Between 2010-16, **USD 1.7 trillion** of private capital invested in infrastructure sector, globally.

563 delayed projects have cost **USD 53.4 billion**.

By 2030, nearly **USD 95 trillion** to be spent on infrastructure assets.

Indian government intends to spend **USD 1.4 trillion** by 2025 on infrastructure investments.
Contents

List of Tables and Figures 01
Acronyms 03
Foreword 04
Executive Summary 06

Chapter 1 - Introduction 07
Increasing Role of Private Finance in Infrastructure Assets 09
Growth of Road, Hydropower, Port, and Mining Sectors in India 10
Unique Role of Finance in Biodiversity Conservation 12

Chapter 2 - Impact of Infrastructure on Biodiversity and Ecosystems 13
Impact on Forests and Habitats 15
Impact on Wildlife Corridors 16
Impact on Freshwater Resources 16
Impact on Coastal and Marine Ecosystems 17
Impact on Climate Change Mitigation and Adaptation 18

Chapter 3 - Business Case for Financial Institutions for Integrating Environmental Considerations in Infrastructure Investments 19
Materiality of Environmental Risks for Financial Institutions 21
Financial Risks 22
Reputational Risks 26

Chapter 4 - Call to Action 29
Acknowledge 31
Assess 32
Act 33
Amplify 34

List of Tables and Figures

Tables
Table 1: Types of Private Sector Investments in Infrastructure 09

Figures
Figure 1: Investment in Hydel Project 11
Figure 2: Investment in Highways 11
Figure 3: Value of stalled projects as a proportion of total projects under implementation 20
Figure 4: Consequences of How Environmental Risks in Infrastructure Projects Translate into Risks for Financial Institutions 21
Figure 5: Stalled Infrastructure Projects in India 24
Figure 6: Reasons for Stalling of Infrastructure Projects in India 25
Figure 7: A Step-wise Approach 30
Acronyms

AIGCC - Asia Investor Group on Climate Change
CAGR - Compound Annual Growth Rate
CMIE - Centre for Monitoring Indian Economy
COVID-19 - Coronavirus
DFI - Development Finance Institution
EIA - Environmental Impact Assessment
EMS - Environment Management System
ESG - Environmental, Social and Corporate Governance
GDP - Gross Domestic Product
GHG - Green House Gas
GRSEB - Global Real Estate Sustainability Benchmark
GW - Gigawatt
HPP - Hydropower Project
IFC - International Finance Corporation
IGCC - Investor Group on Climate Change
IIGCC - Institutional Investor Group on Climate Change
INR - Indian Rupee
InvITS - Institutional Investor Funds
IT - Information Technology
IUCN - International Union for Conservation of Nature
MDO - Mine Developer cum Operator
MT - Metric Tonnes
MTPA - Million Tonnes Per Annum
MMT - Million Metric Tonnes
MOU - Memorandum of Understanding
MoEFCC - Ministry of Environment, Forest and Climate Change

MW - Mega Watt
NGT - National Green Tribunal
NGO - Non-governmental Organisation
NH - National Highway
NHAI - National Highway Authority of India
NIP - National Infrastructure Pipeline
PE - Private Equity
PFI - Private Finance Initiative
PPP - Public Private Partnership
PRI - Principles for Responsible Investment
TOT - Toll, Operate, Transfer
UNEP - United Nations Environment Programme
USD - United States Dollar
VAL - Vedanta Alumina Limited
WCMC - World Conservation Monitoring Centre
WII - Wildlife Institute of India
WWF - World Wide Fund for Nature
Forewords

Rajkiran Rai G.
Chairman,
Indian Banks’ Association and
Managing Director & CEO,
Union Bank of India

Infrastructure is crucial for the economic development of a country. It provides the fundamental backbone for the smooth functioning of the economy. In the last decade and a half, India has seen rapid growth in infrastructure development. Construction of roads in India touched a record 30 km per day in February 2021. Other infrastructure sectors like mining, ports and large hydropower have also witnessed considerable growth.

While the outbreak of the COVID-19 pandemic has disrupted this economic growth, it has also highlighted the need for critical infrastructure development. This has resulted in greater government priority to infrastructure investment, as part of its COVID-19 recovery packages and the Union budget allocations. Although, public spending caters to the bulk of infrastructure requirements, besides lending by commercial banks, government is also promoting long-term debt financing and leveraging public-private collaboration to mobilize private capital. This further requires providing the right enabling environment to attract private capital and investor security.

In addition to economic and policy factors for providing this enabling environment, there is a need for developing a robust framework for integration of environmental and social considerations in infrastructure development. Protecting the natural capital of India is key to sustainable, smart and resilient development. A report released in May 2020 by the Ministry of Statistics and Programme Implementation, Government of India, suggests that as many as 450 infrastructure projects reported cost overruns, totaling more than INR 4.28 lakh crore, and 50% reported delayed in implementation. One of the key reasons behind these scores of halted infrastructure projects was inadequate environmental and social considerations, including biodiversity concerns.

I would like to appreciate the role of WWF-India and congratulate them on bringing this elaborate report, promptly and well timed, ‘Integration of Environmental Risks in Infrastructure Investment in India’, for highlighting the need for balancing economic capital with natural capital that could significantly help in preventing stranding of assets. I am confident that this report will help financial institutions and policy makers address this gap, and ensure safeguards to both financial and environmental returns.

Several institutional investors, including pension funds, insurance companies, including global investors are eying the sector with the long-term deployment of funds. A holistic and balanced approach to this development will enable a more robust investment climate and prevent future shocks to the system.

Sujoy Bose
Managing Director & CEO - National Investment and Infrastructure Fund

Events of the recent past have highlighted the importance of protecting the environment even as countries develop and grow. Across most countries, the impact of environment change is getting manifested through increased occurrences of extreme weather events such as heat waves, flash floods, droughts, cyclones, forest fires etc. Germanwatch Global Climate Risk Index 2021 briefing paper notes that, between 2000 to 2019, the world witnessed more than 11,000 such erratic weather events that led to a loss of more than 475,000 lives and losses of more than USD 2.5 trillion (in PPP terms).

A recent report by the Intergovernmental Panel on Climate Change (IPCC) states that the world may end up bearing economic damages worth USD 54 trillion by the end of this century (in the case we succeed in limiting the rise in temperatures to 1.5 degrees). The damages would go up significantly in case the 1.5 degree scenario is breached, clearly indicating that preserving natural capital is a requirement to avoid setbacks in the achievement of desired economic growth outcomes.

Climate change and ESG considerations are therefore becoming core to all development related discourse. Governments and policy makers are working to achieve steep reductions in their carbon emissions within the next decade. Some nations are even committing to net zero targets over a medium to longer term. These developments in the policy-making space are naturally guiding investment preferences of investors who wish to invest with a long-term perspective. Such investors clearly appreciate that climate change is a systemic, societal risk that needs to be addressed suitably to make the underlying investments sustainable in all respects. In fact, last year at the Virtual Global Investor Roundtable (VGIR) co-hosted by the Ministry of Finance and NIIF, most of the participants (world’s largest pension and sovereign funds) echoed a unanimous view that their investment priorities are decisively shifting towards climate and sustainability focused opportunities.

