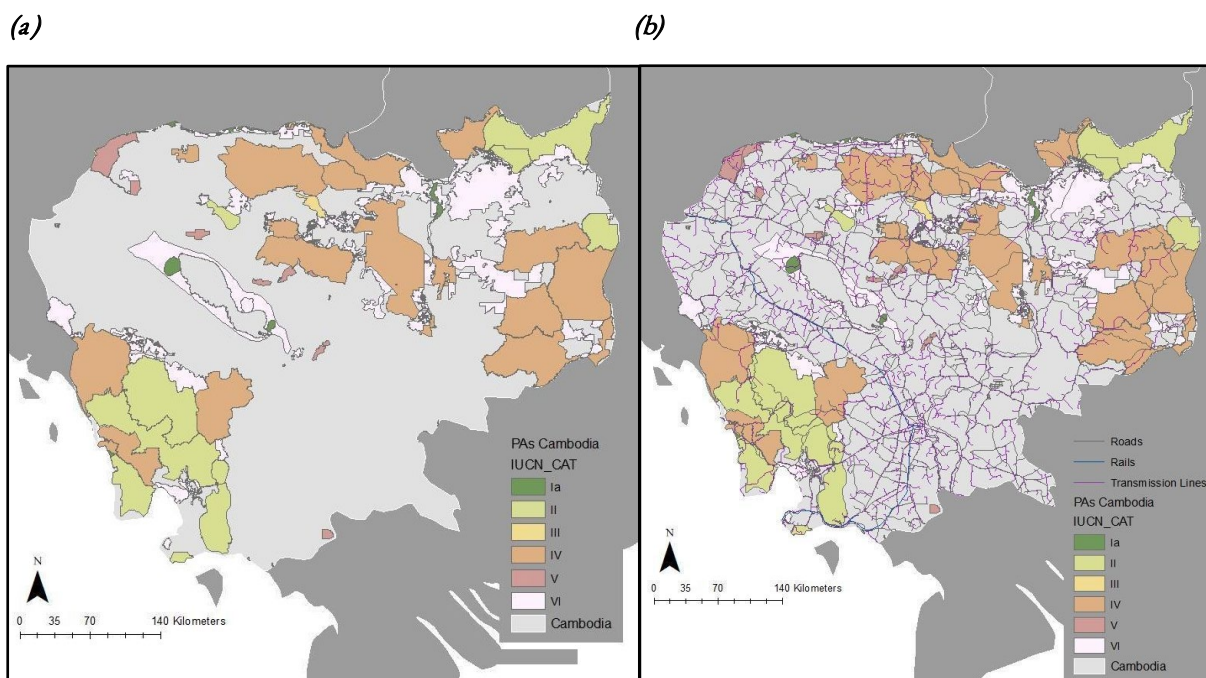
Figure 6. *Key Biodiversity Areas, Important Bird Areas, and protected areas in Cambodia. Source: Atlas of Cambodia 2013, Save Cambodia's Wildlife, 2nd edition. Accessed from:*
https://opendevelopmentcambodia.net/topics/environmental-and-biodiversity-protection/

Existing infrastructure impacts biodiversity in most of Cambodia's protected areas. Only the protected areas under the IUCN category of I and II are afforded formal protection status as inviolate spaces for wildlife. In contrast, other categories include various forms of government and public use. Fig. 7 shows that nearly all of Cambodia's PAs are intersected by roads, rails, and transmission lines to visualize the intersection of conservation and LI. The maps include only existing PAs and LI, not those currently in planning (see Appendix for methodology).

(a)   *(b)*

Figure 7. (a). *Multiple Protected Areas in Cambodia affording*
varying degrees of protection to multi-use landscapes. Highest protection afforded to IUCN categories I and II. ***(b)***
Existing infrastructure already compromises multiple protected areas. We consider only Road, Rails, and Transmission
lines as linear infrastructure for this study. See Appendix A for Methodology.

Many international NGOs actively participate in Cambodia's wildlife conservation (Table 4). As a biodiversity hotspot and one of the countries relying on the Mekong for rural peoples' livelihoods, flagship NGO programs in Cambodia grapple with the needs of people in some of the world's most biodiverse places. Additionally, most wildlife conservation NGOs in Cambodia have ties with forestry governance across scales with varying degrees of involvement (national to local) – allowing for coordination with decision-makers and managers from the national to the local level.

Table 4. *Flagship programs of international NGOs in wildlife conservation in Cambodia*

NGO	Flagship Area of Work	Conservation Importance
WWF Cambodia	Mekong Flooded Forest	Irrawaddy dolphin and gigantic fish like Mekong giant catfish, giant carp, and giant freshwater stingray - all >200 kg in weight; Hog Deer - rediscovered and needs riverine habitats.
WWF Cambodia	Eastern Plains Landscape	Low numbers of recovering populations of large herbivores and leopards. The EPL is also a priority tiger reintroduction landscape with global support from the Global Tiger Forum and WWF's Tx2 initiative (to double tiger populations by 2022).
WCS Cambodia	Tonle Sap and floodplains	Unique habitats being lost to increasingly commercial fisheries and agriculture
WCS Cambodia	Keo Seima Wildlife Sanctuary	Highest diversity in any Cambodian protected area, Keo Seima REDD+ project site

WCS Cambodia	Northern Plains	High biodiversity but high pressures too - of importance nationally to maintain and recover wildlife
Fauna and Flora International	Cardamom Mountains	Siamese crocodile (rediscovered), Asian elephant, yellow cheeked crested gibbon

Major threats to biodiversity include:
- Land conversion for agriculture and deforestation
- Dams, roads, and infrastructure (these include the ongoing coastal infrastructure boom)
- Sand dredging, overfishing, and illegal fishing
- Illegal forest harvests (including the wildlife trade of endangered species)

Local livelihoods are intrinsically tied to wildlife; for example, fish are the largest source of protein nationally. Additionally, decades of war and violence have pushed populations into remote regions and led to large-scale wildlife trade and subsistence and commercial hunting. In turn, many landscapes (even those under protection) are devoid of healthy populations of large herbivores and charismatic species like the tiger have been completely extirpated (Box 2).

Box 2: Cambodia's Sub-decree 30 and wildlife habitat loss

Cambodia's Sub-decree No. 30 signed in 2021 removed official protection from some 127,000 hectares of land that was formerly part of national parks, reserves, and wildlife sanctuaries in Koh Kong province. In turn, conservationists remain highly concerned about the ecological integrity of southern Cambodia.

In 2008, the Union Development Group (UDG), a Chinese company, was granted a 36,000-hectare land concession in Cambodia's Botum Sakor National Park. This was followed by an additional 9,100-hectare concession granted in 2011. Much of the national park's forests have been cleared by UDG and other companies. Conservationists worry that Sub-decree 30 will open up other remaining tracts of forests to the same fate.

