

A circular graphic containing a photograph of a city skyline with several tall skyscrapers and a body of water in the foreground. The image is partially overlaid by green and blue curved shapes. The text is overlaid on the bottom left of the circle.

Incentives for Natural Infrastructure

Review of existing policies, incentives and barriers related to permitting, finance and insurance of natural infrastructure



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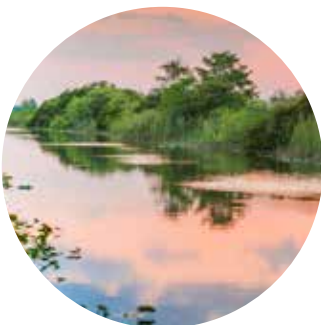
Executive summary

Natural Infrastructure (NI) is a planned or managed, natural or semi-natural system designed to provide a specific benefit. NI solutions have received growing interest from businesses, governments, cities, regulators, and the non-profit sector because of the numerous benefits they bring when compared to gray infrastructure projects.

NI approaches are cost-effective, can help address resource limitations, increase resiliency and adaptation to a changing climate, and can bring co-benefits such as improved stakeholder and community engagement, increased educational and recreational opportunities, and biodiversity conservation.

In 2015, the World Business Council for Sustainable Development (WBCSD) launched the Natural Infrastructure Business platform, which outlines the business case for investing in natural infrastructure. Many WBCSD members have already implemented NI projects. However, many companies are facing challenges and barriers in implementing NI around the world.

This study has been designed to understand the external incentives and barriers for implementing NI projects and supports the overall objectives of the World Business Council for Sustainable Development (WBCSD) Natural Infrastructure for Business Platform.



The purpose of the study was to:

1. Assess and identify incentives and barriers to corporate implementation of NI, focusing on permitting, financing and insurance.
2. Document learnings from private and public implementation of NI in six regions globally.
3. Formulate recommendations to business and the broader community working on advancing NI solutions.

Our findings show that the most common incentives influencing the implementation and permitting of NI are the cost savings of NI compared to gray infrastructure, the co-benefits that NI provides to local communities and alignment with policy frameworks. Within an organization, internal incentives that enable the use of NI include leadership support, awareness and understanding of NI benefits, existing technical capacity and expertise for implementing NI, and pilots that demonstrate physical effectiveness and cost savings associated with NI.

External incentives that influence financing of NI include policies designating funds for NI, public-private partnerships that help meet funding needs for NI, the business case for NI compared to other alternatives and tax-related benefits.

The most common barriers to permitting of NI projects are related to the technical feasibility and the need for technical guidance, the complexity of NI permitting and too few policy incentives.

Significant barriers to financing NI include demonstrating the technical feasibility of NI compared to other approaches, the relatively small scale of NI projects, the challenge of generating revenue from NI projects, the need to quantify risk adjusted returns, and the lack of coordination across NI projects.

The insurance sector has demonstrated significant interest in NI through partnerships and initiatives focused on better understanding and/or implementing NI approaches. However, the use or development of insurance products that provide incentives for NI implementation remains limited at this stage.

This document provides multiple recommendations for businesses and the wider community working on NI related to engaging with governments on permitting, strengthening dialogue with the finance and insurance sectors, and promoting policies that will advance NI solutions.

1 Background to the initiative

Natural Infrastructure (NI) is a planned or managed, natural or semi-natural system designed to provide a specific benefit (WBCSD, 2015).



Introduction to Natural Infrastructure

As such, NI solutions may involve the use of a stand-alone natural ecosystem or may consist of a hybrid solution that combines a natural system and gray infrastructure, as needed, to perform a required function. The benefits derived from NI can include the protection from waves and storm surges provided by coastal ecosystems, the purification of contaminated water by wetlands, or the reduction of flooding by intact forested watersheds, for example. In addition to providing a specific benefit, NI also can provide co-benefits, when compared to traditional gray infrastructure alternatives (EC, 2012). For example, coastal wetlands not only protect people from storm surges and wave energy, but they can also support economically important fisheries, provide recreational opportunities, support wildlife and store carbon (Spalding et al., 2016). NI projects have been implemented by companies, private landholders, communities and governments around the world to secure specific functions and achieve other benefits.

Examples of the kinds of projects that have been implemented by corporations can be found on the [WBCSD Natural Infrastructure for Business \(NI4Biz\) platform](#).

“Natural infrastructure” may also be referred to as “a nature-based solution”, “green infrastructure” and is a way of describing an aspect of “natural capital”. Additionally, the benefits and co-benefits that natural infrastructure provides are often referred to as “ecosystem services”.

In recent years, the concept of NI has become increasingly recognized as a cost-effective way to meet specific objectives while achieving additional benefits. Growing interest in adopting NI solutions is evidenced by recent policy developments and initiatives such as the [European Union Strategy on Green Infrastructure](#), [The United States White House Directive on Ecosystems and Natural Infrastructure](#), [WBCSD Natural Infrastructure for Business \(NI4Biz\)](#) platform and corporate initiatives around NI such as [Caterpillar’s Natural Infrastructure Coalition](#).

However, despite increasing recognition of NI in providing physically effective and cost-efficient approaches to climate change mitigation and adaptation, coastal protection, wastewater treatment, and flood control, NI has not been mainstreamed into the set of solutions and options that are considered by corporations, governments or local authorities when addressing specific needs or risks (Narayan et al., 2016; Gartner et al., 2015). For this reason, increasingly, there is interest in understanding how to enable more systematically the use of NI in cases where it provides a physically effective and cost-efficient alternative or complement to gray or engineered approaches. Several factors that have been identified as important for influencing NI implementation (Gartner et al., 2015; Trinomics 2016; WBCSD, 2015) are outlined in Table 1.

Examples of Natural Infrastructure projects implemented around the world



- Wetland construction for wastewater treatment in the United States by The Dow Chemical Company (Dow)
- Restoration of ecosystems for water management and flood prevention in France by LafargeHolcim
- Restoration of wetlands for coastal protection in the Gulf Coast of the United States by Restore the Earth Foundation through public and private partnerships



- The use of green roofs for storm-water reduction in various cities of Germany and in Washington, DC
- Regulation of water quantity and quality for downstream communities through the use of Water Funds in Latin America

1. Background to the initiative *continued*

Table 1:
Important factors for NI implementation

PERMITTING	FINANCING	INSURANCE
The issuance of permits for implementation of, in this case, land or natural resource use, or construction activities, which is often guided by regulation and/or public policy.	The act of providing funds, in this case to invest/support natural infrastructure.	Protection for specified damage to natural infrastructure and loss/degradation of associated benefits.
SCIENTIFIC KNOWLEDGE	SOCIAL CONCERNS	POLICIES
Scientific knowledge and awareness of the physical performance, cost effectiveness and design features associated with NI. Engineers, governments, corporates, communities and finance institutions may have different knowledge and information needs related to NI.	Social concerns include community preferences for different kinds of solutions to problems such as coastal protection or water security and can be influential in determining the solution selected, especially when projects are being implemented on community held lands.	Policies and regulations can facilitate /incentivize the uptake of NI approaches and can influence funding and incentives for implementing NI projects and/or in some cases inhibit the use of NI through policies that favor other alternatives to NI.
TECHNICAL CAPACITY	SEVERE WEATHER EVENTS	COSTS
People charged with design, implementation and regulation of NI, such as engineers, contractors and regulators, will need specialized training in the design, implementation, monitoring and permitting of NI solutions. Understanding how NI works can also help catalyze the interest in and demand for NI.	The need for resilient infrastructure and ecosystems to protect cities, communities and assets from the negative effects of climate change can lead to adoption of NI solutions. For example, coastal ecosystems can be highly effective at reducing wave energy and storm surges associated with cyclones and or hurricanes.	The costs of implementing NI solutions can be competitive compared to gray infrastructure, particularly in the long-term. Costs include construction, operational, maintenance and monitoring costs.



WBCSD Incentives for Natural Infrastructure study

This document summarizes the results from the WBCSD Incentives for Natural Infrastructure study, which supports the overall objectives of the WBCSD Natural Infrastructure for Business platform.