However, given the needs of a developing country like India, it is equally important to acknowledge the need for integrating climate risks within the context of the country’s development initiatives. The inherent nature of activities involved in building infrastructure (say, the USD 1.5 trillion National Infrastructure Pipeline), will require stakeholders to be innovative in developing solutions that help in balancing both development and climate-protection objectives. As an example, India’s pivot to renewable energy for its power and mobility requirements also has significant economic benefits by reducing dependence of expensive imported fossil fuels and in improving the quality of life while cutting down healthcare spend in urban cities through lower pollution. From a tactical perspective, investors have already started to make the shift by allocating a substantial portion of their investments in India to emerging sectors such as renewables and digital.

The current publication by the WWF-India provides thought-provoking perspectives on the why and the how of integrating environmental risks with infrastructure investments. In my view, the report provides practical frameworks and tools which would benefit all classes of investors and stakeholders in their journey towards sustainable investments and help them realize the targeted returns in an environmentally sensitive manner. On behalf of NIIF, I would like to congratulate and extend my best wishes to the WWF-India team for this timely effort.
Infrastructure is fundamental for the effective functioning of an economy and society. The physical structures and services provide access to a broad range of vital resources, such as water, energy, transportation, and telecommunication – underpinning economic activities and directly affecting the quality of life of the people. In the next decade, an estimated USD 95 trillion is likely to be spent on creating infrastructure assets worldwide. Of these, around 50-70 per cent of the investments are likely to be made in emerging markets like India. If all of these investments materialise, the total global infrastructure will double by 2030 from 2012 baseline. Moreover, in the post-COVID-19 world, governments have been offering stimulus packages to boost their economies. This has resulted in an increase in infrastructure investments, especially as a means of job creation. India’s Union Budget for the year 2021-2022 has also proposed INR 20,000 crore (approx. USD 2.7 bn) allocation for infrastructure development along with a framework for promoting the sector.

These investments are bound to accelerate the scale and pace of infrastructure development and spur economic growth in the country. While infrastructure projects have significant economic and social benefits, they have to be designed and managed with adequate environmental and social safeguards, otherwise, they can cause serious and at times irreparable damage to a country’s natural capital. Such damage to natural capital or ecosystems results in cascading negative economic and social impacts as well. For instance, a road or highway passing through a forest that is not designed considering wildlife, can negatively impact key species by disrupting corridors that enable their movement and dispersal that is crucial for long-term survival of the species. A hydro-power project that is not designed with sufficient provision for environmental flows can fragment rivers, leading to reduced flows, damage of riparian vegetation, as well as extended impacts due to obstruction to sediment flow with significant downstream impacts.

Given the increased importance of infrastructure development and safeguarding the environment post-COVID-19, the focus should be on designing future infrastructure projects that are smart and sustainable, with minimal impact on the environment. The financial sector, involved in the financing of infrastructure assets, can play a key role in this regard. Given its strategic importance, long gestation periods, high upfront capital costs, and underdeveloped financial markets for listed and unlisted assets, traditionally, the government financed infrastructure development projects. However, over the years, governmental constraints, the need for sustained long-term investment and regulatory challenges, created a need for diversification of capital. This led to an increasing participation of private players over and above state-run banks and other government bodies.

With the growing maturity of secondary markets, the participation of private capital in infrastructure financing has grown consistently. This participation is expected to grow even further; in the post-COVID-19 world, as a larger pool of finances are redirected towards economic recovery and governments also seek more public and private investments. The role of private financial institutions, therefore, will be critical in ensuring responsible infrastructure development that balances their returns with adequate safeguards to protect India’s natural capital.

The purpose of this report is to establish a business case for integration of environmental risks in infrastructure investments, in addition to highlighting direct and indirect impacts on our natural capital and the cascading risks to financial institutions. The report focuses on four sectors of infrastructure development – roads, hydropower, ports and mining. It uses case studies of relevant projects from these sectors, to highlight how lack of integration of environmental risks, in lending and investment decisions, exposes financial institutions to material financial risks. For instance, in the road sector, more than 45 per cent of the projects got stranded or delayed due to lack of adequate consideration of environmental and social factors.

The report also presents the perspective of integrating environmental factors, such as biodiversity, climate change, and loss of natural habitat within mainstream financial analysis and how it can benefit financial institutions in preserving and growing their capital. The study, in this regard, shows that financial institutions are in a unique position to finance responsible infrastructure development that is smart, sustainable, as well as resilient to impending climatic change impacts.

The report provides an ambitious and futuristic, yet actionable pathway for financial institutions to ensure that their capital leads to responsible infrastructure development with positive economic and environmental impacts. The step-wise framework Acknowledge, Assess, Act, and Amplify-recognises the varying stages at which different financial institutions are in their respective sustainability journeys, and provides broad guidance on how to progress further. The report also introduces financial institutions to various tools, methodologies, frameworks, standards and fora that can aid them in safeguarding their investments and the environment.

Chapter 1: Introduction
INTRODUCTION

India is an important constituent of the G20 group of countries. India aspires to become a USD5 trillion economy by 2024, which is almost double its current level. There is a significant push to increase the investment rate, as measured by gross fixed capital formation, from the present 29 to 36 per cent of GDP by 2022. Half of this is likely to come from public investment that is slated to increase from 4 to 7 per cent of GDP.

However, this economic growth, especially in a post-pandemic environment, coupled with the sluggish growth in 2019, has seen a steep decline in investments, loss of jobs, and increasing poverty.

India’s economic recovery and push to sustain its previous economic growth will considerably depend on a range of factors, including infrastructure development, which has received a significant focus, as part of India’s Union Budget for 2021 and COVID-19 stimulus package announced in 2020. In 2020, infrastructure development formed a large part of the INR 20 lakh crore (USD 265 bn) package that was announced. Between 2010 and 2016, USD1.7 trillion of private capital was invested in the infrastructure sector, thereby raising questions as to where the economic growth, especially in a post-pandemic environment, will come from. A robust and reliable infrastructure—transport, irrigation, energy, and information and communication technology—is critical for boosting the country’s economic growth by enabling trade, powering businesses, connecting workers to their jobs, and creating new growth opportunities for struggling communities. Through a multiplier effect (the net benefit of building more resilient infrastructure in low- and middle-income countries would accrue to USD 4 in benefit for each USD 1 invested⁴), an increased pace of infrastructure development will positively impact all sectors of the economy.

However, unsustainably designed and managed infrastructure projects have the potential to irreversibly damage India’s natural capital, such as biodiversity, air, soil, water, climate, etc. that provide essential ecosystem services, both to the community and the economy thereby, further risking India’s road to economic recovery.