Peam Krasop Wildlife Sanctuary stands to lose nearly one-third of its total land area due to the sub-decree. Researchers note that this level of habitat degradation could result in "trophic cascades: where the loss of key species destabilizes the entire spread of ecosystems, which may lead to further losses of biodiversity." Both Peam Krasop and Koh Kapik, for example, are important refuges for apex predators and species in threat of extinction, such as the tiger, fishing cat, and hairy-nosed otter.

However, experts caution that other protected areas in the country are unlikely to be faring any better: "A lack of commitment and vision, systemic corruption at various levels, and competing state and private interests" continue the rapid degradation of even the last refuges in protected areas.

Conservationists and government officials have some agreement on the fact that the country does not have the adequate resources (labor or funding) to effectively manage its protected areas.

Source: Flynn & Ball, 2022.

Linear infrastructure and biodiversity in Cambodia

In Cambodia, the highest protection is afforded to IUCN categories I and II across the identified PAs. However, multiple regions of identified composite biodiversity Index (CBI, see Appendix A) cores lie outside of these protected area boundaries and are better covered by Key Biodiversity Areas (KBAs) (Fig. 8a). Moreover, it is within these already threatened, unprotected CBI cores that Chinese supported LI is upcoming, likely with high impacts on biodiversity (Fig. 8b).

(a)   **(b)**
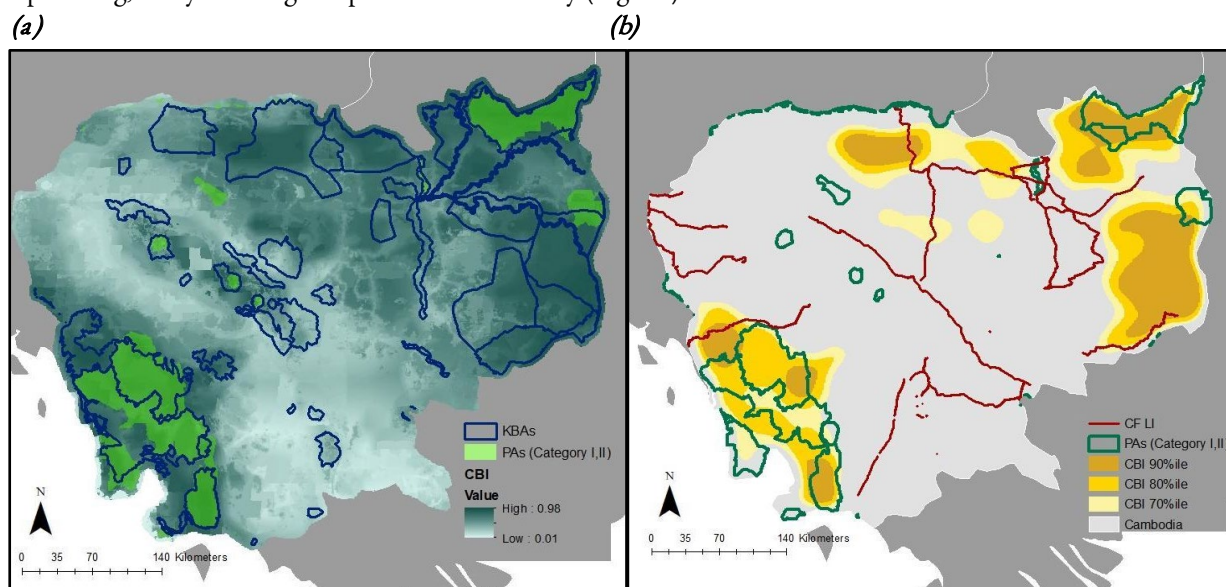
Figure 8. (a) *In Cambodia, KBAs cover more areas of conservation importance (high CBI values) than PAs, with the greatest protection in IUCN categories I and II.* **(b)** *Chinese-funded linear infrastructure (CF LI) refers to road, rail, and transmission (or power line) projects from Aid Data's Chinese development projects (Custer et al., 2021). CF LI is cutting into and across CBI cores - mostly in areas with low protection but high biodiversity importance.*

Only one-quarter of 90th percentile cores overlap with the PA categories I and II in Cambodia. This suggests that many important biodiversity areas remain outside of strict protection. Our summary data (Appendix B) highlights the impacts of linear infrastructure on core biodiversity areas (created from the country-level CBI data). With low coverage of CBI cores by PAs with IUCN categories I and II, there will likely be high impacts on biodiversity with little recourse within formal ESIA processes and safeguards frameworks. Drawing on AidData's dataset (Custer et al., 2021), which captures only Chinese-funded projects, proposed infrastructure incursions into biodiversity areas include 9.7 km of road within protected areas and 115.5 km of road within the richest CBI cores (cut-off at the 90th percentile). The total length of LI captured for Cambodia for roads totaled 2,270.7 km.