The platform, launched in 2015, was developed by the [WBCSD](#) to introduce business leaders and practitioners to NI. It links to other international frameworks and conventions such as the [Sustainable Development Goals](#) (notably SDGs 6, 11, 12, 13, 14, 15, 17), the Sendai Framework for Disaster Risk Reduction, the Paris Agreement, the Ramsar Convention and the Convention on Biological Diversity, among others.

The goal of the WBCSD Incentives for Natural Infrastructure study aims to support the advancement of the role of NI in providing an effective response to business needs while contributing to international development goals given their proven physical effectiveness, cost benefits and ability to support multiple objectives.

The study aims to:

- Advance towards a 2020 goal of new and strengthened frameworks, standards and regulations to support company investments in natural infrastructure projects;
- Positively influence public and private decision-makers to develop and implement relevant frameworks that can support companies' investments in NI projects;
- Identify how the implementation of NI projects is influenced and incentivized by public and private actors.

This study assesses barriers and incentives influencing NI implementation particularly as they relate to permitting, financing and insurance in Asia, Australia, Europe, Latin America, the Middle East and the United States. For the purpose of this report, we focus on the incentives and barriers that are external to the business. Specifically, the study has:

- Reviewed and identified incentives and barriers to corporate implementation of NI, focusing on permitting, financing and insurance;
- Documented learnings from private and public implementation of NI in six regions;
- Formulated recommendations to business and to support WBCSD's next steps on the NI project.

About the report

In order to identify incentives and barriers to corporate implementation of NI, the study team collected information through a survey to corporate representatives who have implemented NI solutions; conducted interviews with specialists working on NI across different sectors in six regions (Asia, Australia, Europe, Latin America, Middle East and North America); and reviewed literature and documents relevant to the topic.

The survey and interview questions addressed the incentives and barriers related to permitting, financing and insurance of NI, with a focus on relevant policy and regulatory drivers, in the different regions. A list of the contributors interviewed for the project is included at the end of this document.

2 Policy trends and legislation influencing the implementation of NI



Policy frameworks that enable permitting and encourage or provide financing for NI are critical for main-streaming NI into the set of solutions that are used to meet different needs from water quality and quantity regulation to coastal protection.

A range of existing and pending policy frameworks and agendas are advancing NI implementation through enabling more efficient permitting processes and catalyzing financing. Currently, policy making related to NI at a regional level only occurs within the European Union. Outside of the EU, NI regulatory frameworks must be understood within each country or within local jurisdictions due to variations in national and local governance, policies and regulations.



Europe

In 2013, the European Commission adopted an EU-wide strategy to promote investments in green infrastructure and promote the deployment of green infrastructure across Europe.

In a communication from the European Commission to the European Parliament, it states that a Green Infrastructure strategy focused on restoring or enhancing green infrastructure is fundamental to the achievement of other policies such as the 2020 Biodiversity target and the resource-efficient Europe flagship initiative under the Europe 2020 strategy (Davies et al. 2015). In addition, the communication identifies funding mechanisms that can be leveraged for NI implementation such as the [Natural Capital Financing Facility](#). The strategy is implemented through other policy mechanisms such as the EU Bird and

Habitats Directive that protects Natura 2000 sites, which each member country of the EU implements within their national context.

For example, at a country level, the Dutch Government has recently released a 10-year vision on nature policy in the country 'The Natural Way Forward' that aims for engagement by individuals, companies, local authorities and civil society organizations in nature conservation, and for sustainable use of nature's assets. In addition, the Netherlands has adopted an approach called "Building with Nature" to guide development of its extensive coastal and river works by making use of the dynamics of the natural environment and providing opportunities for natural processes (de Vriend et al. 2014). Thus, in EU member countries such as the Netherlands, multiple policy drivers acting at regional, national and project scales are collectively creating incentives for the consideration and use of NI in environment and development planning. By the end of 2017, the Commission will evaluate the progress made through the EU Strategy on Green Infrastructure, develop a report on the lessons learned and generate recommendations for next steps¹. The Government of the United Kingdom also has made significant commitments to integrating natural capital, including natural infrastructure, into economic development decisions. In 2012, the Government established a national [Natural Capital Committee \(NCC\)](#) which reports to the Economic Affairs (EA) Committee of the Cabinet and advises the National Infrastructure Commission to ensure that both 'green and blue infrastructure' are adequately considered within broader infrastructure discussions. In parallel, green infrastructure plans are being implemented at the municipal and local levels throughout the country. For example, in the London Infrastructure Plan, the Mayor of London created a [Green Infrastructure Task Force](#) to identify how to encourage a more

strategic and long-term approach to green infrastructure delivery and investment in the city.



Asia

Many countries throughout Asia will be severely impacted by climate change due to high populations of people living in low lying, coastal areas. These risks are especially critical for island nations such as the Philippines. In the Philippines, recent typhoon devastation combined with the growing scientific evidence and the experiences of local communities regarding the ability of mangroves to provide protection from waves and storm surges has catalyzed development of a comprehensive National Coastal Greenbelt Action Plan for the country. This plan will support protection of mangroves for risk reduction and conservation through the establishment of a 100-meterwide area of mangrove and coastal vegetation, initially for the eastern Pacific seaboard of the Philippines where typhoons make landfall (World Bank 2015).

¹ https://ec.europa.eu/environment/efe/themes/land-use-and-soil/moving-grey-green-infrastructure_en

2. Policy trends and legislation influencing the implementation of NI *continued*



Australia

In Australia, the National Landcare Programme is a key component of the Australian Government's commitment to natural resource management. Through the program, the Government is investing \$1 billion over four years (as of 2014-2015) in initiatives such as the 20 Million Trees Programme, the Green Army Programme, Reef 2050 Plan, Working on Country, the Land Sector Package, investments in the Great Barrier Reef Foundation, Carbon Farming Futures, and drought support package. The program is being implemented through both national and regional streams with a focus on natural resource management investments that are simple, local and long-term.



Latin America

Throughout Central and South America, policy drivers have helped catalyze funding for natural infrastructure, especially through mechanisms such as water funds and Payments for Ecosystem Services (PES).

For example, in 2013, Colombia's Ministry of Environment and Sustainable Development authorized regulation requiring municipal and departmental entities to direct at least 1% of annual revenues towards PES that compensates landowners or direct land acquisition in source water areas (Bennett et al. 2014).

This aligns with Colombia's National Development Plan (NDP) that emphasizes multi-sectoral and inter-regional dialogue and articulates a vision of green growth that ensures the provision of adequate goods and ecosystem services to meet the country's needs and allows the natural environment to recover from the impacts of economic activities.



North America

Canada has made significant national commitments to natural infrastructure. As part of its [Budget 2016 plan](#), the Government proposed to invest \$5 billion over 5 years in water, wastewater and green infrastructure projects across the country and \$3.4 billion over 5 years to address climate change and air pollution, protect ecologically sensitive areas and restore public trust in the environmental assessment processes. In addition, the Government established the [Clean Water and Wastewater Fund \(CWWF\)](#) which provides funding for projects that provide communities with more reliable water and wastewater systems, which include projects that use natural systems to manage and

treat contaminated water and to reduce stormwater².

In the United States, policy frameworks related to NI include Executive Orders at the Federal level, the US Environmental Protection Agency (EPA) Green Infrastructure Strategic Agenda, and state and local regulations. In 2015, the United States government announced a new memorandum directing all Federal agencies to factor the value of natural infrastructure and ecosystem services into Federal planning and decision making³. The executive order requires that Federal agencies integrate these considerations into their plans and budgets. The new nationwide permitting process should help streamline this process across state and federal levels.

At the local level, several US cities have also created enabling programs and frameworks for NI implementation. For example, New York City's Department of Environmental Protection (DEP) released the [NYC Green Infrastructure Plan](#) in 2010, which presents an alternative approach to improving water quality that integrates "green infrastructure," such as rain gardens and green roofs, with investments to optimize the existing system and to build targeted, cost-effective "gray" or traditional infrastructure. The major goals of the program are to achieve measurable water quality benefits while also providing co-benefits such as improved resiliency in order to adapt to climate change.