In the long term, poor management of natural capital induces significant financial costs and potentially dampens growth prospects instead of boosting them. The current pandemic and its zoonotic linkage further testify how an imbalance in the relationship between human beings and the natural world can have devastating impacts on the global economy.

This report aims to build a business case for financial institutions to integrate environmental considerations within their lending and investment decisions for infrastructure development. It highlights the risks—ecological and financial—associated with unsustainable infrastructure development and their impact on biodiversity and financial loss.

The report focuses on four sectors—road, hydropower, port, and mining—vital for India’s economic growth but have potentially high ecological impacts, if not managed responsibly. The report argues that integrating environmental risks will help financial institutions preserve and grow their capital and help them exercise their unique position in contributing to making our natural environment more resilient.

The report also provides an ambitious, yet actionable pathway for financial institutions to ensure that their capital positively contributes to environment protection and conservation.

Increasing Role of Private Finance in Infrastructure Assets

The 2008 global financial crisis triggered the entry of private sector investments in infrastructure assets. As global financial markets reached record lows, governments around the world found themselves under intense pressure to reduce debts. At the same time, private investors started seeking alternative long-term investments that were better protected from cyclical economic contractions and systemic shocks.

Between 2010 and 2016, USD1.7 trillion of private capital was invested in the infrastructure sector, primarily led by institutional investors, such as pension funds, sovereign wealth funds, and insurers⁵.

![Image](https://www.brookings.edu/opinions/why-infrastructure-matters-rotten-roads-bum-economy/)

![Image](https://www.financialexpress.com/budget/budget-2021-boost-for-infrastructure-sector-as-fm-sets-up-dfi-allows-fpi-investment-in-reits/2184031/)

![Image](https://http://www.eib.org/attachments/efs/economics_working_paper_2013_02_en.pdf)


![Image](https://wwf.ch/sites/default/files/doc-2019-03/WWF_report_3.11.19_FINAL.pdf)


Table 1: Types of Private Sector Investments in Infrastructure⁶

| Particulars | Investment Type                        | Direct                                           | Indirect                                        |
|-------------|----------------------------------------|--------------------------------------------------|                                                |
| Equity      | Public                                 | Listed infrastructure and utility stocks         | Listed infrastructure equity funds, index funds, Exchange Traded Funds |
|             | Private                                | Direct equity investment in infrastructure company/project | Unlisted infrastructure funds                  |
| Bond        | Corporate bonds of infrastructure companies; project bonds; PPP/PFI bonds; US municipal; Green bonds | Infrastructure bond funds |                                                |
| Loans       | Direct loans to companies/ projects/ asset-backed financing | Infrastructure loan/debt funds |                                                |

---

Driven by the spread of COVID-19, the current global economic crisis is expected to further increase the role of private financial institutions in infrastructure development, as the government seeks to leverage a combination of public and private capital to further spur infrastructure development as a means for addressing the socio-economic repercussions of the pandemic.

Although absolute government funding continues to increase in India, the share of private capital in infrastructure investments has also risen. In 2019, India spent USD 100-110 bn, 3-4 per cent of its GDP on infrastructure. This, however, is slated to increase exponentially. In line with its plans to make India a USD 5 trillion economy by 2024-25, the government has announced its intention to spend USD 1.4 trillion over the next five years on infrastructure. The private sector is expected to account for 22-25 per cent of the total investment, or USD 350 bn, supplementing budgetary support from the government and financing from multilateral institutions—two funding pots of around USD 439 bn in real infrastructure assets, representing a growth of around 20 per cent from the previous year. As mentioned earlier, the participation of these investors in infrastructure is only expected to grow, especially in the post-COVID-19 world, where low-interest rate regimes across the world will force them to look for sources of long-term, inflation-protected returns.

**Growth of Road, Hydropower, Port and Mining Sectors in India**

Over the years, National Highways (NH) in India have expanded tremendously, with construction reaching an all-time high of 30 km/day in the 2019-20 fiscal year—a growth of 30 per cent over the 23 km/day recorded in the fiscal year 2016-17, and more than double of the 12 km/day during 2014-15. Currently, at 132,000 km (as of March 31, 2019), the government has announced plans to further expand national highways to reach 200,000 km by 2022. The National Infrastructure Pipeline (NIP) was established in 2019-20, with the aim to improve project preparation and attract investments in infrastructure and it has seen the completion of 217 projects of worth INR 1.1 lakh crore till January 2021. Dominated by the road sector, the inventory of projects in NIP are also set to witness expansion to cover 7,400 projects by 2025.

**Figure 1:** Investment in Hydel Project (INR in Cr)

To increase private sector participation in the road sector, various financial models have been introduced. These include:

- **Toll, Operate, Transfer (TOT) Model:** Monetisation of existing road assets by transferring the rights to operate and maintain an existing road to a private bidder, who also gets rights to toll revenues from the project.
- **Infrastructure Investment Funds (InvITs) Model:** Allows developers to monetise revenue-generating infrastructure assets, such as roads, while enabling investors or unit holders to invest in these assets without actually owning them.

Similarly, the hydropower sector in India is expected to see a growth in participation by private capital. As of December 2020, the total installed hydropower capacity stood at 45.8GW, accounting for close to 13 per cent of the country’s energy mix. An addition of 58.3GW in total capacity of installed hydropower is in the pipeline for the period from 2018 to 2022. This expansion is expected to lead to at least a 20 per cent jump in the total investments in the sector between 2018 and 2022, compared to the investments in the sector between 2014 and 2018. The Draft Electricity (Amendment) Bill 2020 seeks to expand the scope of Renewable Purchase Obligations to include energy generated from hydropower sources, which is likely to further promote hydropower development. The share of private capital in this pie of total investment is also expected to grow, given the liquidity constraints on the balance sheet of state-run and private commercial banks, whose lending has traditionally accounted for the most significant share of financing in the sector. The increased interest from institutional investors and Private Equity (PE) firms to invest in the hydropower sector is a case in point.

Driven by expansion in external trade, India’s port sector has also witnessed strong growth, handling around 95 per cent of international trade by volume and 70 per cent by value. To meet the ever-increasing trade requirements going forward, expansion of port capacity has been accorded the highest priority by the government of India, with the implementation of infrastructure development projects such as Sagarmala—a national programme that aims to implement 605 projects, by investing INR 8.7 trillion by 2035.

To make port projects more investor-friendly and the investment climate more attractive, in early 2018, the Indian government approved amendments in the Model Concession Agreement for Public-Private Partnership (PPP) projects at major ports. According to India Infrastructure Research, as of June 2018, 43 PPP projects were in the preliminary/planning and bidding stages. These projects are estimated to entail an investment of over INR 181 bn and will add a capacity of at least 125 mn tonnes per annum.

1Economic Survey 2018-19 (Ministry of Finance, Government of India)
3https://realassets.iipe.com/top-100-and-surveys/
4https://morth.nic.in/sites/default/files/Summary-of-NHs_1.pdf
Financial institutions have significant leverage to integrate environmental considerations within infrastructure development processes.