In many cases, apart from direct loss of forests (Cambodia has some of the highest deforestation rates globally), roads and other linear transgressions into intact forests allow for illegal timber and wildlife trade. Laws have not spared PAs in Cambodia from habitat loss and degradation and many areas have become devoid of the wildlife they were meant to conserve. Roads also can be precursors or follow-up actions to agricultural or economic land concessions that allow for much of the deforestation in Cambodia (Clements et al., 2014). Linear infrastructure also poses a threat to remaining wildlife by becoming challenging barriers to movement (crucial to maintaining viable wild populations). One clear example of this is the Snuol Wildlife Reserve, where a road incursion and the subsequent degradation of this PA eventually led to its degazetting in 2018, as there was "almost nothing left to protect" (Boyle & Turton, 2019; Fig. 9.)
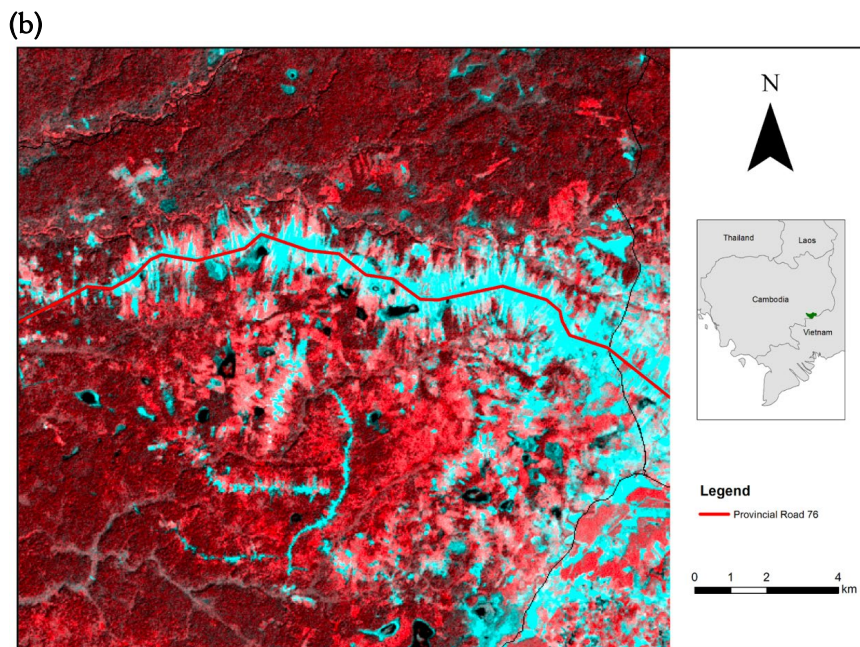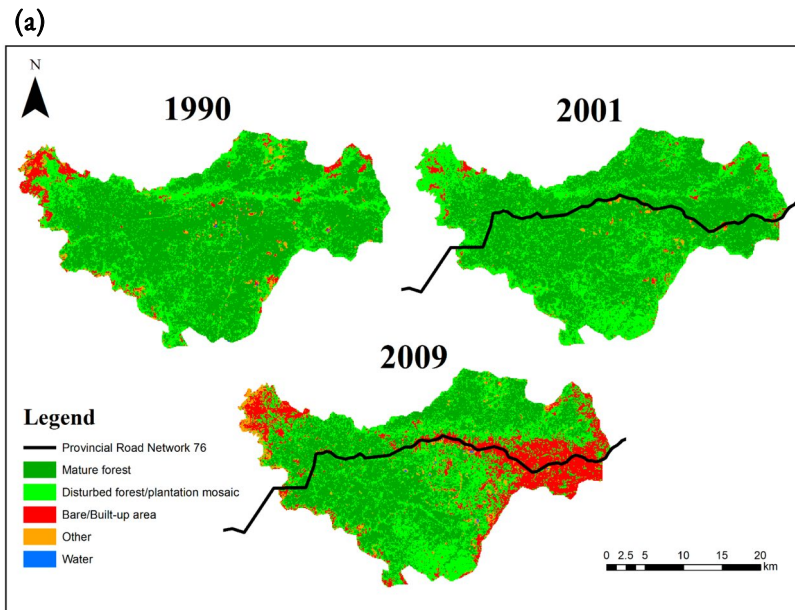
(a)

(b)

Figure 9. (a) *Land cover change of the Snuol Wildlife Reserve. Landsat images from 1990, 2001, and 2009 demonstrate the widespread conversion of forest and forest mosaic in this protected area.* ***(b)*** *A false-color composite of a Landsat 5 image over part of the Snuol Wildlife Reserve. This image reveals the fish-bone pattern of deforestation branching out from Provincial Road 76, visually demonstrating the indirect impacts of LI on wild spaces. Source: Clements et al., 2014.*

Additionally, LI is not necessarily based on local needs or local participation. Whether implemented or proposed, many projects remain shrouded in high-level government tenders and permission procedures. Environmental and Social Impacts Assessments (ESIAs) are rarely public for many large infrastructure projects, regardless of the funder. Chinese-funded linear infrastructure, which comprises the bulk of infrastructural undertakings in Cambodia, often sees little scrutiny, even according to the Cambodian government's Standard Operation Procedures (SOPs) (The Asia Foundation, 2020).

PES and REDD+ pilots for conservation in Cambodia

Payment for environmental or ecosystem services (PES) in Cambodia have increasingly been integrated into conservation plans due to international influences from conservation projects. It has become an increasingly popular approach, particularly in countries with acute land competition between development projects, local peoples, and wildlife areas. PES is also one instrument that countries use to reduce deforestation, by receiving payments for Reduced Emissions from Deforestation and forest Degradation (REDD) via conservation, sustainable forest management, and the increased forest carbon stocks (REDD+).

PES aims to acknowledge the many benefits people receive from nature by incorporating them into economic models of development and management. Several conservation studies suggest that attributing economic value to nature through market-based mechanisms has the potential to make sustainable development and environmental management more effective (Geneletti, 2011; Tinch et al., 2018). However, serious critiques have been leveraged against PES, which raise the challenges of equitably valuing nature, urge scrutiny of when and how PES is implemented, and question who 'gains' or 'loses'(Büscher, 2012; Kull et al., 2015; Kolinjivadi et al., 2019). However, due to the prevalence of PES, below we summarize a study by Milne and Chervier (2014) to summarize the current characteristics and state of PES in Cambodia:

- There is explicit legal basis or mandate for PES in Cambodian law.
- PES language that has been added to national policies as a result of discussions led by the Ministry of Foreign Affairs of Denmark (Danida), the Japan International Cooperation Agency (JICA), and multiple United Nations agencies.
- Policies incorporate suggestions for PES either as an innovative financing tool and funding source for natural resource management or as a distribution system for potential REDD+ revenues, but there remains no explicit mandate for implementation.
- Policies with PES language include the National Green Growth Roadmap (RCG 2009), the REDD+ Readiness Roadmap (UN-REDD 2010), and the National Forestry Programme (NFP) for 2010-2029 (RGC 2010) – created by the Forestry Administration (FA) of the Ministry of Agriculture Forestry and Fisheries (MAFF) and the Ministry of Environment (MoE).
- Two examples of PES in practice are the Atai Dam in Pursat province and the maintenaning urban water supply, for example around Phnom Kulen in Siem Reap province (Fig. 10).
- Currently, the authors suggest that ESIAs in Cambodia are the most appropriate vehicle for integrating PES in relation to large infrastructure.
- Key NGOs working in this policy space are Flora Fauna International (FFI) and Wildlife Alliance. Together these organizations drafted a PES law and a white paper. Unfortunately, PES momentum has slowed due to implementation challenges.
- Challenges to PES implementation:
  - The Prime Minister's populist speeches rallied against PES during the study period, and purported that PES will increase energy prices (hydropower) and shift the costs of energy generation from funders (China) to consumers (Cambodian citizens).
  - PES implementation occurs at the nexus of infrastructure construction (predominantly in the ESIA phase), biodiversity laws, and land laws. Given the complexity of land tenure in Cambodia, these legal interactions are fraught and rarely resolve to inform or mobilize PES schemes.
- Prior to the Prime Minister's speeches, some PES was touted as successful:
  - Conservation International's (CI) set of community-based conservation agreements to avoid deforestation and protection of critically endangered species in the Cardamom Mountains in 2005.