² <http://www.infrastructure.gc.ca/plan/cwwf-fepeu-eng.html>

³ <https://obamawhitehouse.archives.gov/blog/2015/10/07/incorporating-natural-infrastructure-and-ecosystem-services-federal-decision-making>



Globally, multi-lateral institutions such as the World Bank Group are supporting the integration of the value of natural capital into government accounting systems through initiatives such as the [Wealth Accounting and Valuation of Ecosystem Services \(WAVES\) program](#). The WAVES program is being implemented in Botswana, Colombia, Guatemala, Indonesia, Madagascar, Rwanda and the Philippines and includes integrating the value of ecosystems, such as natural infrastructure for carbon sequestration and water quality and quantity regulation, into national accounting systems to better inform national level decision making. The Government of the United Kingdom has undertaken a similar effort through the establishment of a national [Natural Capital Committee \(NCC\)](#), which also advises the National Infrastructure Commission. Similarly, in Africa, multiple countries have agreed to the [Gaborone Declaration](#) that commits them to integrating the maintenance of natural capital into their national development plans.

In parallel to the growing momentum around NI in public sector policies and directives, multiple private sector commitments and coalitions have formed that focus on capturing and enhancing the value of NI. These include the [Natural Capital Coalition](#), comprised of multiple public and private sector organizations to harmonize approaches related to natural capital measurement and valuation to support business decision making.

Similarly, the [Natural Capital Finance Alliance](#) includes over 90 financial institutions and other partners who are committed to collaborating to understand the importance of natural capital risks and opportunities.

All of these public and private sector frameworks and commitments are critical factors for advancing the implementation of natural infrastructure. However, it is important that these frameworks and commitments be bolstered by legislation and/or regulations that enable permitting and support financial incentives for NI projects in countries where they will be implemented.

3 Permitting



Incentives and barriers to implementing NI

The most important incentives to implementing and permitting of NI that were identified throughout this project include:

Cost-effectiveness of NI approaches compared to other alternatives

As NI, including hybrid solutions, can be less expensive to construct (although this is not always the case) and are typically less expensive to operate and maintain, and are often more physically effective than gray or engineered alternatives (The Business Case for Natural Infrastructure, WBCSD 2015), they are increasingly being prioritized by cities, corporations, and regulators as viable solutions going forward. Multiple companies interviewed for this project stated that NI was on average more cost-effective than other approaches due to lower capital investment requirements, lower long-term operational and maintenance (O&M) costs, and lower requirements for labor, chemicals, and other inputs throughout the NI solution lifecycle. Recent research has also shown that NI solutions can be as effective as gray solutions – for example, coastal ecosystems can be as cost effective as their gray analogues for protecting coastlines (Narayan et al. 2016). Business and cities are increasingly selecting NI solutions because of their cost effectiveness in addressing regulatory requirements, such as water discharge limits or remediation commitments.

For example, the city of New York implemented a NI solution with up-stream farmers because it was a more cost-effective way for securing drinking water than building an expensive gray water treatment facility (Grolleau and McCann, 2012)⁴. All of these factors affect the options preferred and promoted by regulators, which influence the permitting process.

Co-benefits of NI

Community support is a significant incentive for permitting of NI by national and local regulators, especially on public or community lands. Organizations implementing NI solutions should work with the local communities, regulators, and permitting bodies to educate them on the multiple co-benefits offered by NI solutions such as environmental enhancement, climate change resiliency, educational, tourism, and recreational opportunities. For example, in Vietnam, involving local communities as project partners from the outset of a mangrove restoration project aimed at promoting coastal resilience and risk reduction was critical for the success of the project, while previous less participatory projects were not as successful (Hoa et al., 2016). The many co-benefits provided by mangroves for the community in this project were also important for securing community support, as has been the case in many other projects.

Alignment with policy frameworks

Policy frameworks can facilitate the permitting process by prioritizing certain kinds of NI approaches. For example, specialists we interviewed who have engaged with the Washington, DC Stormwater Retention Credit program have stated that permitting of green infrastructure is relatively easy when the project is aligned with the city's regulatory framework for stormwater management, which encourages the use of green infrastructure⁵. Similarly, in Louisiana, Restore the Earth Foundation is implementing their project without going through a complicated permitting process because their coastal restoration project is located on US Fish and Wildlife Service land, which is land that is prioritized for conservation and restoration purposes. Thus, when projects are aligned with and/or helping support the implementation of policy directives or goals, permitting challenges may be significantly reduced or eliminated.



⁴ <http://www.ecosystemmarketplace.com/articles/ecosystem-services-in-the-new-york-city-watershed-1969-12-31/>

⁵ <https://doee.dc.gov/release/district-establishes-new-river-protecting-stormwater-management-standards>

3. Permitting *continued*

Barriers that present challenges to NI permitting in multiple regions include:

Lack of technical guidance and policy drivers

The lack of technical guidance for NI implementation is one of the most commonly cited barriers in all regions and refers to the understanding and knowledge of the performance of NI by policy makers, regulators and/or permitting agencies, who often prioritize gray infrastructure over NI because it is familiar and something they understand with respect to compliance and permitting. This is especially a challenge in many developing countries where technical capacity for implementing alternative approaches is often lower than it is in developed countries (Narayan 20015, Jupiter 2015). To address the need for technical knowledge and guidance, the Department of Energy and the Environment in Washington DC, provides training⁶ on the use of green infrastructure for storm water reduction, including training on General Compliance, Generation and Certification of Stormwater Retention Credits (SRCs) and Discounts on Stormwater Impervious Fees, Green Area Ratio and Best Management Practices for GI Construction and Inspection. To address these challenges, Dow, for example, had in-house expertise related to using wetlands for waste-water treatment in Texas and applied this expertise to help provide guidance and build the capacity within local regulating authorities responsible for permitting to support the project approval process. The WBCSD and UNEP, in collaboration with Wetlands International, ARCADIS and Shell have launched a training course on Natural Infrastructure for Business to meet some of these technical capacity building needs within the corporate sector. Policies that specifically address permitting of NI are not common. However, some policies either directly or indirectly prioritize solutions or processes that can make NI permitting more challenging.

For example, policies related to coastal protection in North Carolina require different permits for gray or hard infrastructure and natural infrastructure, with the latter being more time-consuming and expensive to secure. This creates a disincentive for using NI approaches for coastal protection in NC. However, in Maryland, policies prioritize living shoreline over gray approaches making it easier to get a permit and implement NI for shoreline protection (Kochnowar et al., 2015).

Complexity of permitting for NI

Multiple types of permits may be needed to implement a NI project and will depend on what form of NI is being used to achieve specific goals and where the project is being implemented. In addition, the kind of permit(s) required will depend on the activity or management practices needed to implement NI.

The EU Habitats Directive requires permits for changing a "sensitive habitat" from one landcover type to another. In the US, the National Pollutant Discharge Elimination System (NPDES) permit translates the provisions of the United States Clean Water act and must be secured if wetlands are being implemented to improve water quality. Similarly, the permit(s) needed for NI may be different from that needed for gray infrastructure. For example, in the US, living shorelines projects often have to apply for an individual Clean Water Act 404 permit, while bulkheads can often be covered under an Army Corps Nation Wide Permit, which are generally granted more quickly (Sutton- Grier et al. 2015). Furthermore, in the majority of countries, an Environmental Impact Assessment (EIA) is required to get a permit for the construction or implementation of any natural or gray infrastructure project. Understanding these regulations and specific requirements within a country and knowing relevant requirements for different forms of NI is critical for successful implementation of NI projects.



⁶ <https://doee.dc.gov/node/619262>

Regional examples related to permitting incentives and barriers



Asia

Like many regions, Asia is characterized by a diversity of governance systems and approaches that influence policies relevant to permitting of NI. For example, Vietnam is more centralized with respect to policies related to natural resource management than other countries in the region and the Vietnam Forest Policy stipulates that permits are required for any kind of forest regeneration program. However, in Indonesia and in parts of the Mekong, it is necessary to work at the local level through local agencies and/or local communities to advance projects and secure necessary permits.