**Unique Role of Finance in Biodiversity Conservation**

Biodiversity is declining globally at an unprecedented rate. In the last 50 years, there has been a 68 per cent decline in vertebrates’ population sizes, including mammals, birds, reptiles, amphibians, and fishes. This rapid loss of biodiversity is disrupting many essential ecosystem services that underpin every element of the global economy including, but not limited to, water, energy, food, and carbon sequestration. The rapid pace of unsustainable infrastructure development threatens to further exacerbate this rapid loss of biodiversity and implications on economic losses associated with infrastructure assets. More than 45 per cent of projects have been stranded or delayed in the road sector alone due to inadequate consideration of environmental and social issues.  

This correlation between the environmental impacts, due to infrastructure assets and the associated financial risks, highlight the importance of integrating adequate environmental considerations and safeguard measures into every stage of an infrastructure project life cycle.

As lenders, investors, and insurers, financial institutions have significant leverage to integrate environmental considerations within infrastructure development process. Financial institutions as financial intermediaries, analysts, and risk managers can send the right signals, at an early stage of the project, to prevent and reduce negative environmental impacts. This can influence appropriate siting, designing, and implementation of infrastructure assets that contribute to the holistic economic development of the country.
Infrastructure projects have significant economic and social benefits, however, they have to be designed and managed with adequate environmental and social safeguards, otherwise, they can cause serious and at times irreparable damage to a country’s natural capital. Lack of effective and responsible management of infrastructure projects could lead to significant environmental and social impacts that, in turn, impede long-term economic growth. Although, this report primarily focuses on incorporating environmental-biodiversity risks in the financial decision-making process, identification, assessment, and addressal of social impacts is equally important for investors and policymakers.

The impacts of infrastructure projects are tangible, making their scrutiny from the perspective of all stakeholders critical.

**Impacts on Forests and Habitats**

- Habitat loss and fragmentation
- Spread of invasive species
- Effect on functionality of wildlife corridors

**Coastal and Marine Impacts**

- Oil, minerals, and other toxic elements spillage
- Coral reefs damage
- Threat to marine biodiversity

**Impact on Freshwater Resources**

- Barricading sedimentation flow
- Flooding/Submergence
- Effect on natural flows
- Affects fish movement

**Climate Change Mitigation and Adaptation**

- Release of stored carbon from forests due to deforestation
- Affects ecosystems resilience by disrupting their functions

Construction of projects, such as, roads, ports, hydropower plants and mines can adversely affect natural ecosystems, such as forests, freshwater, oceans, air, drainage systems, and natural habitats. Whether a highway cuts through a dense forest or a mining concession is granted in a wildlife corridor, infrastructure projects carry inherent environmental risks across different stages of the project lifecycle that, if not considered adequately, translate into financial risks. The first step in effectively managing these risks is proactively identifying them at an early stage in the project life cycle. It is also important to understand that while the impact of one infrastructure project sometimes may appear to be insignificant, however, multiple projects in the same region may have a much deeper cumulative impact on the area’s natural ecosystems, necessitating adequate assessment and mitigation plans.

Therefore, it is essential to identify and assess these negative impacts on the environment to support informed decision-making. Negligence of environmental risks will not just threaten the ecosystems but also impose non-malleable risks on the associated investments, particularly in the long-term, thereby affecting the economic growth of specific regions and the country at large.

**Impact on Forests and Habitats**

India is home to some of the most biodiverse forests in the world, which provide vital ecosystems for biodiversity to survive and thrive in. These ecosystems are also integrated into the socio-cultural fabric of the society, particularly the indigenous tribal communities. Around 21.67 per cent of India’s geographical area is covered by forests, with a majority regulated by multiple legal and management approaches like the formation of protected areas, creation of ecologically sensitive zones, identification and management of wildlife corridors, monitoring of primary forests in the form of reserved forests and other such provisions. Despite these regulations, forests continue to be threatened especially as a consequence of large-scale land-use change activities, like infrastructure development. In forested areas, infrastructure development can cause severe disturbances, such as:

- **Habitat Loss and Fragmentation**
  
  Rampant clearance of forests, diversion of rivers, pollution of freshwater sources like lakes and other habitats to develop roads, mining, ports (mainland connectivity and transportation), hydropower dams, result in significant loss and fragmentation of natural habitats, and has been a major factor in the decline of wildlife species around the globe.

*India State of Forest Report, 2019
Impact on Wildlife Corridors

One of the gravest threats posed by large-scale infrastructure projects to forests is the impact on wildlife corridors. Wildlife corridors are crucial for maintaining the integrity of a landscape (a local/regional ecosystem), as they enable wildlife movement between two or more critical conservation habitats, which is critical for genetic variation between various wildlife populations, availability of prey, and the distribution of over-populated species. Any large-scale land-use change, particularly due to infrastructure development projects like road highways and mining that lack appropriate mitigation measures and planning, can make wildlife corridors highly vulnerable.

Impact on Freshwater Resources

Unlike forests, the impacts of large infrastructure projects on freshwater resources, particularly on rivers, is not just localised or regional, but extends to the basin level. Indian rivers are under tremendous pressure from fragmentation and loss of stream continuity, caused by the construction and operation of hydropower and irrigation dams that impede environmental flow or e-flow (a regime of the flow of water, sediments and other natural constituents needed in a river stream to perform its minimal natural functions). Moreover, the impact on wetlands due to run-offs, groundwater contamination, breaching of tailing dams from mining projects pose a serious threat to the health and quality of freshwater resources. Some of the impacts caused by large infrastructure projects are:

- Flooding vast areas of land upstream, particularly in the fragile, hilly regions of India, destroying local ecosystems. In some cases, due to the lack of preventive and mitigating measures, such impacts can also lead to local communities’ displacement.
- Along with causing fragmentation, dams can become barriers to the migration of aquatic species, eventually affecting species distribution—a key factor for ensuring a healthy freshwater ecosystem.

Impact on Coastal and Marine Ecosystems

Maritime shipping is responsible for over 80 per cent of global freight transportation. While emissions from shipping may seem lower when compared to other modes of transport, the shipping industry also has potential adverse impacts on fragile ecosystems due to shipping operations, including port development. As a result of the industry's large-scale operations, it becomes important to identify and assess potential impacts of shipping, particularly at ports, and develop concrete mitigation strategies, from avoidance to mitigation. Unsustainable development of ports can pose serious and irreversible threats to coastal and marine ecosystems. Damage to these ecosystems can get further exacerbated by port operations, ship' movements, and the transport networks serving the port hinterland.

Some of the key ecological impacts on port and allied activities on coastal and marine ecosystems are:

- Untreated run-offs from mining locations and breach of any tailing dam contaminate the surface as well as groundwater near the project location and sometimes, even further.
- Obstruction to sedimentation flow is a significant issue with hydropower dams, as sediments are essential for maintaining river morphology and healthy biomes. This sediment retention by dams and reservoirs is also a significant cause behind shrinking deltas, thereby affecting coastal ecology and communities.