- Wildlife Conservation Society's (WCS) direct payments for bird nest protection and other PES-like conservation schemes in Preah Vihear and Kompong Thom provinces, delivered through conditional benefits from agricultural certification and eco-tourism ventures at the community level.
- Success attributed to the non-threatening nature of these schemes to the development plan, NGOs funded them, and the small scale of operations.
- The REDD+ site in Oddar Meanchey has been cited as the most likely PES success in Cambodia. It included multiple actors and intermediaries: NGOs (Wildlife Conservation Society, Pact), multilateral agencies and donors (JICA, UN-REDD+, US Agency for International Cooperation), government partners (FA, MoE), and various international carbon certification and marketing groups. The main way PES will be implemented is with international support, without compromising the country's development agenda.
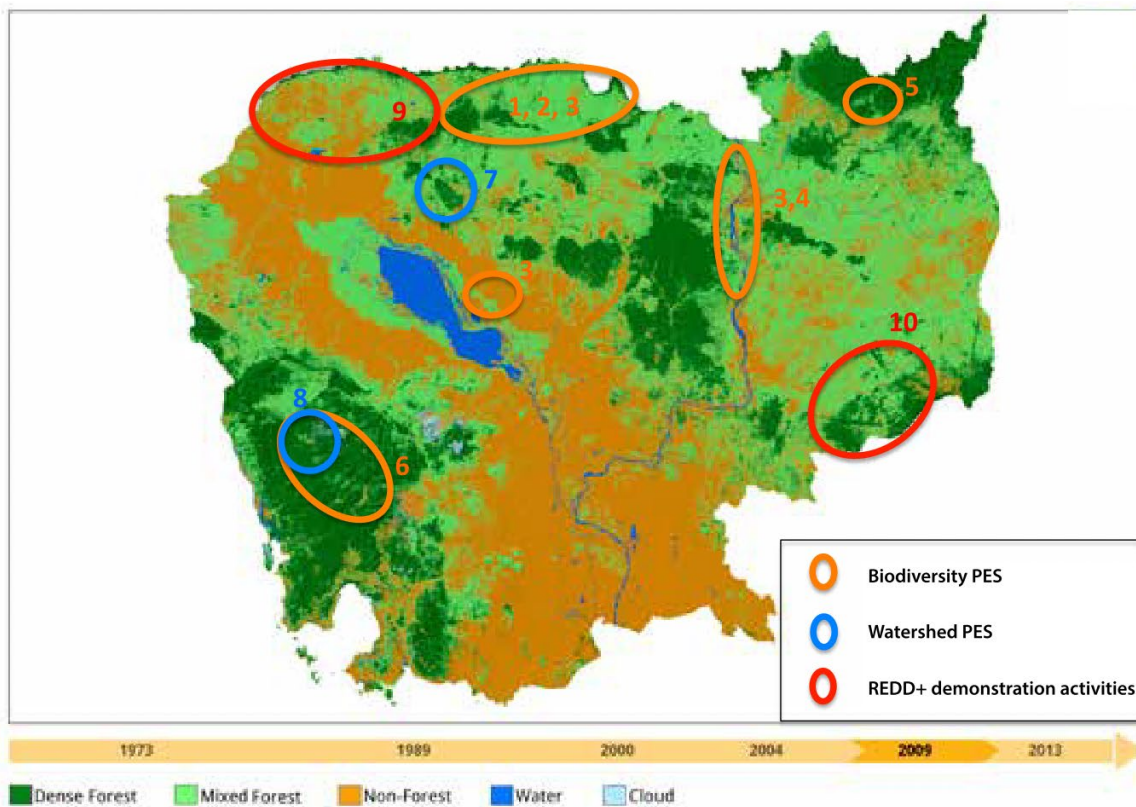

Figure 10. Location of PES schemes in Cambodia. Source: Milne and Chervier, 2014.

IV. Country policy and planning landscape for biodiversity & infrastructure

International commitments to conserve biodiversity

Cambodia is a party to multiple international conservation conventions. The government signed on to the Convention on Biological Diversity (CBD) in 1997. Cambodia's CBD efforts have progressed with the preparation of the Biodiversity Prospectus in 1997 and the nearly completed efforts to prepare a National Biodiversity Strategy and Action Plan (NBSAP), undertaken with support from the Food and Agriculture Organization (FAO). Cambodian membership in the International Union for the Conservation of Nature (IUCN) has been inconsistent. Cambodia was a state member of the IUCN from 1958 to 1990. In 1992, the IUCN re-opened a liaison office through UNESCO before establishing the country's project office. The nation reestablished IUCN membership in 2020, to much appreciation from the international community. During the time it was not an IUCN member, several international NGO members of the IUCN (the World Wide Fund for Nature [WWF], FFI, Wetlands International, and CI) typically carried Cambodian conservation matters to the meetings and working groups of the IUCN.

Additionally, Cambodia ratified the Ramsar Convention (the Convention on Wetlands of International Importance) in 1999 and listed three Ramsar sites: Koh Kapik/Koh Kong and surrounding areas along the coast, Boeng Chhmar on the Tonle Sap Lake, and parts of the middle stretch of the Mekong River north of Stung Treng. However, drafting management plans and on-the-ground management of these Ramsar sites remains challenging. Under the UN World Heritage Convention, signed in 1992, Cambodia currently protects areas surrounding Angkor Wat, and the government is considering other sites for inclusion. Cambodia is also a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and the International Convention to Combat Desertification (CCD). It has implemented REDD+ programs, which continue to receive mixed reviews from those involved in wildlife conservation and local land rights.

The country, however, has varying outcomes regarding its compliance and effectiveness in meeting its many obligations. For example, although a party to the Convention on International Trade in Endangered Species since 1997, wildlife trade continues to dominate conservation discussions within the country and internationally, and there is a need for greater transparency. Cambodia has engaged in dialogue with neighboring countries about the illegal trade of wild species, notably to verify timber legality (CITES, 2021), cross-border (Cambodia-Vietnam) anti-smuggling training (CITES, 2014), and "the 2nd Regional Dialogue on Preventing Illegal Logging and Trade of Siamese Rosewood" hosted by the Government of Thailand (CITES, 2016).

Cambodia highlights its many achievements in meeting international goals and commitments on national and international stages. For example, the country exceeded its 2020 Aichi Biodiversity Targets by officially declaring protected areas around three times more than 17% of the land. The government also plans to halve its deforestation rate by 2030. However, it is critical to note that the state leans on NGOs and donor communities to help fulfill the international mandates to which it has agreed.