Australia

Survey results show that permits are relatively easy to secure for NI projects in Australia if necessary requirements are met. Permitting requirements included bed and banks approvals for disturbing waterways, Aboriginal consultation and engagement, and planning and cultural

heritage considerations. In most cases, an approvals process exists to guide the NI implementer.



Europe

The EU Bird and Habitats Directive establishes a permitting procedure for any plans or projects that are likely to have a significant effect on Natura site(s)⁷, either individually or in combination with other plans and projects. This policy is interpreted and implemented individually by EU member countries and has both catalyzed and impeded the implementation of NI projects according to specialists interviewed for this project. For example, in some countries such as the Netherlands it has been difficult to implement certain NI projects because of the stipulation that specific habitats cannot be transformed, while in the UK this directive has served as a driver for ecological restoration.



Latin America

Land ownership in developing countries can be a challenge for advancing NI implementation, as it was for one company implementing a NI project in

Latin America. The project was located on community owned land and, thus, approval for the project had to go through a community-based process, which can be lengthy and potentially unclear to an external project implementer.



Middle East

Working in oil-rich and/or conflict prone countries can pose unique and complex permitting requirements to any kind of project, including but not limited to NI projects. For example, contractors working on phytoremediation in Kuwait must comply with a suite of environmental and work related requirements and permits.

To implement a project, it must conform to applicable Kuwait Environment Public Authority (KEPA) regulations (e.g. KEPA Act 210/2001) and the project developer must obtain the necessary approvals from Kuwait EPA (KEPA) prior to implementation in the form of a Final Environmental Impact Assessment (FEIA). In addition, other permits and passes must be obtained which may include: a "Gate Pass" to gain access to the property (which can take approximately 4 months to acquire); an "Excavation Notification" to excavate anywhere within an oilfield, which requires multiple signatures and supporting documentation (which can take approximately 1 month); and a "Permit to Work", which is a daily permit required for working in the oilfield that must be signed in the morning and end of the day by an on-site Supervisor (up to 2 hours per day). Other requirements include "Loading Notes" for all materials entering/exiting the oil-field and making

⁷ Natura sites are part of the Natura 2000 network of core breeding and resting sites for rare and threatened species, and some rare natural habitat types which are protected in their own right. The network spans all EU countries, both on land and at sea.

3. Permitting *continued*

advance arrangements with Kuwait authorities for shipping of samples, if required, to other countries for laboratory testing.



To address this challenge, they worked with regulators from the outset of the project to introduce them to a new approach to meeting water quality standards. Permitting of projects designed to reduce coastal erosion in the US may favor nature-based or soft solutions through policy measures such as the 2008 Maryland Living Shoreline Protection Act in Maryland. However, in other states such as North Carolina, gray infrastructure for coastal protection requires one kind of permit while NI approaches require another kind of permit, with the latter being more time consuming and expensive to secure (Kochnowier et al., 2015).

North America

In the United States, permitting requirements can vary by state, may depend on whether projects are being implemented on public or private land and the kind of project being implemented. In the case of Dow's reconstructed wetland, which was implemented on their property, the primary permitting requirements were associated with securing their NPDES permit.



⁸ <https://www.gov.uk/government/publications/a-coastal-concordat-for-england>

Key opportunities for reducing barriers to NI permitting

Streamlining of permitting processes

When a project requires multiple permits, streamlining the permitting process can save time and money. The Coastal Concordat in the UK has sought to address such challenges by unifying multiple agencies and government bodies in England to coordinate separate processes for coastal development consents⁹.

Awareness raising and capacity building within regulatory agencies on the performance of NI

Increasingly, government agencies and NGOs are developing guidance for permitting bodies on NI implementation, particularly as new permits are needed to accommodate for NI. These guidance documents should include awareness raising related to the natural variance of NI performance and the fact that sometimes these approaches have not been used widely in the past. For example, the United States Environmental Protection Agency (EPA) has a series of factsheets that describe how EPA and state permitting and enforcement professionals can

incorporate green infrastructure practices and approaches into National Pollutant Discharge Elimination System (NPDES) wet weather programs, including stormwater permits, Total Maximum Daily Loads (TMDLs), combined sewer overflow (CSO) long-term control plans (LTCPs), and enforcement actions¹⁰.

In North Carolina, the National Center for Coastal and Ocean Science of the National Oceanic and Atmospheric Administration published a handbook on decision making around Living Shorelines, entitled, "Weighing Your Options", which is being distributed by the North Carolina Division of Coastal Management permitting staff. In addition, staff from National Marine Fisheries Services and the NOAA Restoration Center staff provide technical advice and guidance on project design and permitting of Living Shorelines in North Carolina. Working alongside regulators from the outset and throughout implementation has been shown to support awareness raising and facilitate the permitting process.

Supporting policies that facilitate or streamline permitting of NI

Policy frameworks and directives that prioritize natural infrastructure are helping to advance NI implementation. The 2008 Maryland Living Shoreline Protection Act is an example of a policy that has enabled NI implementation by giving preference to soft solutions over hard solutions for coastal protection, which has made permitting for living shorelines easier in the state. Recently, the US Army Corps of Engineers authorized its first nationwide permit for living shorelines, which solidifies on a national level, the value of living shorelines as a more natural erosion control alternative to hardened structures such as bulkheads. The new general permit will help reduce the time and complexity associated with getting a permit to implement nature-based approaches to coastal protection. While project developers may also have to go through state level processes, it is believed that this new nation-wide permit should ease and streamline the permitting process for NI solutions^{11,12}.

⁹ <https://www.gov.uk/government/publications/a-coastal-concordat-for-england>

¹⁰ <https://www.epa.gov/green-infrastructure/permitting-and-enforcement-series>

¹¹ <http://www.coastalreview.org/2017/01/corps-eases-living-shoreline-permit-process/>

¹² <http://www.newsobserver.com/opinion/editorials/article80335922.html>

4 Financing

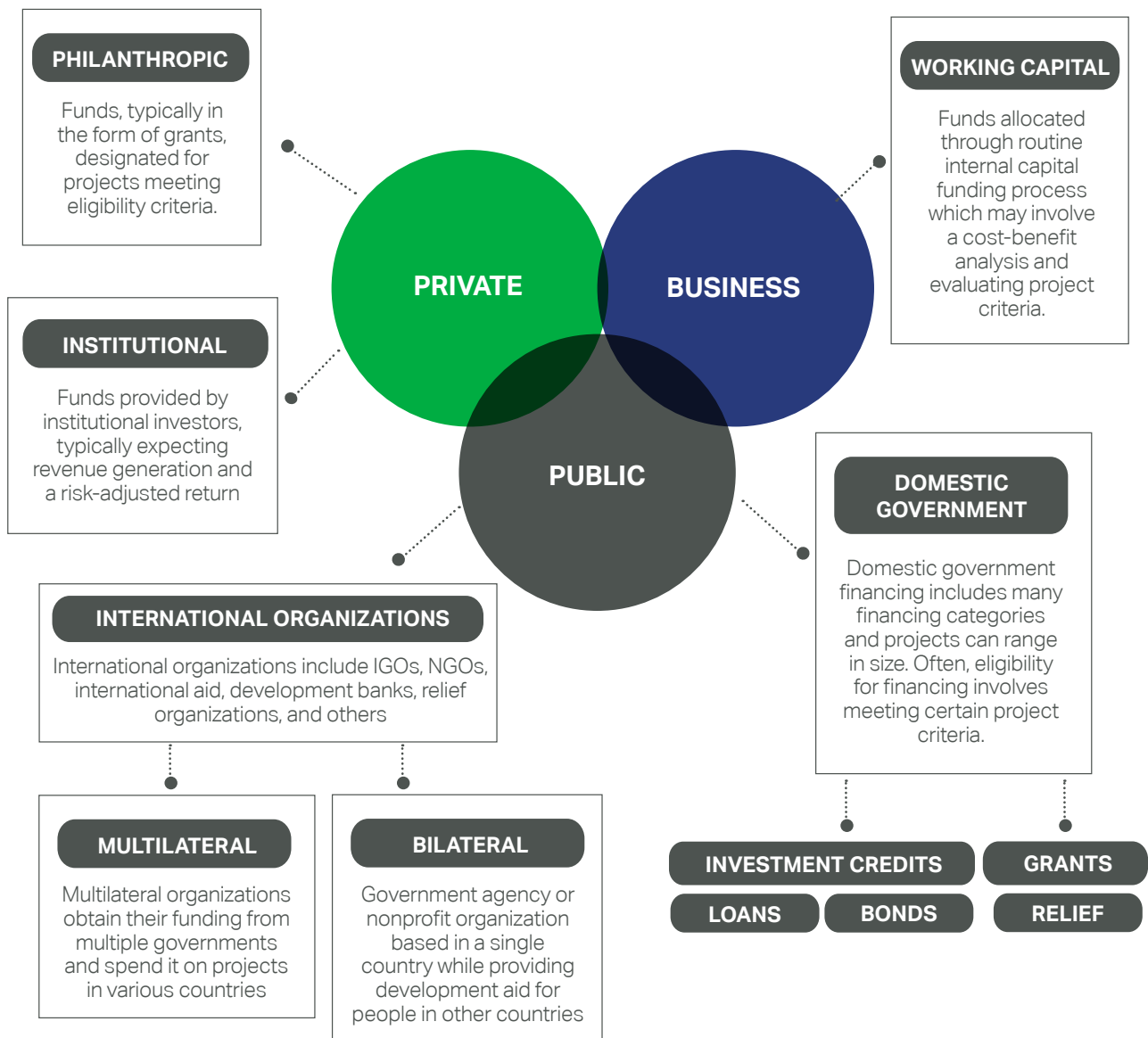
The majority of NI projects assessed in this study were implemented by corporations and were financed by the businesses through routine capital expenditures while other projects are financed by government funds.

