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ENVIRONMENT AND BIODIVERSITY SECTOR FRAMEWORK DOCUMENT

ENVIRONMENT, RURAL DEVELOPMENT,
AND DISASTER RISK MANAGEMENT DIVISION

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CONTENTS

ABBREVIATIONS

BIO	Special Program for Biodiversity and Ecosystem Services
CPE	Country Program Evaluation
DEM	Development Effectiveness Matrix
EBM	Ecosystem-Based Management
EIA	Environmental impact assessment
EPI	Environmental Performance Index
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FANP	Protected Areas Endowment Fund
GDP	Gross domestic product
GEF	Global Environmental Facility
IAIA	International Association for Impact Assessment
ICZM	Integrated Coastal Zone Management
IDB	Inter-American Development Bank
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
LAC	Latin America and the Caribbean
LME	Large Marine Ecosystems
MPA	Marine Protected Area
MSP	Marine Spatial Planning
OECD	Organization for Economic Cooperation and Development
OVE	Office of Evaluation and Oversight
PAH	Polycyclic aromatic hydrocarbon
PCR	Project Completion Report
PES	Payment for ecosystem services
PRTR	Pollutant release and transfer registers
REDD+	Reducing Emissions from Deforestation and Forest Degradation
SEA	Strategic environmental assessment
SEEA	System of Environmental-Economic Accounting
SFD	Sector Framework Document
SIDS	Small Island Developing States
SLCP	Short-lived Climate Pollutants
UNEP	United Nations Environment Program
WHO	World Health Organization

EXECUTIVE SUMMARY

i. The Environment and Biodiversity Sector Framework Document (SFD) orients the IDB's work on policies and actions for environmental sustainability. The SFD seeks to address cross-cutting environmental challenges with a holistic approach that recognizes the linkages between the environment, economic growth and social inclusion. To achieve high levels of environmental sustainability, evidence shows countries must: (i) enhance their supply and protection of ecosystem services, which are an engine of economic growth and sustainable livelihoods, especially for the most marginalized populations; (ii) reduce environmental pollution and degradation to improve the health and quality of life of their inhabitants; and (iii) improve their environmental governance systems to promote policy coherence and access to environmental information.

ii. The Latin American and Caribbean (LAC) region has abundant natural capital wealth held in its terrestrial, coastal and marine ecosystems. Therefore, the region's natural capital is one of its greatest assets; and if harnessed effectively, a powerful engine of sustainable economic development.

iii. This SFD presents information on the status of LAC terrestrial, coastal and marine ecosystems, the services they provide, and on the effectiveness of instruments to tackle the main challenges of the region:

iv. **Challenge 1: Habitat destruction and overharvesting/exploitation of resources**. The region still faces pressures for land use change, mainly due to commercial agriculture. Between 1990 and 2015, LAC's forested area was reduced from 51% of its land area to 46.3%, at a rate twice the world average. Growing demand for irrigated land, large infrastructure projects, and the rapidly increasing urban population are also compromising water security and increasing land degradation. Moreover, about half of the entire LAC population lives less than 100 km from the coast, putting pressure on coastal areas and marine resources. As many as 40% of mangrove species are threatened with extinction in the Atlantic and Pacific coasts of Central America. Moreover, 66% of LAC coral reefs are damaged and an additional 20% is projected to be lost over the next 20 years.

v. Although LAC has been successful in enacting new terrestrial and marine protected areas (i.e., since 1990, the protected area surface in LAC has grown to exceed 20% of the territory), evidence shows that protected areas in the region are poorly managed and insufficiently financed. Interventions such as public-private co-management arrangements, co-management by local communities, Payment for Ecosystem Services (PES) mechanisms, sustainable management practices from production, manufacturing and retailing of timber and non-timber products, establishment of new networks of marine protected areas to enhance protection outside their boundaries, and nature tourism have potential for contributing to enhancing natural capital and ecosystem services, when strong institutional capacity and regulation is also present. This potential will only materialize when countries comprehensively mainstream the importance of natural capital and the ecosystems services it provides in long-term planning strategies and across sectoral policies.