While hydropower is a renewable resource, it is crucial to address ecological impacts associated with these projects that affect many fundamental processes and functional characteristics of healthy rivers and lead to the rapid decline of biodiversity and necessary ecosystem services.

Impact on Coastal and Marine Ecosystems

Some of the key ecological impacts on port and allied activities on coastal and marine ecosystems are:

- Regular release of wastewater from vessels and ships parked at the dock, which is often contaminated with oil/grease due to operations and machinery.
- Spillage of oil during loading/unloading/overfilling and even due to oil pipelines’ accidents and leakage.
• Dredging (removal of sediment to deepen the ship channels) impacts the ecosystem functionality and deeply affects marine life and can permanently destroy critical wildlife habitats, particularly corals and nutrient-rich sediments.

• Release of chemicals and wastes leads to eutrophication of water, which induces sedimentation of dead planktons, and affects the composition and characteristics of the bottom sediment at the port location.

Impact on Climate Change Mitigation and Adaptation

Building large-scale infrastructure, without mainstreaming environmental considerations as part of the project cycle also has climate change implications, particularly because of land-use change and release of carbon dioxide stored in forests.

To begin with, damage caused by climate change requires spontaneous and planned adaptations for resistance and recovery of ecological changes happening to our ecosystems. To ensure the effective functioning of such necessary adaptations, the efficacy of ecological assets to maintain the carbon cycle in ecosystems is an essential element of the entire resilience process.

If not constructed/maintained/operated in an environment friendly manner, infrastructure projects can negatively affect the resilience of our ecosystems for coping with climate change.

• Shipping vessels’ movement and the consequent noise critically impacts marine life and ecosystems, particularly if routes overlap with or pass through biodiversity-rich marine protected areas.

The location of a port is also crucial for identifying, assessing and mitigating ecological impacts that go beyond just marine ecosystems, as ports need a highly efficient and well-connected system of infrastructure in terms of railways and roads.

• Dredging (removal of sediment to deepen the ship channels) impacts the ecosystem functionality and deeply affects marine life and can permanently destroy critical wildlife habitats, particularly corals and nutrient-rich sediments.

• Release of chemicals and wastes leads to eutrophication of water, which induces sedimentation of dead planktons, and affects the composition and characteristics of the bottom sediment at the port location.

Need for Investors to Go Beyond Regulatory Compliance

There is a strong need for lenders and investors to look beyond the regulatory compliance as even weaker environmental policies and regulatory regimes are a threat to the project, and associated investments, simply because of the visibility and magnitude of impact that infrastructure projects are inherited with. Further on in this report, case studies will give a fair idea of how despite being granted clearances/permissions/allotment of concessions, some projects have only ended up being sunk cost, without seeing any return on investments. The fundamental cause behind such failed investments is incomplete and unscientific assessment of environmental risks during the decision making process.

https://www.unescap.org/sites/default/files/pub_1234_ch2.pdf
Infrastructure investments face environmental risks given the extensive ecological damage, poorly managed infrastructure assets can cause. Financial institutions tend to assess and track traditional financial risks like political uncertainty, currency risks and credit risk. However, when it comes to environmental and social risks, they tend to narrow down the focus to just regulatory compliances. With the ever-changing ecosystem of environment and social accountability of businesses, this approach may not insulate the investors from new and emerging material risks. Lack of understanding and adequate information about these risks tends to limit financial institutions’ ability to measure and manage them as they tend to be indirect, underpinning many of the portfolio investments. Implications of environmental risks to infrastructure investments are immense, given the large-scale and wide scope of ecological damage that poorly managed infrastructure assets can cause. 

The risks to financial institutions stemming from investments in infrastructure assets can be broadly classified into two heads:

a) **Financial Risks**: The risk of losing part of the capital invested.

b) **Reputational Risks**: The adverse impact on an institution’s reputation from negative publicity and public perception.

---

**Materiality of Environmental Risks for Financial Institutions**

Financial institutions tend to assess and track traditional financial risks like political uncertainty, currency risks and credit risk. However, when it comes to environmental and social risks, they tend to narrow down the focus to just regulatory compliances. With the ever-changing ecosystem of environment and social accountability of businesses, this approach may not insulate the investors from new and emerging material risks. Lack of understanding and adequate information about these risks tends to limit financial institutions’ ability to measure and manage them as they tend to be indirect, underpinning many of the portfolio investments. Implications of environmental risks to infrastructure investments are immense, given the large-scale and wide scope of ecological damage that poorly managed infrastructure assets can cause.

---

**Infrastructure investments face environmental risks given the extensive ecological damage, poorly managed infrastructure assets can cause.**

---

**Private Sector Investment Stalling near All-time High**

Figure 3: Value of stalled projects as a proportion of total projects under implementation (in %)

---

**Business Case for Financial Institutions for Integrating Environmental Considerations in Infrastructure Investments**

While lending to and investing in infrastructure assets, the costs and risks faced by private financial institutions are high. This is due to multiple factors including, but not limited to, political instability, regime uncertainty, rule of law and property rights, government regulations, government transparency and accountability, and enforceable contracts, along with environmental and social risks. The diagram highlights the higher risks faced by private investment compared with government projects in infrastructure assets in India, due to stalling of projects.
### Financial Risks

The failure to manage the potential negative impacts of infrastructure projects on the environment, including biodiversity, can cause delays, increase costs or lead to stalling of projects—all of which will adversely impact cash flows of the project proponent and subsequently, the return on capital for the financial institution investing in or lending to these projects. The financial risks to investors in investing in infrastructure assets can originate from the following:

#### a) Time and Cost Overruns:

Given a host of political, social, and economic factors, the infrastructure assets in India have been prone to significant changes in schedules and costs, relative to the initial estimates. A government report released in October 2019 assessed 1,636 ‘major’ infrastructure projects—projects worth USD 20 m or more⁸—in India and found that as many as 388 such projects reported cost overruns, while 563 projects overshot their schedules. The average time overrun in the 563 delayed projects was reported to be 38.74 months, while the report put the total cost overrun at USD 53.4 bn—close to one-fifth of the total project costs⁹. Poor management of environmental impacts of the infrastructure assets is known to severely increase the chances of time and cost overruns. Such persistent issues relating to time and cost escalations inevitably negatively affect the cash flows and profitability of the project proponent, which cascades the risk to the financial institution and its exposure to the project. These costs generally translate into the imposition of post-facto mitigation measures, rehabilitation of ecosystems, penalties, and legal proceedings (see case studies).

Recently, an Odisha based merchant mining company was fined INR 2,056 crores by the state mining department for major illegalities and excess mining that were linked to discrepancies in environmental clearances granted to the mining assets.⁹

In order to mitigate potential impacts on biodiversity, Wildlife Institute of India (WII), after carefully studying the biodiversity existence and wildlife movement in the area, proposed a series of flyovers adding to the cost of the project. The project construction was stalled till NGT’s approval in 2016. Owing to this delay in construction, the project cost escalated from INR 543 crore to INR 1,060 crore.