The process of securing financing varies significantly across public and private sponsored NI projects and across regions, with significant differences in sources of financing between developing and developed countries.

For example, in developing countries, many NI projects are supported by international donor funding while in many developed countries NI projects are being financed by a combination of government funding and private entities. Many businesses, however, are financing NI from capital expenditures to meet specific needs (i.e. treatment of wastewater) across all regions considered in this project.

The range of sources of financing for NI may include a company's internal capital budget, external investors such as impact investors, philanthropic donor/aid agency and governments. These sources of funding can take a variety of forms as shown in Figure 1 and represent a diverse set of financing opportunities.

Figure 1:
Typology of sources of financing available for NI implementation



4. Financing *continued*

Incentives and barriers to implementing NI

The most important incentives with respect to securing financing for NI as identified in this study are:

Policy frameworks

Policy frameworks can help catalyze funds for NI and come from either private and/or public sector policy directives. Private sector investments in NI have included Dow's Valuing Nature Initiative which comprises a commitment to deliver \$1 billion in value through projects that are good for business and good for ecosystems by 2025¹³. This was driven by a recognition of the cost-savings and performance of NI, which has in turn led the company to commit to create more value from NI approaches. Public sector policy directives also create the foundation needed to catalyze financing streams, incentives and taxes that could be used to advance NI implementation, such as the EU Green Infrastructure Strategy.

Public-private partnerships

Public-private partnerships are proving to be critical for enabling funding for NI in situations where the scale of the project is larger than any one entity can afford to fund. For example, a public-private partnership was necessary to implement Europe's largest constructed wetlands for power-plant cooling in Italy because a much bigger scale was required than was the case for previous, similar projects. In another example, Sasol, a large consumer of industrial water in South Africa, formed a partnership with the Emfuleni local municipality and the German Development Agency (GIZ), to improve municipal infrastructure and reduce leakages in an effort to improve water availability in the region. The partnership is enabling all three parties to share water risks in this increasingly water stressed environment.

The project will result in an approximately 15% decrease in water demand for the municipality and a reduction in water

related expenses of about US\$ 4.4 million annually¹⁴.

Business case

Proving the business case and demonstrating cost-effectiveness of NI compared to other more familiar approaches has helped secure public and private finance for NI in multiple regions and has been especially important in cases where companies are using internal financing to support NI implementation. The majority of survey respondents and interviewees agreed that this was relatively easy to do because NI approaches are typically cheaper to implement and manage than traditional gray alternatives. For example, in the case of Dow's Seadrift project, the initial cost comparison between a water treatment facility and a wetland was approximately \$40 million and \$1-2 million respectively, making NI a much less expensive option. In addition, there were few if any operating costs associated with wetlands like there were with an engineered water treatment facility. Even in cases where NI is more expensive to implement, in the long-term, NI pays off with reduced operations and maintenance costs. However, because capital budgets and operation and maintenance (O&M) budgets are often managed separately, they may require separate sets of approval within an organization. Thus, proving the business case should include a consideration of implementation costs, permitting costs, costs of operations and maintenance and potential opportunities to generate additional revenue.

Tax incentives

Tax benefits are an especially important incentive in North America and Europe. In Germany, a combination of tax incentives, fees and regulations related to storm-water management on individual properties have been extremely effective at encouraging people to adopt green roofs throughout the country (Buehler et al. 2011, Li and

Yeung, 2014) making it the country with the highest number of green roofs in the world (Waterford, 2015).

Barriers to securing financing for NI include:

Technical feasibility

The technical feasibility of NI is relevant for securing financing for new approaches, particularly approaches that may not have been widely tested. For example, Shell and The Nature Conservancy worked together to pilot the use of the living shore concept (including oyster reefs) for protecting oil and gas pipelines from erosion caused by wave energy in the Louisiana delta in the US. The pilot will test the technical feasibility of using a nature-based and/or hybrid approach for physical protection and the cost-effectiveness of a nature-based approach compared to gray alternatives^{15,16}. These kinds of pilots will also be useful for building confidence within the financial sector and among investors who are not very familiar with these kinds of approaches and will need evidence that they work and are cost-effective.

Scale

The relatively small scale of NI projects has hindered institutional investments in NI. Many NI projects are not large enough to attract institutional investors who look for projects in the US\$100-150 million range. It was stated by several stakeholders from the financial sector that there are very few NI projects of the desirable size, despite the fact a significant amount of capital is available to invest in NI. One way to overcome this challenge is through public-private partnerships, which can enable the implementation of larger scale projects. For example, Restore the Earth Foundation has formed public-private

partnerships to support large-scale restoration of one million acres of degraded land in the lower part of the Mississippi River to support climate change mitigation and protection of

¹³ <http://www.dow.com/en-us/science-and-sustainability/2025-sustainability-goals/valuing-nature>

¹⁴ <http://www.sasol.com/sustainability/environment/sasol-water-sense/collective-action>

¹⁵ <http://www.naturalinfrastructureforbusiness.org/>

¹⁶ <http://www.nature.org/about-us/working-with-companies/companies-we-work-with/building-a-case-for-green-infrastructure.xml>

people and infrastructure from storms and flooding along the Gulf Coast¹⁷. Their partners who helped make this large-scale restoration project possible include the United States Business Council for Sustainable Development (US BCSD), CITGO, Entergy, Shell, VMWare, Louisiana Department of Wildlife and Fisheries, the Lower Mississippi Joint Venture and the U.S. Fish and Wildlife Service. In the short-term, another solution to the challenge of scale is to encourage impact investors who are willing to accept the lower returns and lower revenue associated with smaller projects to invest in order to get more of these projects implemented as proofs of concepts.

Revenue generation

To attract larger scale institutional investments, projects will need to generate revenue, which can be a challenge with NI projects that may require a substantial amount of time before revenue will manifest (if the project is even able to generate a revenue stream, which may not be possible for all forms of NI). Revenue generation can come from the project itself in the case of carbon credits generated by forests or the co-benefits generated from a project such as fisheries or tourism generated from wetland restoration.

Risk adjusted returns

Quantification of the risk profiles of NI at an acceptable level is also a challenge that was cited in interviews. A risk adjusted return is necessary to support an investor's confidence in an NI project. This is a critical challenge for NI, which is a non-conventional asset class in which institutional investors have not invested historically. Thus, getting investors to understand, accept and feel comfortable with the risk profiles of NI is critical to unleashing more financing opportunities to support implementation. In addition, implementers need to quantify risk in metrics that resonate and are acceptable to investors.