vi. To this end, the Bank's work will focus in two lines of action: (i) promote an integrated management of terrestrial, coastal and marine ecosystems with investments that aim to

protect and enhance natural capital assets; and (ii) promote systematic mainstreaming of the environment in productive sectors. The latter requires crosscutting, multisector interventions, both within the Bank and at the interagency level in the countries, on issues such as natural resource management and conservation, urban sanitation, land tenure security, integrated water resources management, and climate change, among others.

vii. **Challenge 2: Water, Soil and Air Pollution**. Pollution, along with climate change, is a major challenge to maintaining ecosystems health and vitality. Wastewater from urban and industrial areas, diffuse pollution primarily by use of pesticides and fertilizers in agriculture, and salinization are problems affecting LAC bodies of water and marine ecosystems. Moreover, pollution is a major cause of higher morbidity and mortality rates worldwide, including the LAC region. Evidence shows premature deaths from ambient pollution have increased from 131,000 to 173,000 over the period 1990-2015 in LAC, while related labor losses were US$9.2 billion in 2015.

viii. Marginalized urban and rural populations, including children, women, indigenous and natural capital-dependent communities, are the most affected and exposed to pollutants, natural disasters, and environmental degradation. A clean environment, the integrity of natural capital, and the ecosystem services it provides are critical to the quality of life of many.

ix. Therefore, two lines of action of this SFD are specifically directed to improving lives of LAC inhabitants: (i) invest in pollution management in air, water and soil and raise awareness on health-related pollution impacts; and (ii) promote investments to reduce threats and the vulnerability of exposed populations.

x. **Challenge 3: Gaps in environmental governance**. Evidence shows that the quality of environmental governance, the involvement of civil society and the availability of timely and high-quality environmental information enhances environmental sustainability. Moreover, integrating environmental considerations into sectoral policies and across levels of governance is essential to bridge tensions between environmental and economic targets. In most LAC countries, however, institutional capacity is low, the enforcement of the regulatory framework is weak, the environmental information is insufficient, and the use of economic instruments to control pollution and manage natural capital is limited.

xi. The lines of action to enhance environmental governance are: (i) strengthen and improve the performance of environmental governance systems at the regional, national and subnational level for the application of environmental regulations and standards, strategic management, and monitoring, oversight, and enforcement of the law; (ii) improve policy coherence among sectoral and environmental policies to effectively address environmental considerations; and (iii) increase involvement of civil society and its access to environmental information.

I. THE SECTOR FRAMEWORK DOCUMENT IN THE CONTEXT OF EXISTING REGULATIONS AND THE INSTITUTIONAL STRATEGY 2010-2020

A. The Environment and Biodiversity Sector Framework Document as part of existing regulations

1.1 The Environment and Biodiversity Sector Framework Document has been developed in accordance with document "Strategies, Policies, Sector Frameworks, and Guidelines at the IDB" (GN-2670-1), which governs the strategies, policies, sector frameworks, and guidelines for the IDB's knowledge generation activities, country dialogue, and operational work concerning the environment. This Sector Framework Document (SFD) aims to provide specific yet flexible guidance to accommodate the diverse challenges and institutional contexts faced at different levels by the IDB's 26 borrowing member countries on environmental issues, applicable to IDB financing for sovereign guaranteed and non-sovereign guaranteed operations.

1.2 This SFD is based on the mainstreaming principles and guidelines of the: (i) Environment and Safeguards Compliance Policy (Operational Policy OP-703); (ii) Indigenous Peoples Policy (OP-765); and (iii) Disaster Risk Management Policy (OP-704). Whereas the above referenced are policy documents applicable to all IDB interventions, this SFD is not a normative policy document. Instead, this document offers strategic guidance in setting operational and analytic priorities.