National policy commitments to conserve biodiversity

Cambodia has a rich policy landscape that is regularly updated via *Prakas* (guidelines and new policies by various ministries), which are easier to create than amendments to existing laws. The following are the most relevant Cambodian laws for biodiversity management:

- Royal Government of Cambodia (RGC) national forest policy (2002);
- Land Law 2002;

- Law for Protection of Cultural Heritage adopted by the National Assembly in December 1995 and promulgated by the King on 25 January 1996. This law focuses on Angkor Wat and its surrounding areas. Natural conservation and biological conservation may be byproducts of cultural protection;
- Law on Administration and Management of the Commune (2001), which delegated responsibility to local authorities to protect the environment and natural resources within commune boundaries but gave no management decision-making power without specific authority from RGC (Oberndorf, 2005);
- Sub-Decree on State Land Management (2005).

While laws continue to evolve through *Prakas*, with the formalization of policies under official sub-decrees, transparency and implementation of these policies remain significant challenges. Rent-seeking, elite-capture of opportunities, and corruption allow specific influential individuals to utilize guidelines for personal gains in conjunction with high-level political influence. However, steps are being taken that acknowledge these prevailing challenges in Cambodia. The Law on PAs has been updated with more specific guidelines. The protection of biodiversity is addressed in the Rectangular Strategy Phase III and the National Strategic Development Plan – balancing development and conservation.

As an active member of the Association of Southeast Asian Nations (ASEAN) and other regional efforts for international coordination, Cambodia looks to keep pace with policies and environmental measures in neighboring Thailand and Vietnam, as well as China. Many updates and changes in policy result from the Cambodian government seeking to maintain international standards (EIA laws, for example, as detailed below). However, many progressive policies are unevenly implemented, and therefore participatory policy frameworks remain ineffective in considering the needs of people or natural systems. Entities seen as adversarial to development in Cambodia are likely to remain limited in their capacities to broker change. Additionally, the government has identified a lack of skilled conservation workers and managers. As a result, the Royal University of Phnom Penh now hosts the Center for Biodiversity Conservation which trains and supports Cambodian scientists.

The current framework for environmental governance is made up of the following policies, legal documents, and plans:

- Cambodia Climate Change Strategic Plan 2014–2023
- Draft Environmental and Natural Resources Code of Cambodia (2018)
- National Forest Program 2010–2029
- National Policy on Green Growth (2013)
- National Strategic Plan on Green Growth 2013–2030
- National REDD+ Roadmap.
- National Strategic Development Plan 2019–2023
- Prakas No. 021 on Classification of Environmental Impact Assessment for Development Project (2020)
- Rectangular Strategy Phase IV
- Strategic Planning Framework for Fisheries Sector 2010–2019
- National Environment Strategy and Action Plan 2016–2023

The ESIA/EIA Process in Cambodia

The EIA laws and process remain the key policy-implementation framework to hold industry responsible for biodiversity conservation goals. After tenders and projects are identified, most large infrastructure projects enter the Cambodian EIA process. The MoE utilizes the following legal instruments for EIA regulation and processing (source - https://www.cambodiaict.net/wp-content/uploads/2019/02/access_to_eia.pdf):

1. Law on Environmental Protection and Natural Resource Management (1996)
2. Law on Nature Protection Area (2008)
3. Sub-Decree on Environmental Impact Assessment Process (1999)
4. Sub-Decree on Water Pollution Control (1999)
5. Sub-Decree on Solid Waste Management (1999)
6. Sub-Decree on the Control of Air Pollution and Noise Disturbance (2000)
7. Joint Prakas between MoE and Ministry of Economy and Finance on the Establishment of Service fee for Reviewing report of EIA and Monitoring the Project implementation (2000)
8. Prakas on Delegation of Power to Municipal/Provincial Department of Environment to Decide on Project Development (2005)
9. Prakas on General Guideline for Preparing Initial Environmental Impact Assessment and Full Environmental Impact Assessment Report (2009).

International standards and multilateral actors influenced the EIA process in Cambodia. It follows a fairly standard EIA formula (Fig. 11).
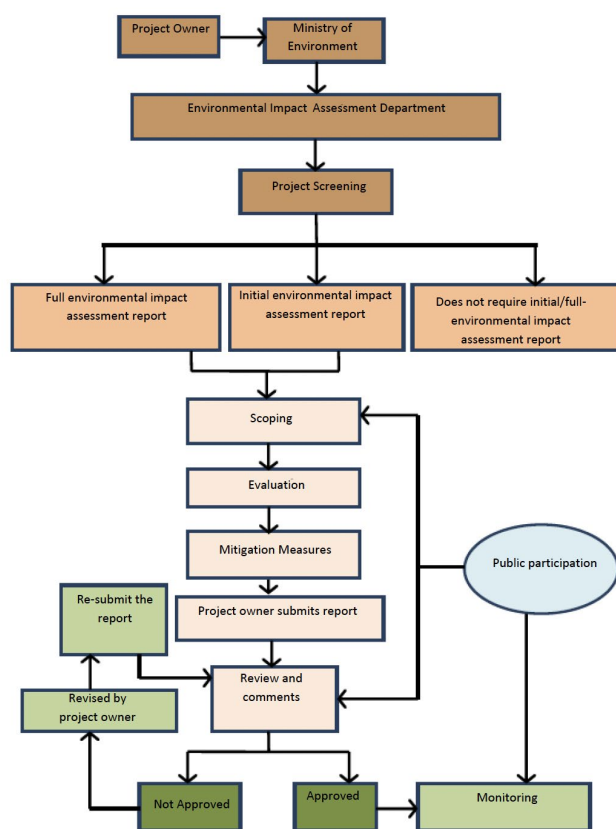

Figure 11. *The formal EIA process in Cambodia mirrors well-known global steps for EIAs. Source: Guidebook on Environmental Impact Assessment in Cambodia, 2012.*

However, many EIA reports are not public, and affected stakeholders (local people and NGOs working on wildlife issues) are usually excluded or are involved too late to change the extent or intensity of detrimental consequences. The Sub-decree on EIAs states that the process of conducting an EIA should "encourage public participation in the implementation of the EIA process" but does not elaborate on the level and nature of public consultation and decision-making capacity such interactions can have.

Overall, it seems that the ministerial departments in forestry and conservation are disconnected from those introducing infrastructure. While housed in the MoE, the EIA process is in its own department. There is a lack of open, formal coordination between government actors and stakeholders at the local level.

Regarding environmental assessments, Cambodia is surrounded by countries legally adopting Strategic Environmental Assessments (SEA), which bring an EIA-like approach to assessing policies, plans, or programs. It can aid in driving a more holistic and inclusive approach to planning, siting, and building large infrastructure. China, followed by Vietnam and Laos, introduced provisions for SEA into official legislation in the 1990–2000s. As with EIAs in the region, efforts to mainstream SEAs came from international influence and donors. In these three countries, SEA provisions mandate the involvement and coordination of planning *and* environmental ministries. In Cambodia, the SEA legal framework is yet to be finalized, and any efforts to conduct SEAs are due to donor requirements and support.