Long-term funding

Funding is often provided on time horizons that are too short given the nature of the project and not coordinated within countries where projects are being funded. This barrier is particularly a challenge in developing countries which are highly dependent on bilateral or multilateral funding for NI projects.

Coordination of projects and funding

Financing and implementation of projects within countries is often not coordinated, especially in developing countries where external donor money is being directed towards NI implementation. In some cases, local officials may not be aware of the different projects being funded by external donors. Thus, better coordination and joint planning of donor funded projects within countries could improve the effectiveness and sustainability of individual NI projects.

Regional examples of policies and financing streams and mechanisms that have enabled NI implementation

Policies and financing streams and mechanisms that have enabled NI implementation



Asia

To facilitate the development of the market for environmental services, the government of Vietnam established a pilot policy framework for Payment

for Forest Ecosystem Services (PFES; Decision 380) in 2008 that focused primarily on water supply and regulation, soil conservation, and landscape conservation for tourism purposes through local contracts. In 2009, the total revenue derived from service buyers, mostly hydropower and water supply companies, was approximately US \$4 million. In 2013, water users including hydropower operators and utilities collectively paid \$54 million to Vietnamese forest-based communities for watershed services they were helping to provide. This policy was instrumental in driving investments and funding into ecosystem service projects (To et al. 2012).



Australia

The Australian Reef Trust has been designed to allow for the consolidation of investment from a wide range of sources and has secured \$210 million from the Australian government to deliver against the targets set out in the Reef 2050 Plan. The Reef Trust Innovative Financial Mechanisms Panel provides a forum for experts from leading financial and philanthropic organizations to explore a range of conservation financing mechanisms which could be piloted for the Great Barrier Reef. These mechanisms could include green bonds, impact investment and private equity investments which are new to the environment sector in Australia.

¹⁷ <http://restoretheearth.org/2016/10/25/press-release-restore-the-earth-foundation-breaks-ground-on-one-million-acre-landscape-scale-restoration-project/>

4. Financing *continued*



Europe

The [European Union Green Infrastructure Strategy](#) provides a policy framework for NI implementation and for leveraging financing available to member states include cofinancing opportunities for advancing green infrastructure through programs such as Horizon 2020, which has funded research on nature-based solutions. In addition, the European Commission and the European Investment Bank (EIB) established the Natural Capital Financing Facility (NCF) to finance investments in natural capital projects, including in green infrastructure, which generate revenue or cost-savings, while contributing to nature, biodiversity and climate change adaptation objectives¹⁸. Under the Natural Capital Financing Facility (NCF), the European Investment Bank (EIB) provides loans and investments to support projects which promote the preservation of natural capital, including adaptation to climate change, in the Member States. The NCF will provide funding to projects that are developed by public and private entities, including public authorities, land owners, businesses and NGOs¹⁹. The total budget for the NCF Investment Facility amounts to €100 – 125 million for 2014-2017.



Latin America

In 2013, collective action funds, which pool multiple program investor contributions, attracted more than \$65 million in long-term watershed project finance in Latin America (Bennett et al, 2014). Water Funds in Latin America, particularly, Colombia and Mexico, have provided a model of long-term watershed conservation. Water Funds in Colombia include Madre Agua - Water Fund Cali and Agua por la Vida y la Sostenibilidad, Valle del Cauca.



The Middle East

The United Nations Compensation Commission (UNCC) was created to process claims and pay compensation for losses and damage suffered as a direct result of Iraq's unlawful invasion and occupation of Kuwait in 1990-91. About 2.7 million claims, with an asserted value of \$352.5 billion, were filed with the Commission. The Commission concluded claims processing in 2005, and the total compensation awarded was \$52.4 billion to approximately 1.5 million successful claimants. The UNCC has supported multiple environmental

restoration projects, including the phytoremediation of oil contamination by oil and gas industry.



North America

In 2016, in the United States, the private sector announced more than \$2 billion in new private sector and non-federal investments to protect land, water and wildlife for future generations much of which focused on natural infrastructure²⁰. These investments were aligned with the United States Government's work to encourage additional private sector investment in the health and restoration of natural resources and conservation across the country.

Key opportunities/ considerations for increasing NI financing

Despite a number of interesting initiatives and approaches, the uptake of natural capital, including natural infrastructure, as a material issue by the private financial sector has been deemed as rather poor (Trinomics 2016). Several opportunities may help reverse this pattern and increase the availability of more funding for NI:

Publicizing the business case

More examples of the business case for NI are needed and should be shared with investors, including cost-savings and risk adjusted returns, to secure more private investment in NI. Internal financing from corporations has been

¹⁸ http://ec.europa.eu/environment/nature/ecosystems/investing/index_en.htm

¹⁹ http://ec.europa.eu/environment/life/funding/financial_instruments/nccff.htm

²⁰ <https://www.whitehouse.gov/the-press-office/2016/03/07/fact-sheet-2-billion-new-private-sector-investments-protect-natural>

secured for NI in cases where budgets already existed for infrastructure of some sort and where physical performance and the business case of NI have been made as equal to or superior to gray infrastructure at providing that benefit.

Proof of concept projects

To attract larger scale institutional investments in NI, impact investment and concessionary funding can support smaller projects that demonstrate proof of concept with respect to cost-savings, risk adjusted profiles and revenue generation.

Public-private partnerships

Public-private partnerships can help secure the required finance for larger-scale projects. Partnerships such as the ones formed by the Restore the Earth Foundation in the Gulf Coast are examples of how they can be leveraged to support implementation of large-scale NI projects that no one entity is able or willing to fund alone.

Alternative financial mechanisms

A range of innovative financing models are also showing promise for supporting NI and providing sustainable streams of financing. For example, the “Debt for Adaptation” mechanism that is being implemented in the Seychelles is leveraging impact investment capital to restructure debt and release capital that can be directed towards conservation of natural infrastructure that is critical for climate change adaptation. Other mechanisms such as Payment for Ecosystem Services or Water Funds have been used by governments such as New York City, Mexico and Costa Rica (Wunder et al. 2012, Bennett et al. 2014).

In addition, regulatory driven market-based mechanisms, such as the Washington, D.C. Stormwater Retention Credit (SRC) Trading Program allows property owners to generate SRCs for the implementation of green infrastructure that reduces stormwater runoff and allows them to trade their SRCs to others who use them to meet regulatory requirements for stormwater retention. The revenue generated creates an incentive to implement green infrastructure approaches. Green bonds, blue bonds and resilience bonds are also mechanisms that have potential for supporting climate change adaptation (Colgan 2016), which could be achieved through natural infrastructure implementation.

NatureVest, the impact investment unit of The Nature Conservancy, is an example of an entity that is catalyzing the financing and structuring of some of these innovative models, including Seychelles Debt Restructuring Program and the DC Storm water program.

NatureVest has been formed to source and deploy \$1 billion of impact investment capital for measurable conservation outcomes, including green infrastructure for storm water reduction, debt for adaptation and water funds, in the next three years. However, most of these innovative mechanisms tend to increase in scale and size of investments when policy frameworks or legislation are in place, such as has been the case in Vietnam where the policy on PES has driven implementation of restoration and protection of ecosystems that secure specific benefits.



Seychelles debt restructuring for marine conservation and climate adaptation

This agreement between the Government of Seychelles and its Paris Club creditors uses impact investing in debt restructuring to support adaptation to climate change through improved management of coasts, coral reefs and mangroves.

The arrangement provides the Government of the Seychelles with an innovative financial tool to restructure its debt and, thereby, free-up capital streams and direct them toward climate change adaptation activities that includes the conservation of coastal and marine natural infrastructure to benefit fisheries and tourism industries, and ultimately the livelihoods of their citizens.

5 Insurance

Currently, insurance companies are advancing NI approaches through direct implementation of NI projects and/or supporting partnerships related to NI.