### Case Studies of Time and Cost Overruns for Infrastructure Projects from Lack of Integration of Environmental Risks

#### Four-Laning of National Highway (NH 7) between Seoni (Madhya Pradesh) and Nagpur (Maharashtra)

- **Sector:** Road Highways
- **Status of Project:** Operational (Forest area delinked)

In 2008, NHAI floated the proposal for four-laning (from two lane) of NH 7 between Seoni and Nagpur of length 125km, of which 65km falls under forest area. Some of these forests are home to key species, including tiger, and form part of the wildlife corridor connecting Kanha and Pench Tiger Reserves. Due to this overlap, the project had to go through several rounds of forest/wildlife appraisal process and even a judicial intervention, in order to ensure that an effective mitigation plan is prepared before the construction could be completed. NHAI’s initial proposal of building a 9.3km flyover, as an environmental impacts mitigation measure, was rejected by the Hon’ble Supreme Court of India’s Central Empowered Committee (CEC). In a fresh proposal in 2012, NHAI reduced the forest area requirement for the project. However, despite this reduction, there were still some areas involved which are important for wildlife and their movement.

In order to mitigate potential impacts on biodiversity, Wildlife Institute of India (WII), after carefully studying the biodiversity existence and wildlife movement in the area, proposed a series of flyovers adding to the cost of the project. The increase in capital cost resulted in NHAI delinking this stretch from the scope of work. The project with the revised scope was completed at a cost of INR 278 crore. The reduction in scope of work resulted in reduction of the semi-annual annuity to INR 19 crore from INR 35 crore (reduction by 47 per cent), payable half-yearly to the concessionaire.

#### Tidong I Hydro Project (Himachal Pradesh)

- **Sector:** Hydro
- **Status of Project:** Construction

100-MW Tidong Hydro Electric Project is located on the Tidong stream, a tributary of river Satluj in Kinnaur district of the Indian state of Himachal Pradesh and was granted clearance from MoEFCC in 2007. The project required a diversion of 39 hectares of forest area and felling of 1,261 trees in total. Tidong area is reported to be the habitat of endangered species namely musk deer and Himalayan brown bear.

The project construction was stopped owing to petition filed with NGT in 2013. It was alleged that the project proponent had not obtained consent, particularly the No Objection Certificate from the Gram Sabha, Rispa (a nearby village), and started construction of the road for the hydropower dam development purpose. The project construction was stalled till NGT’s approval in 2016. Owing to this delay in construction, the project cost escalated from INR 543 crore to INR 1,060 crore.

This shows that identification and effective management of environmental risks throughout the project supply chain and lifecycle stages is essential, both for the environment, as well as for investments.
b) Stalling of Projects: The value of stalled infrastructure projects in India in September 2017 stood at close to USD 176 bn, with more than 13 per cent of total projects under implementation stalled. The private sector accounted for more than two-thirds of the value of these stalled infrastructure projects.\(^{(27)}\)

While the projects were stalled for many reasons including, but not limited to, issues with raw material supply, land acquisition problems, and unfavourable market conditions, failing to obtain green clearances due to inadequate considerations of environmental factors in projects accounted for the largest proportion of stalled projects and accounted for the highest costs resulting from stalling of these projects.

As we can see in the figure above, lack of a comprehensive and robust strategy to identify, assess, and mitigate environmental impacts leads to higher risks of stalled projects. This results in failure to obtain green clearances and propels regulatory and judicial interventions at any stage in the project’s life-cycle, leading to project delays or stalling (see case study below).

### Case Study for Financial or/and Reputational Risks Due to Lack of Integration of Environmental Risks

**Bunder Diamond Mines (Madhya Pradesh)**

**Sector:** Mining  
**Status of Project:** Stalled

The Bunder diamond project of Rio Tinto Exploration India Private Limited was initiated with a discovery of a large diamond deposit in 2004. The exploration findings promised to deliver a commercial yield of 27.4 million carats of rough diamonds. After carrying out detailed prospecting and exploration of the deposit for eight years, the company was granted the mining lease in 2012 for production of diamonds and subsequently started preparatory work, before the actual production started on obtaining other required clearances. However, upon finding later that the forest areas in the project location overlapped with a tiger corridor, connecting Panna Tiger Reserve and Nauradehi Wildlife Sanctuary and is a potential site for dispersal of tigers from the Panna Tiger Reserve, the project failed to secure the forest clearance from MoEFCC. The Forest Advisory Committee (FAC) under MoEFCC, while highlighting this overlap, also noted that the forest areas proposed for diversion in this project fall in an *inviolate category*-areas with high biological richness-and therefore, out of bounds for any non-forestry purpose, including mining.

The initial cost of the project, at the time of inception, was estimated to be around INR 2,200 crore, which escalated to around INR 3,406 crore in 2015. Subsequently, in 2017, after prospecting and exploring diamond deposit in the area for close to a decade, Rio Tinto returned the ownership of mine to the state government, including all the land, plant, equipment and diamond samples, forcing it to write off an investment of INR 630 crore already made in the project.

---

\(^{(2)}\)https://www.livemint.com/Politics/1LqGqphQGAfYQyrDvY/W Value-of-stalled-projects-reaches-yet-another-high.html

*Other includes reasons such as natural calamities and projects where reasons for stalling are not available. Stalling percentage is calculated as proportion of projects under implementation by value at the end of the September 2017 quarter.

* Created with Datawrapper  
Source: CMIE
Reputational Risks

Unmanaged environmental risks at the project level impact the project proponent and the financial institution investing in the project. The reputational risks to financial institutions from infrastructure investments can arise from the negative perception that institutions may attract due to adverse environmental impacts of these investments on vulnerable species and ecosystems. In some cases, these risks may lead to immediate financial losses for the investors and bankers due to stalling of projects (see case study). In other cases, though losses may not have an immediate monetary impact, but in the medium to long-term, they will either directly affect the viability of a particular project or the financial institution’s brand perception.

Negative perception of investments adversely impacting the environment can cause reputational risks to financial institutions

This can significantly impact pension funds, which may come under increased pressure from subscribers to either amend the investment strategies around sustainability or the investors could have on the environment around it”

Case Study for Financial or/and Reputational Risks Due to Lack of Integration of Environmental Risks

Nyamjang Chu Hydroelectric Project (Arunachal Pradesh)

Sector: Hydro  Status of Project: Stalled

The government of Arunachal Pradesh awarded the Nyamjang Chu hydropower project (HPP) as a run-of-the-river project on Nyamjang Chu River, in Tawang district to Bhilwara Energy Limited. The initial estimated cost of the project was INR 6,400 crore, while the total time schedule for project construction was 74 months, including 12 months for construction of ancillary facilities and other pre-construction activities.