V. Understanding stakeholders and power dynamics

Cambodia has internationally recognized conservation landscapes for flagship species and biodiversity hotspots, yet these remain imperiled due to on-the-ground challenges. Many of the conservation challenges in Cambodia stem from elite capture, legacies of violent pasts, and a singular focus on economic returns from development. The government has continued to lean on external funding and aid, in large part provided by Chinese institutions. Apart from LI, large development-oriented projects include agricultural efforts, hydropower, and urban expansions that impact the adjoining high biodiversity areas. Therefore, the following dynamics play out across planning and implementing agencies.

Ministries and departments involved in conservation and environmental management have seen continual updating and reorganization in the last two decades with additional updates to policies via *Prakas* (see subsection below). As such, the latest iterations of some of these changes are reflected in this section on understanding dynamics. The MoE is responsible for environmental governance. While the MoE and the Ministry of Agriculture, Forestry and Fisheries (MAFF) are the two main governmental actors overseeing natural resource management and conservation, they are also tasked with developing pertinent policies and overseeing agencies in the forestry sector. In addition, the GDANCP (General Department of Administration for Nature Conservation and Protection) manages protected areas and wildlife sanctuaries housed under the MoE. However, the actual management responsibility for protected areas and wildlife sanctuaries falls to the Provincial Department of Environment (PDoE) in each province (which is under the provincial governments). Also, 'Protected Forests' no longer exist as a designation (they ceased to exist when they were transferred from MAFF to MoE when they became Wildlife Sanctuaries). Operationally, some of the GDANCP's work falls to NGOs, with GDANCP / PDoE staff seconded to projects within NGOs. Interestingly, MAFF is responsible for key resources in the rural economy and operates under a mandate to develop community forestry programs and implement forestry policy. Community forestry and policy implementation are especially important in PAs. In this latter role, the MAFF and MoE partner with NGOs. Other ministries with ties to conservation efforts in Cambodia include the Ministry of Land Management, Urban Planning and Construction; the Ministry of Mines and Energy (MME), and the

Ministry of Water Resources and Meteorology. In 2020, MIH became the Ministry of Industry, Science, Technology, and Innovation (MISTI).

In its *National Strategic Development Plan 2019-2023* (NSDP), the Ministry of Planning outlines the country's current infrastructure assets and strategy. The Ministry of Public Work and Transport is responsible for constructing roads, bridges, ports, railways, waterways, etc., and for implementing national policy. The MME is responsible for policy and strategy; the Electricity Authority of Cambodia (EAC) issues regulations and licenses, reviews costs, approves tariffs, and regulates compliance; and Electricité du Cambodge (EDC) is the state utility, operating since 1996 as a state-owned, limited-liability corporate entity with its own administrative, financial, and managerial authority.

Ministry of Environment (Department Of EIA) and *Prakas*

Under the law, the MoE's Department of EIA decides if a project must undertake an EIA/ESIA. The project proponents then hire a government-recognized EIA consultant to conduct required assessments. Public participation is solicited across the scoping to mitigation stages of a project's EIA process. However, a specific clause in the governing *Prakas* suggests that the government must include public participation on request by the public (civil society organizations [CSOs] / NGOs, citizen groups, etc.). The legal framing allows for ambiguity when EIAs must be made public. The initial assessment for EIA rests largely within the government structure, as does project proposal information: leading information is largely inaccessible to public organizations and citizen groups when it would be most useful. Documents may be made available after EIA approval has been obtained from the Department of EIA or, rarely, if on-the-ground surveys include studies where people informally hear about upcoming projects.

In interviews, multiple experts reiterated that while the laws and *Prakas* for EIA have continued to evolve to include the concerns of people and conservation stakeholders, in reality much remains inaccessible to public institutions and citizens until the project has been approved and construction begins. Although spaces to engage are limited, external funders and NGOs are responding to such limitations. For example, on an ADB transmission line project, civil society actors solicited avifauna data from WCS-Cambodia to help mitigate bird impacts. This suggests that external funders may be able to demand more wildlife data and solicit expert feedback to develop more robust assessments as well as mitigation mechanisms in the future. This, in turn, can create vital space to intervene in and improve EIAs/ESIAs for Cambodia's wildlife landscapes.

Civil society organizations and land tenure around developmental projects

Chinese influence on land and how land tenure is administered in Cambodia is complicated with China supporting firms from Cambodia as well as Vietnam receiving land concessions., Land concessions for new agricultural projects have led to boom-bust cycles in people's livelihoods, with all parts of the planning and execution of these efforts shrouded in ministerial and provincial workings. Large-scale land grants to all domestic and international companies have resulted in land conflict, regardless of the mechanism used or the nationality of the investor. Finally, Cambodia put a moratorium on economic land concessions in 2012, and it is still in place, so ELCs are no longer the major cause of displacement they once were. While conservation agencies are not as aware or involved in studies or advocacy for land rights – experts suggested that this has a major influence on conservation landscapes. Those working on land tenure issues are often not engaged with biodiversity professionals but these two groups could mobilize ground-up demand for more sustainable landscape-wide plans for local livelihoods as well as biodiversity and climate change goals.

It may be beneficial to encourage wildlife NGOs and CSOs to engage with each other at the landscape level to jointly seek and create spaces for further engagement with the funders of large LI projects. This could act as a first step to ensure funder-led ESIAs mandate more inclusive spaces for feedback. Overall, the

disconnect between government agendas (political and economic) and those of citizens in biodiversity landscapes (including NGOs and CSOs) is high in Cambodia, specific interventions should not be framed as anti-government or anti-development, but aligned with sustainable development goals of which climate change and biodiversity can be an integral part.

VI. Recommendations

Several long-term challenges drive swift LI construction in vulnerable landscapes and affect environmental safeguarding in Cambodia. For example, across sectors, frameworks may be inclusive on paper, but break down in practice. An existing deficit of data on wildlife is exacerbated by a lack of political will for environmental efforts and a strong political will for LI development. Finally, tenure rights of local peoples and land pricing problems are ongoing challenges that are influenced by export-driven concessions. The path to successfully mitigating impacts lies in proactively applying landscape planning and cost-benefit. Conservation bodies need to align with development agendas or at least acknowledge them to make the case of cost to biodiversity goals.