For example, Tokio Marine & Nichido Fire Insurance Co., Ltd. have been directly involved in planting 8,994 hectares of mangrove forests in nine countries across the Asia-Pacific region. As a result of this planting initiative, the company has achieved carbon neutrality in domestic operations every year since 2009. Multiple partnerships involving the insurance sector are also helping advance NI. For example, Zurich Insurance Group and the Zurich Foundation have partnered with the [Global Resilience Partnership](#) to address resilience of flood prone communities in the Sahel, the Horn of Africa, and South and Southeast Asia. In March of 2016, Prudential Financial announced that it would be investing \$1.7 million towards a new pilot collaboration between The Nature Conservancy and Encourage Capital called District Stormwater LLC (DS).

The investment will be used to finance the development of green infrastructure on properties in the District of Columbia that measurably reduce storm-water run-off through nature-based solutions. Lloyd's Tercentenary Research Foundation is funding a two-year research project led by University of California at Santa Cruz, The Nature Conservancy and the Wildlife Conservancy Society, to examine the factors that determine the role of coastal and marine habitats in damage reduction from flooding and surge and how nature-based defense systems can be incorporated into policy and industry and to quantify and emphasize the societal value that these ecosystems provide.

Risk Management Solutions and Guy Carpenter have also been engaged in this research. Swiss Re has also made commitments and conveyed their support for the importance of natural infrastructure in risk reduction (McLeod, 2015) and is working with The Nature Conservancy to demonstrate the cost-effectiveness of coastal ecosystems in risk reduction and climate adaptation, to support decision making around risk reduction, and to design new finance mechanisms to support greater investment in nature based on its risk reduction benefits²¹.

Partnerships have also formed to support implementation of risk reduction activities that influence the insurance business. For example, the largest agricultural insurer in South Africa, Santam, is providing support to Living Lands, an international nonprofit, to plant more than 3.7 million trees in an effort to reduce land degradation and restore the water catchment system that provides water to Port Elizabeth.

While these initiatives and partnerships signal considerable interest among the insurance sector, responses from our survey and interviews revealed that at this time the risk reduction benefits provided by NI are not being integrated systematically into insurance products. Some of the reasons given are that it is not clear who would pay for or benefit from insurance of NI and the challenges of measuring and quantifying the risk reduction benefits of NI in ways that are acceptable to the insurance industry. If these challenges could be overcome, multiple professionals in the finance and insurance sectors felt that NI could be a growth area given the potential of ecosystems to reduce risks. However, one example of how insurance is being used to incentivize NI is through the National Flood Insurance Program (NFIP) in the United States. The NFIP offers flood insurance to homeowners, renters, and business owners if their community participates by agreeing to adopt and enforce ordinances that meet or exceed FEMA requirements to reduce the risk of flooding. Insurance premiums through the NFIP are based on degree of risk in a community.

The coastal community of Avalon, New Jersey, became a member of the NFIP, which created an incentive for the community to increase the height of the dune systems as a barrier to flooding: the municipality's use of dunes to reduce risks of storm damage has decreased premiums by 10% (Nordstrom et al. 2002). While the purchase of insurance policies and products is not as widespread in many developing countries as in developed countries, insurance mechanisms in developing countries have been established through support of

multilateral institutions such as the World Bank and are helping reduce risks and impacts of disasters.

For example, the Caribbean Catastrophe Risk Insurance Facility, established in 2007, is the first multi-country risk pool in the world and was designed as a regional catastrophe fund for Caribbean governments to insure government risk. It is designed to limit the financial impact of catastrophic hurricanes and earthquakes by quickly providing participating governments with short term liquidity when a policy is triggered. A recent evaluation of approaches used for coastal risk reduction and adaptation- from building codes to NI restoration- found that reef and mangrove restoration were among the most cost-effective of all risk reduction approaches used in the region (CCRIF 2010).

Key opportunities for considerations

- Strategic partnerships between insurance companies and NGOs, such as those highlighted in this section, can be critical for advancing the understanding of the risk reduction benefits of NI, the value of those benefits and directly supporting risk reduction activities involving NI. These initiatives signal considerable interest in NI from within the insurance sector.
- Challenges that need to be overcome to increase the use and development of insurance products to advance NI include clarification of who would pay for and benefit from insurance of NI (this is especially the case where NI is being implemented on community or government lands) and rigorous, industry standard quantification of risk reduction benefits by NI, including a consideration of the variance of NI performance.

²¹ <http://www.nature.org/about-us/working-with-companies/companies-we-work-with/swiss-re.xml>

6 Recommendations

Drawing from the findings of this study, recommendations are outlined for advancing incentives and decreasing barriers to NI implementation.

These recommendations address: 1) engaging with local authorities on permitting requirements for NI; 2) engaging with insurance and finance institutions; and 3) advancing NI solutions and ecosystem-based disaster risk reduction through policies and financing. These recommendations target the business community, the wider community of NGOs and researchers working on NI, business and industry associations in different countries, and governments.

1. Engaging with local authorities on permitting requirements

Recommendations for the business community

a. Raise awareness among local permitting agencies of NI as a viable solution:

Several businesses and organizations that have implemented NI have demonstrated the important role they can play in facilitating permitting if they work alongside local agencies from the outset. For example, organizations have worked with permitting agencies to introduce and discuss new approaches to a solution, raise awareness of the physical effectiveness of NI and ensure the permitting process is manageable for implementers. These collaborations are especially important for new kinds of solutions that have not been tested before.

- For an example of how Dow has done this, see: http://www.naturalinfrastructureforbusiness.org/wp-content/uploads/2015/11/DowUCC_NI4BizCaseStudy_ConstructedWetlands.pdf

b. Co-develop guidance with local authorities on NI implementation:

Business is also working alongside agencies to provide and/or co-develop guidance materials on how NI projects can be implemented. Guidance includes technical and regulatory information related to implementation and permitting of NI, as well as information about the benefits of NI solutions.

- For an example of guidance on living shoreline implementation, co-developed by national and local governmental bodies and business, see “Weighing your options”: <http://nosb.org/wp-content/uploads/Weighing-your-Options-Final-5x7-11-18-15.pdf>

c. Promote and request streamlined permitting processes with local governments:

Permitting of NI projects, including hybrid approaches, can be a more difficult process than for gray infrastructure projects (Sutton-Grier et al. 2015). It is time consuming and challenging to get multiple permits from different agencies, particularly for more complex projects. Business can advocate with local agencies and NGOs for streamlined policies to support more efficient permitting of NI projects.

- The Coastal Concordat provides an example of how this might be done and can be found at <https://www.gov.uk/government/publications/a-coastal-concordat-for-england>
- The Pew Charitable Trust along with other organizations in the US has been advocating for a streamlined permitting process at the Federal Level to support NI implementation: <http://www.pewtrusts.org/en/research-and-analysis/analysis/2016/06/01/army-corps-of-engineers-releases-living-shoreline-permit>
A description of the new national living shorelines permit in the United States that Pew Charitable Trust and others supported that will streamline NI permitting for coastal protection across federal and state levels: <http://www.coastalreview.org/2017/01/corps-eases-living-shoreline-permit-process/>

d. Work within policy frameworks that already exist to facilitate implementation of NI solutions:

Permitting and implementation will be easier when a NI project can demonstrate that it is supporting government goals outlined in policy

directives or frameworks. For example, permitting has not been a barrier for green infrastructure implementation in Washington, DC because a policy framework related to storm water reduction was already in place to promote these approaches. Similarly, it is important for businesses to know and understand the local policy directives within which their NI project aligns and/or supports to facilitate approvals and permitting processes. For example, the Restore the Earth Foundation project was implemented on U.S. Fish and Wildlife Service land and was supporting their conservation goals, so, no additional permitting was necessary for the project.

Recommendations for business and the wider community advancing NI solutions

a. Share and disseminate experiences on permitting challenges and opportunities within different countries:

Each country will have different permitting requirements that will need to be understood and navigated and these can be extremely complex in different places. Businesses operating in a specific country will benefit from sharing their experiences and successes with each other, local governments and with other organizations supporting NI implementation. Multiple platforms related to NI information sharing could be leveraged and integrated to address specific issues such as permitting and financing.