The environmental clearance was granted in April 2012. However, the local communities protested against the project, as a 3 km stretch of the Nyamjang Chu River, between Brokenthang and Zemithang township, falling under the project area, was a rich biodiversity area and also one of the only two wintering sites in the State for the black-necked cranes. Black-necked crane, locally known as Thrung-Thrung Karmo in Tawang, is a vulnerable species as per IUCN Red List of threatened species and the locals see the winter arrival of the bird as norbu (good fortune).

Later on, the project was challenged at the NGT by Save Mon Region Federation, a local conservation group led by the Buddhist Lamas. Subsequently, in 2016, the NGT suspended the environmental clearance after observing serious errors in the EIA study based on which the environmental clearance was granted and asked the MoEFCC to conduct a revised study to ascertain the potential ecological impacts of the dam.

Following this, the Wildlife Institute of India (WII) conducted the revised impact assessment study and their report asserted the premise that the construction of the dam would eventually submerge the entire habitat of vulnerable black-necked crane, leading to local extinction of the species in Zemithang Valley. The NGT withheld its decision on suspension of environmental clearance and the project was stalled.

This shows how incomplete information and faulty EIA study leads to failed investment decisions. There is an urgent need to have robust scientific EIA studies, with involvement of local communities for secure and sustainable execution of infrastructure projects.

Niyamgiri Bauxite Mining (Odisha)

**Sector:** Mining

**Status of Project:** Stalled

Vedanta Alumina Limited (VAL), a subsidiary of Vedanta Resources plc, signed an MOU with the Government of Odisha in June 2003 for the construction of 1 MTPA (one million tonne per annum) alumina refinery, along with a 75 MW coal-based power plant in the Lanjigarh region of Kalahandi district. The bauxite required for the aluminium refinery was proposed to be procured by mining bauxite at a capacity of three MTPA at the top of the sacred mountain in the vicinity, called Niyam Dongar, which is inhabited by an indigenous tribe, Dongria Kondh.

Though the refinery project was granted environmental clearance in 2004, there were widespread protests and multiple petitions alluding to extreme environmental degradation to the Niyamgiri hills and violation of forest rights of the indigenous population of Dongria Kondh.

Subsequent to the widespread protests and various petitions, the Central Empowered Committee (CEC) of the Hon'ble Supreme Court of India recommended on 21 September 2005 the revocation of the environmental clearance for the alumina refinery project. Based on the recommendations, on 23 November 2007, the Hon'ble Supreme Court barred the project proponent from undertaking the project, until a fresh proposal was submitted, addressing the concerns raised and after incorporating the safeguards recommended by the committee. After a fresh appraisal, based on the revised project proposal, the Hon'ble Supreme Court gave the formal approval to the project on 8 August 2008. However, the tribes of the region argued that the safeguards were not sufficient to prevent the environmental degradation of the region and continued to protest, resulting in a review of the proposal by MoEFCC. MoEFCC revoked the clearance in 2011 and banned the project after reviewing the final report that suggested that the project was detrimental to the existence of Dongria Kondh. The Hon'ble Supreme Court, while hearing the plea filed by the project proponent for revoking the ban, upheld the ban on mining and decreed that the Dongria Kondh would have a decisive say in the clearance of the mining project. The court also recognized that the Dongria Kondh's right to worship their sacred mountain must be 'protected and preserved' and Dongria Kondh should be engaged in the decision-making process. They were given three months for the final decision on the project. 12 Gram Sabhas (village councils) were chosen by the state government who unanimously rejected the project proposal, resulting in the scrapping of the project.

The ruling against the mining project was a result of a 10-year long protest, including judicial interventions that gained widespread international media coverage. This resulted in the company losing investor confidence and a steep fall in the share prices of Vedanta Resources plc in early 2014.

The failure of the Niyamgiri bauxite mining project is estimated to have cost Vedanta USD10 billion in lost investments as well.
CALL TO ACTION

Infrastructure has come a long way in developing as a separate asset class in financial analysis. However, the impacts of infrastructure assets on biodiversity and ecology are still absent or inadequately accounted for in financial models and analyses. Consequently, mainstream financial analysis fails to capture the full range of risks across their investments and lending portfolios. Hence, it is imperative that the financial institutions develop a systematic and streamlined process to integrate these risks and develop a robust plan to manage them.

Going forward, to ensure that capital allocations made to infrastructure development yield higher economic, social and environmental value, there is a need to adopt a step-wise approach that help financial institutions to transition toward smart, resilient and sustainable infrastructure. This framework acknowledges the heterogeneity of infrastructure landscape, thereby providing only overarching and not prescriptive guidance to investors. Depending on the stage of an institution’s involvement in incorporating environmental risks and impacts into their infrastructure asset analysis, this framework will help them safeguard their investments as well as the environment.

A step-wise approach by investors can enable building sustainable infrastructure, securing both financial and natural capitals

**Figure 7: A Step-wise Approach**

**Environmental Impacts FROM Infrastructure Investments**

- **Infrastructures**: If not managed properly, severely impact the environment, leading potentially to widespread degradation of these ecosystems.
- **Examples**: Fragmentation of forests and wildlife habitats, disruption of sediment flows in rivers, spillage of toxic compounds in freshwater and marine ecosystems, and loss of carbon sinks from deforestation.
- **Some of these impacts may be irreversible and can set off self-perpetuating loops which will worsen the ecosystems and weaken the resilience ability to perform its functions at much larger scale.**

**Environmental Impacts ON Infrastructure Investments**

- **Any adverse changes in the environment have the potential to impact the long-term financial viability of the investments in infrastructure assets.**
- **Not substantially meeting the sustainability considerations linked to biodiversity loss, degradation of ecosystems and climate change cause loss of invested capital or loss of reputation, or both for financial institutions.**
- **Given that most investors have diversified portfolios of long-term assets, some of these risks, reputational risk for example, may impact not just one specific asset/holding but also the wider portfolio of the investors.**

**Acknowledge**

Over their lifetime—from development to construction to operation, all the way to decommissioning—infrastructure assets have critical impacts and dependencies on biodiversity and ecosystems, and acknowledging these relationships is the first step for investors to track and improve asset sustainability. It is even more essential for investors to streamline these relationships through a systemic functioning in the decision-making process as climate change and sustainable development commitments from governments, businesses, and communities have started to see ambitious targets worldwide, and there is increased demand for infrastructure assets to deliver on these commitments. Investors who develop a comprehensive understanding of the impacts and dependencies of infrastructure assets on the environment will be ahead of the curve in managing the risks in infrastructure investments, while also taking advantage of opportunities in sustainable infrastructure development.
Assess

Using appropriate tools, methodologies, and frameworks to assess the risks related to biodiversity and nature loss within their mainstream investment and lending, financial institutions can mitigate the drivers of these risks and create better financial outcomes for their investments. While there is no single comprehensive set of criteria linking environmental impacts and dependencies with investments in infrastructure, individual financial institutions will need to establish unique measurable criteria deemed most relevant to the sustainability and financial materiality of the particular asset they are investing in. Furthermore, while any such criteria will vary based on the type of asset, investment philosophies of the financial institution, client preferences, and internal and external sustainability policies, it must help a financial institution highlight the material factors linked to environmental impacts and dependencies of the asset in question.