Priority Recommendations in Cambodia
- NGOs can be encouraged to work directly with external funders to enhance ESIA requirements by providing wildlife data and expertise on mitigation hierarchy / alternate routes [there is space in formal frameworks for funders and project proponents to include this information even it comes during site-visits, as long as it is prior to final approvals]
- There exist some efforts to make biodiversity information available but the current platform does not include policy teeth to make its use mandatory. GBIF – Cambodia a member for the past 15 years or so - https://www.gbif.org/country/KH/summary
- Possible wildlife NGOs that could provide expertise to funders – WCS (has already provided some of this information to ADB for a transmission project); WWF is well-placed to interface with high-level stakeholders. Other notable NGOs can be found as partner organizations of WCS and WWF on a landscape-by-landscape basis.
- High priority areas: Cambodia's protected areas and those on biodiversity lists (such as KBAs) for the country. Many of these protected areas are already beset with hard conservation battles against poaching and land-use encroachment, so LI will exacerbate these problems and therefore they must be safeguarded on priority.
- Cardamom Mountains – a remaining biodiversity rich region in Cambodia that is currently threatened by multiple dams and ensuing LI development in the region. Conservation groups are active and can be encouraged to provide open biodiversity data to all funders proactively to ensure adequate safeguards.
- An abundance of NGO-led coalitions exist in Cambodia to better conservation outcomes and these can be made aware of tools to use to engage with landscape planning as well as communities.

Longer-term visions for biodiversity conservation

Project EIA/ESIA process:
- NGOs and CSOs to engage with LI funders proactively to ensure wildlife data is available to them with site-specific detail (i.e. relevant data, alternative routes and costs, etc.), so they may be

---

incorporated into planning. WCS – ADB is a great showcase of the same. Coalitions can actively advocate for their data to be utilized with international funders.

- Policy making is hard to advocate for given the current political climate in Cambodia, but with meeting REDD+ goals and recent advocacy for better decisions for local communities as active stakeholders, there is an opportunity to push for guidelines that mandate public participation in-practice vs. in-principle.

Capacity:
- Cambodia remains a country with a large amount of NGO and CSO expertise coming from other countries. A path forward (difficult to attain but required) is to transfer knowledge and expertise to local personnel to better advocate from the ground-up.
- Tools for better landscape planning and cost-benefit analyses can be brought to bear on the current business-as-usual practices of funders. These changes are internationally encouraged for the 'Supply' side of LI, and will put funders in a positive light. Capacity to use the same needs to then percolate into government offices, in particular the Department of EIA – which is more likely to incorporate these tools with funder pressure.

International pressure to meet climate or other environmental framework commitments to influence national policy:
- Cambodia has committed to resuscitating wild tiger populations, and has seen positive press on meeting its Aichi target (by protecting more than 41% of lands) and the positive outcomes on livelihoods from its REDD+ efforts. Given these recent achievements and the recognition they have garnered, the Ministry of Environment can be approached to meet other biodiversity goals under the National Biodiversity Strategy and Action Plan. The leverage point here is the rich formal commitment as a backdrop to encourage action on important directives - with a framing of continuing what's being done right, not stopping what's being done poorly.
- Cambodia has a long historical relationship with China and should Chinese actors consider trickle-down approaches to incorporate best practices for wildlife safeguards, it is likely Cambodia would be aligned with receiving and implementing these.

References

Alamgir, M., Campbell, M.J., Sloan, S., Goosem, M., Clement,s G.R., Mahmoud, M.I., and W.F. Laurance. 2017. Economic, Socio-Political and Environmental Risks of Road Development in the Tropics. Current Biology 27:R1130–R1140. Elsevier Ltd. Available from https://doi.org/10.1016/j.cub.2017.08.067.

Asia Foundation, The. 2020. Community Engagement Along the Belt and Road: Findings from Cambodia and Pakistan: Summary Report. The Asia Foundation. Available from: http://hdl.handle.net/11540/12025.

Asian Development Bank. 2017. Meeting Asia's Infrastructure Needs. Manila, Philippines: ADB. Available from: https://www.adb.org/sites/default/files/publication/227496/special-report-infrastructure.pdf

Boyle, D. and S. Turton. 2019. Plundering Cambodia's Forests. *AlJazeera*. Available from: https://interactive.aljazeera.com/aje/2019/plundering-cambodias-forests/index.html

Büscher, B. 2012. Payments for ecosystem services as neoliberal conservation: (Reinterpreting) evidence from the Maloti-Drakensberg, South Africa. Conservation and Society 10:29. Medknow Publications and Media Pvt. Ltd. Available from http://www.conservationandsociety.org/text.asp?2012/10/1/29/92190 (accessed September 20, 2013).

Chheang, V. and P. Heng. 2021. Cambodian perspective on the Belt and Road Initiative. Pages 176–190 Research Handbook on the Belt and Road Initiative.

CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora). 2014. *CITES supports UNODC-led PATROL cross-border law enforcement training programme in Cambodia and Viet Nam*. Available from: https://cites.org/eng/news/sundry/2012/20121121_PATROL.php

CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora). 2016. Concrete measures agreed to tackle illicit trafficking in Siamese rosewood. Available from: https://cites.org/eng/node/43380

CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora). 2021. *CITES and FAO hold joint workshop in support of the verification of timber legality in the Lower Mekong Region.* Available from: https://cites.org/eng/CITES_FAO_workshop_timber_LAF_LowerMekongRegion_25052021

Clements, G.R., Lynam A.J., Gaveau, D., Yap, W.L., Lhota, S., Goosem, M., Laurance, S., and W.F. Laurance. 2014. Where and how are roads endangering mammals in Southeast Asia's forests? PLoS ONE 9:1–25.

Custer, S., Dreher, A., Elston, T. B., Fuchs, A. Ghose, S., Lin, J., Malik, A., Parks, B. C., Russell, B., Solomon, K., Strange, A., Tierney, M. J., Walsh, K., Zaleski, L., and S. Zhang. (2021). *Tracking Chinese Development Finance: An Application of AidData's TUFF 2.0 Methodology*. Williamsburg VA: AidData at William & Mary. From Dreher, A., Fuchs, A., Parks, B. C., Strange, A., and Tierney, M. J. (Forthcoming) *Banking on Beijing: The Aims and Impacts of China's Overseas Development Program*. Cambridge, UK: Cambridge University Press.

Davis, K.F., Yu, K., Rulli, M.C., Pichdara, L., and P. D'Odorico. 2015. Accelerated deforestation driven by large-scale land acquisitions in Cambodia. Nature Geoscience 8:772–775.

Diepart, J.C. 2015. The fragmentation of land tenure systems in Cambodia: peasants and the formalization of land rights. Country Profile No 6: Cambodia.