- Examples of information sharing platforms for NI that could be integrated and targeted to support information sharing on specific issues: http://ec.europa.eu/environment/nature/ecosystems/docs/green_infrastructures/GI%20Final%20Report.pdf

6. Recommendations *continued*

2. Engaging with insurance and finance institutions

Recommendations for governments and business, particularly the finance sector

a. Test and evaluate the effectiveness and benefits of new models and partnerships for financing of NI:

Piloting new models such as Debt for Adaptation models, Storm Water Retention Trading Credits and Payments for Ecosystem Services may represent ways to sustainably finance NI and risk reduction, generate revenue/cost-savings, attract more investment for NI and can lay the foundation for the development of new finance/ insurance products that support NI. Many of these mechanisms require coordination across business, particularly the finance sector, and government.

- Examples of pilot projects and collaborations around NI involving government and the private sector can be found at: <https://www.whitehouse.gov/the-press-office/2016/03/07/fact-sheet-2-billion-new-private-sector-investments-protect-natural>

Recommendations for governments, donors/philanthropies and NGOs working with business on NI

a. Convene key NI stakeholders to identify knowledge gaps needed to increase finance and insurance activity in NI:

The most commonly cited barrier to increased financing and insurance for NI was around the physical performance of NI and the business case for NI. Much work in these areas has been done by the research community and NGOs, such as WBCSD, but it may not have reached many finance or insurance professionals and/or may not have been translated into metrics that resonate with different sectors. Thus, it will be important to bring different groups together to identify

knowledge gaps on NI pertinent to the finance and insurance sectors, address how issues of variance can be addressed, translate scientific understanding into metrics of importance for the finance and insurance sectors, and address if/how knowledge gaps and challenges can be overcome.

- Collaborations between scientists at TNC and Swiss Re demonstrate how these issues can be addressed: <http://www.nature.org/about-us/working-with-companies/companies-we-work-with/swiss-re.xml>.

b. Engage a range of investors to identify how to overcome scaling challenges:

The small-scale of NI projects was mentioned in this study as a major barrier impeding institutional investment in NI. Engagement between NI proponents and both impact and institutional investors is necessary to assess how financing challenges related to the small scale of NI projects can be overcome through public-private partnerships, concessionary funding, bundling/aggregating multiple projects, and/or creating regional level projects that benefit multiple stakeholders. Philanthropies and donors can play an instrumental role in convening different types of investors to address these challenges.

- Possibilities for attracting more private investment in large-scale NI projects, such as a trans-European Green Infrastructure network, can be found at http://ec.europa.eu/environment/nature/ecosystems/docs/green_infrastructures/GI%20Final%20Report.pdf.

c. Connect sustainable finance networks to bring lessons to bear on NI financing:

Convening and connecting multiple networks such as the Conservation Finance Alliance, Biodiversity Finance Initiative (BioFin) and Natural Capital Finance

Alliance (formerly the Natural Capital Declaration) could be extremely useful for sharing lessons learned around scaling of different kinds of NI projects to a size that would be attractive to mainstream investors and for securing additional revenue streams from NI. In addition, encouraging more coordination of funding and implementation of nature-based projects could help limited funds go much further.

- The Natural Capital Finance Alliance addresses financing challenges relevant to NI <http://www.naturalcapitaldeclaration.org/>

3. Advancing NI solutions and ecosystem-based disaster risk reduction through policies and financing

Recommendations for national and industry organizations representing business

a. Advocate for policy frameworks that encourage or incentivize consideration of NI:

Businesses and national business councils for sustainable development should advocate for and support national and sub-national policy frameworks that facilitate the equal consideration of NI as part of a holistic strategy for securing services or benefits that are typically provided by gray infrastructure in the countries where they are working. Examples of enabling policy frameworks include the Strategy for Green Infrastructure in the EU, the Maryland Living Shoreline Protection Act in the United States and the National Coastal Greenbelt Action Plan in the Philippines, which encourage the consideration and use of NI for coastal protection and risk reduction. These kinds of policies can expedite permitting and can help catalyze financing for NI.

- For an example of how policies can be used to reduce disaster risk and secure other benefits, see <http://www.bamaquino.com/senate-bill-no-2179-national-coastal-greenbelt-act-of-2014/>

b. Convey local business support for NI solutions for risk reduction to local governments and international agencies:

Much of the push for NI mainstreaming and implementation has come from the NGO community. However, the business community has an important role to play with respect to advocating for the cost-effectiveness and performance of NI to local governments in the countries where they are working and to international organizations, such as the World Bank. The experience and support of business for NI will help raise the importance of NI as a solution among different government and multi-lateral agencies who can have significant influence over financing and permitting.

- Companies such as Entergy in the Gulf Coast of the US are demonstrating how important NI is for risk reduction in the communities where they work through their support for local NI restoration projects²², <http://www.entergy.com/environment/adaptation.aspx>

c. Quantify the business benefits of NI for climate change adaptation and risk reduction to increase financing options:

NI can be as physically effective as gray infrastructure and more cost-effective than gray infrastructure, which will be increasingly expensive to maintain with climate change (Naryan et al 2016, Hinkel et al 2012). Resilient infrastructure projects are typically supported by federal, state, or local funds, and data analysis on the risk reductions is rarely done at a level of detail required to support access to capital market financing, which is needed to scale up NI projects to

meet the need (Vajjhala and Rhodes, 2015). As businesses quantify and share details of the business case of NI for risk reduction, including cost-savings for implementation and maintenance, it will be important to share this information with government, with local business communities and development agencies working within countries to increase investor confidence in NI solutions for risk reduction. This will be an important priority particularly in the context of financing ecosystem based disaster risk reduction strategies.

Recommendations to the wider community of NGOs and business working on NI

a. Demonstrate how NI can help governments achieve their policy and development and risk reduction goals:

Demonstrating how NI can support policy directives and commitments related to sustainable development, including commitments to the SDGs, for example, will be important to mainstreaming NI into a range of development and planning decisions in different regions and countries. Multiple examples from this study have shown that demonstrating how NI supports existing policy frameworks and commitments makes permitting and financing easier.

- The SDGs provide a useful framework for identifying NI contribution to sustainable development and providing multiple co-benefits: <https://sustainabledevelopment.un.org/sdgs>
- The Sendai Framework for Disaster Risk Reduction can be used to demonstrate how NI can support risk reduction priorities <http://www.unisdr.org/we/coordinate/sendai-framework>

²² <http://restoretheearth.org/2016/10/25/press-release-restore-the-earth-foundation-breaks-ground-on-one-million-acre-landscape-scale-restoration-project/>

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List of Contributors

We are grateful to the following experts and practitioners, who participated in the interviews:

Mark Weick	Lead Director, Sustainability and Enterprise Risk Management	The Dow Chemical Company
Jim Bays	Technology Fellow and East Region Technology Leader	CH2M
Jon Weier	Ecologist, Practice Leader, and Principal Technologist	CH2M
Courtney Lowrance	Global Head, Environmental and Social Risk Management	Citi Bank
Eron Blomgarden	Partner	Encourage Capital
Sofia Bettencourt	Lead Adaptation Specialist for the Global Facility for Disaster Reduction and Recovery (GFDRR)	World Bank Disaster Financing
Guillermo Franco	Managing Director & Global Head of CAT Risk Research	Guy Carpenter
Johan Lammerant	Lead Natural Capital and Biodiversity Expert	Arcadis
Bregje Von Weesenbeck	Senior Researcher/Advisor	Deltares
Bedanga Bordoloi	Manager	EY/Kuwait
Guy Edgar	Senior Manager	EY/Australia
Fred Papillon	Director	EY/Australia
Fabrice Renaud	Head of Section/ Institute for Environment and Human Security	UN PEDDR/United Nations University
Adam Ichikawa	Section Manager at CSR Department Role; CSR Communication	Sompo Japan Nipponkoa Insurance Inc.

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Dr. Velislava Ivanova, Principal, EY

Dr. Carter Ingram, Senior Manager, EY

Vish Patel, Senior Consultant, EY

This study was managed by:

Violaine Berger, former Director, Ecosystems and Landscape Management, WBCSD

Tatiana Fedotova, Director, Water, WBCSD

Anais Blasco, Manager, Natural Capital, WBCSD

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World Business Council
for Sustainable Development

Maison de la Paix
Chemin Eugène-Rigot 2B
CP 2075, 1211 Geneva 1
Switzerland
www.wbcsd.org