Tools for Financial Institutions to Assess Environmental Impacts and Dependencies of Infrastructure Assets

**WWF-SIGHT**

WWF-SIGHT is a global intelligence platform that aims to provide an updated, high-level understanding of the possible overlaps between infrastructure asset(s) and ecologically sensitive zones in a particular geography. It allows users to bring together diverse spatial datasets and combine them with satellite imagery, to provide a near real-time, high-level understanding on the overlap between infrastructure assets in select sectors and conservation assets.

**WWF Water Risk Filter**

WWF Water Risk Filter is a leading online tool designed to explore, assess, respond and value water risks. With 32 basin risk indicators and more than 12 high-resolution country data sets, the Water Risk Filter offers an array of water risk map layers that can help financial institutions evaluate and understand the extent of water risks for the assets they are investing in.

**ENCORE**

Developed by Natural Capital Finance Alliance in partnership with UNEP-WCMC, ENCORE is a tool that helps users better understand and visualise the potential and actual impact of environmental change on the economy. By focusing on the ecosystem services that nature provides to enable economic production, it can help financial institutions understand how their portfolio companies depend on nature and how these dependencies might represent a risk, if environmental degradation disrupts these businesses. The tool also helps to widen the horizon of environmental risks assessments associated with the businesses – from raw material security to consumers’ demand.

Act

Once financial institutions assess the environmental risks and impacts from the infrastructure asset, they need to translate this assessment into relevant qualitative or quantitative indicators, which can then inform the investment process including due diligence, benchmarking investments and projects, reporting and stewardship. Once the costs and benefits related to the impact of infrastructure assets on natural resources and ecosystem services are clearly articulated, these assessments will help financial institutions engage with the project proponents on mitigating the drivers of the risks.

Assessments should articulate costs and benefits related to infrastructure assets’ impact on the ecosystem to support favourable decision-making processes

Tools/Standards for Financial Institutions to Integrate Environmental Risks Within Lending and Investment Processes

**GRESB**

The GRESB Infrastructure Asset Assessment framework is a tool to score and benchmark the ESG performance of infrastructure assets. It can be used for a variety of sectors, including energy (generation, distribution, and transmission), data infrastructure (telecommunications, data centres), transportation, waste, water and social infrastructure. Investments are grouped as asset type and assessed across approximately 40 different indicators and the results are based on the inputs around seven core areas including management, policy and disclosure, risks and opportunities, monitoring and EMS, stakeholder engagement, performance indicators, and certifications and awards. The process includes validation, scoring and peer benchmarking (against other similar assets using the framework). Maintaining a GRESB portfolio allows investors to compare the environmental ESG performance of their assets within a sector and peer-group benchmark. In addition to the Infrastructure Asset tool, GRESB also provides a benchmarking framework for Infrastructure Funds and a Resilience Module.

**RepRisk**

RepRisk is a global market research and intelligence provider, specialising in ESG risk analysis, offering a range of due diligence products for a variety of stakeholders, including banks, insurance providers, asset managers, asset owners, and corporations. The core product is an online searchable database of ESG risk exposure for companies, projects, and sectors. Using a proprietary IT tool, RepRisk screens over 80,000 sources daily to identify ESG risks. The company then filters and analyses the results to quantify risk in the form of the RepRisk Index and the RepRisk Rating (ranging from AAA to D). The analysis is driven by 28 core ESG issues in the environmental, social, and governance topic areas, along with variable ESG ‘hot topics’ that are more specific and thematic.
The Standard for Sustainable and Resilient Infrastructure (SuRe Standard)

The Standard for Sustainable and Resilient Infrastructure is a global voluntary standard that integrates key criteria of sustainability and resilience into infrastructure development and upgrade, through 14 themes covering 61 criteria across governance, social and environmental factors. SuRe® applies to infrastructure projects across different types of infrastructure and relies on independent verification and certification by third parties.

Amplify

Nature is a shared resource. Hence, any intervention adopted by a financial institution to mitigate risks arising from its degradation would involve focus at a portfolio level and also an engagement and dialogue with other stakeholders to enable a systemic shift in how these risks are understood and acted upon. The following are some ways in which financial institutions can achieve this:

- Working with policymakers and regulators to address the integration of biodiversity and nature loss into investment decision-making.
- Engagements with academic institutions, civil society groups, and research organisations to access a variety of expertise and scientific information about the impacts of projects/infrastructure assets, in-turn potential risks/benefits to their investments, on biodiversity and ecosystems.

With the involvement of all relevant stakeholders at different fora, financial institutions must ensure sustainable infrastructure development.

Principles for Responsible Investment (PRI)

This framework consists of six voluntary and aspirational principles that help guide sustainable investment practices. The framework further incorporates ESG criteria into decision making by providing asset owners, investment managers, and service providers a menu of possible actions. Signatories are required to report on their responsible policies and processes annually.

Global Investor Coalition on Climate Change

The Global Investor Coalition on Climate Change is a collaboration of four regional partner organisations from around the world – Asia Investor Group on Climate Change (AIGCC), Ceres, Investor Group on Climate Change (IGCC) and Institutional Investors Group on Climate Change (IIGCC) – to increase investor education and engagement on climate change and climate-related policies. Launched in 2012, the coalition provides a platform for dialogue between and among investors, and world governments to accelerate low-carbon investment practices, corporate actions on climate risk and opportunities, and international policies that support the goals of the Paris Agreement. The regions in which the coalition partners are working include Asia, Australia, Europe, and North America.

UN Net-Zero Asset Owners Alliance

Representing nearly USD 5 trillion in assets under management, the United Nations-convened Net-Zero Asset Owners Alliance is an international group of pension funds, insurers and investors delivering on bold commitments to transition their investment portfolios to net-zero GHG emissions by 2050. The initiative demonstrates united investor action to align portfolios with a 1.5°C scenario, addressing Article 2.1c of the Paris Agreement.

The integration of this simple framework – Acknowledge, Assess, Act, Amplify – for biodiversity risks associated with infrastructure projects will support and enable informed decision-making for lenders and investors interested in infrastructure projects. This framework will also help financial institutions transition toward smart, resilient and sustainable infrastructure, ensuring that their capital allocations yield higher economic, social and environmental value.

The current pandemic has exposed the fragility of our economic systems around the world, which, if not safeguarded with adequate environmental considerations, especially in case of large-scale land-use change activities, like infrastructure development, has the potential to damage both financial and natural capitals. Any delay in the actions toward building smart, sustainable and resilient infrastructure is inarguably going to increase the threat on financial and natural capitals.