FAO (2015) Global Forest Resources Assessment 2015: Desk reference. UN Food and Agriculture Organization, Rome

Flynn, G. and A. Ball. 2022, 8 February. Endangered wildlife face perilous future as vital habitat loses protection in Cambodia. *Mongabay*. Available from:

https://news.mongabay.com/2022/02/endangered-wildlife-face-perilous-future-as-vital-habitat-loses-protection-in-cambodia/

Grimsditch, M. and N. Henderson. 2009. Untitled: Tenure Insecurity and Inequality in the Cambodian Land Sector. *Mekong Land Research Forum*: 86.

Geneletti, D. 2011. Reasons and options for integrating ecosystem services in strategic environmental assessment of spatial planning. International Journal of Biodiversity Science, Ecosystem Services and Management 7:143–149.

ICEM, 2003. Cambodia National Report on Protected Areas and Development. Review of Protected Areas and Development in the Lower Mekong River Region, Indooroopilly, Queensland, Australia.

Ken, S., Sasaki, N., Entani, T., Ma, H.O., Thuch, P., and T.W. Tsusaka. 2020. Assessment of the local perceptions on the drivers of deforestation and forest degradation, agents of drivers, and appropriate activities in cambodia. Sustainability (Switzerland) 12:1–26.

Kolinjivadi, V., Van Hecken, G., Almeida, D.V., Dupras, J., and N. Kosoy. 2019. Neoliberal performatives and the 'making' of Payments for Ecosystem Services (PES). Progress in Human Geography 43:3–25.

Kull, C.A., Arnauld de Sartre, X., and M. Castro-Larrañaga. 2015. The political ecology of ecosystem services. Geoforum 61:122–134. Elsevier Ltd. Available from: http://dx.doi.org/10.1016/j.geoforum.2015.03.004.

Lohani, S., Dilts, T.E., Weisberg, P.J., Null, S.E., and Z.S. Hogan. 2020. Rapidly accelerating deforestation in Cambodia's Mekong River basin: A comparative analysis of spatial patterns and drivers. Water (Switzerland) 12.

Loughlin, N., and M. Grimsditch. 2021. How local political economy dynamics are shaping the Belt and Road Initiative. Third World Quarterly 42:2334–2352. Routledge. Available from: https://doi.org/10.1080/01436597.2021.1950528.

Milne, S. and C. Chervier. 2014. A review of payments for environmental services (PES) experiences in Cambodia. Working Paper 154. Bogor, Indonesia: CIFOR.

Myers, N., Mittermeier, R.A., Mittermeier, C.G., Da Fonseca, G.A., and J. Kent. 2000. Biodiversity hotspots for conservation priorities. Nature 403:853–858. Nature Publishing Group. Available from: http://www.ncbi.nlm.nih.gov/pubmed/10706275.

Neef, A., Touch, S., and J. Chiengthong. 2013. The Politics and Ethics of Land Concessions in Rural Cambodia. Journal of Agricultural and Environmental Ethics 26:1085–1103.

Pheakdey, H. 2012. Cambodia-China Relations: A Positive-Sum Game? Journal of Current Southeast Asian Affairs 31:57–85.

Riggs, R.A., Langston, J.D., and S. Phann. 2020a. Actor network analysis to leverage improvements in conservation and development outcomes in Cambodia. Ecology and Society 25:1–13.

Riggs, R.A., Langston, J.D., Sayer, J., Sloan, S., and W.F. Laurance. 2020b. Learning from Local Perceptions for Strategic Road Development in Cambodia's Protected Forests. Tropical Conservation Science 13.

Slocomb, M. 1979. An Economic History of Cambodia in the Twentieth Century. The Economic History Review.

Souter, N.J., Simpson, V., Mould, A., Eames, J.C., Gray, N.E., Sinclair, R., Farrell, T., Jurgens, J.A., and A. Billingsley. 2016. Will the recent changes in protected area management and the creation of five new protected areas improve biodiversity conservation in Cambodia ? Cambodian Journal of Natural History 2016:1–5.

The Stimson Center. 2021. *Cambodia Country Profile*. The Mekong Infrastructure Tracker Project. Accessed from: https://www.stimson.org/2021/cambodia-country-profile/ on April 25, 2022.

Tinch, R., Bugter, R., Blicharska, M., Harrison, P., Haslett, J., Jokinen, P., Mathieu, L., and E. Primmer. 2018. Arguments for biodiversity conservation: factors influencing their observed effectiveness in European case studies. Biodiversity and Conservation 27:1763–1788. Springer Netherlands.

Available from: https://doi.org/10.1007/s10531-018-1549-3.

Travers, H., Winney, K., Clements, T., Evans, T., and E.J. Milner-Gulland. 2015. A tale of two villages: An investigation of conservation-driven land tenure reform in a Cambodian Protection Forest. Land Use Policy 43:186–196. Elsevier Ltd. Available from: http://dx.doi.org/10.1016/j.landusepol.2014.11.007.

World Bank. 2022. The World Bank In Cambodia. Available from: https://www.worldbank.org/en/country/cambodia/overview#1

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, CLLCmaintains 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 of the CBI methodology, see the LISA project spatial annex[1]. 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 acknowledgment 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

---

[1] 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.

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)	[Explore the World's Protected Areas (protectedplanet. net)](#)
gROADS	2010 (1980-2010)	Global	Vector lines shapefile	CIESIN - Columbia University, and ITOS - University of Georgia(2013)	[https://www.globio.info/download-grip-dataset](#)
GRIP Road Data	2018	Global	Vector lines shapefile	Meijer et al. (2018)	[https://sedac.ciesin.columbia.edu/data/set/groads-global-roads-open-access-v1](#)

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. https://doi.org/10.5281/zenodo.3538890	[Data from: Predictive mapping of the global power system using open data | Zenodo](#)
Global Railway	2017	Global	Vector lines shapefile	World Food Program/ Humdata	https://data.humdata.org/dataset/global-railways
Key biodiversity areas - KBA	2021	Global	Vector polygon shapefile	BirdLife International (2021)	[Key Biodiversity Areas GIS Data Request](#)
Chinese development projects	2021	Global	Vector polygon shapefiles	Custer et al., 2021 - AidData	https://github.com/aiddata/china-osm-geodata

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, KBAs, CBI, and Chinese-funded LI across Cambodia.

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

Cambodia	70th Percentile Core	80th Percentile Core	90th Percentile Core
CBI Core Area (km²)	54344	36332	17683
Overlap with Protected Areas (km²)	14235.4	10684.9	4491.16
Percentage of CBI Core within PAs (%)	26.195	29.4	25.4

Chinese-funded LI (CF LI) across whole Cambodia

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

LI Mode	Length
Road (km)	2270.757
Rail (km)	0
Transmission (km)	0

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

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

LI Mode	Length
Road (km)	9.7
Rail (km)	0
Transmission (km)	0