B. The Environment and Biodiversity Sector Framework Document and the IDB Institutional Strategy

1.3 This SFD is consistent with the Update to the Institutional Strategy 2010-2020: Partnering with Latin America and the Caribbean to Improve Lives (AB-3008), which incorporates climate change environmental sustainability as one of the LAC region's three cross-cutting challenges. Therefore, the IDB includes actions to ensure environmental sustainability in all areas of work.

1.4 This SFD falls within the framework of the "IDB Integrated Strategy for Climate Change Adaptation and Mitigation, and Sustainable and Renewable Energy" (GN-2609-1), particularly in sustainable management of natural resources.

1.5 This SFD is also associated with the "Sustainable Infrastructure for Competitiveness and Inclusive Growth: IDB Infrastructure Strategy" (GN-2710-5), which highlights natural capital and environmental quality as factors contributing to competitiveness, revenue generation, green infrastructure development, and a better quality of life for the population, particularly for vulnerable groups.

1.6 In operational terms, this SFD relates to the following sector framework documents: (i) Agriculture and Natural Resource Management (GN-2709-5), which addresses the role of sustainably harvested natural resources as inputs to crop farming, livestock, forestry, and fishing activities; (ii) Tourism (GN-2779-7), which identifies tourism, when effectively planned and managed, as an instrument for environmental and biodiversity conservation; (iii) Water and Sanitation (GN-2781-8), which highlights the importance of ecosystem services in water resource management; (iv) Transportation (GN-2740-7), Energy (GN-2830-3), and Climate Change (GN-2835-3), which set priority actions that reduce air pollution and greenhouse gas emissions; (v) Integration and Trade (GN-2715-6), which recognizes the importance of environmental standards to prevent spurious regional competition; (vi) Health and Nutrition (GN-2735-7), which recognizes pollution, and other environmental factors, as determinants of human health; and (vii) Gender and Diversity

(GN-2800-8), which identifies gender equality and development as crosscutting themes for sustainable natural resource and risk management

1.7 This SFD reflects environmental sustainability principles consistent with the multilateral agreements, conventions, or international treaties on environmental sustainability to which the region's countries have acceded. Globally, the 2030 Agenda for Sustainable Development, agreed by the 193 States Members of the United Nations in September 2015, develops a framework for "achieving sustainable development in its three dimensions –economic, social and environmental– in a balanced and integrated manner" (UN, 2015). The 2030 Agenda features the environmental dimension as the foundation to achieve many of its 17 Sustainable Development Goals (SDGs) and its associated targets.[1]

1.8 For purposes of this SFD, and consistent with the Environment and Safeguards Compliance Policy (Operational Policy OP-703), the term "environment" is defined in its broadest sense, to include natural (physical/biotic) factors as well as associated social factors. Similarly, the term "natural capital" refers to the terrestrial and marine ecosystem components, including biodiversity, that contribute to the generation of valuable goods and services for humankind now and in the future (Guerry et al., 2015). Thus, the SFD supports sustainable development by integrating biodiversity and ecosystem services into economic sectors, promoting means to a clean environment, and mainstreaming and applying sustainability criteria in all IDB financing sectors investments. The IDB's work is based on principles of competitiveness, social inclusion, and enhancing inter-generational wealth.

1.9 In implementing this SFD, the IDB seeks to adapt interventions to the specific needs, national policies, and demands of each country, as well as to the special features of each client, considering the geographic, social, and cultural heterogeneity of the LAC region. Thus, the intention of this SFD is not to set limits, rather it is a strategic and indicative document. The specific nature of the interventions will be determined as outcomes of dialogue with the countries.

1.10 **Roadmap of the SFD.** The SFD covers a breadth of information with sufficient depth to inform the IDB's engagement in environment and biodiversity in LAC. The SFD is articulated under three overarching challenges: (i) habitat destruction and overharvesting/exploitation of resources; (ii) air, water and soil pollution; and (iii) gaps in governance. Section II.A presents the conceptual framework which establishes as a core idea that there is a relationship between natural capital and economic growth. Section II.B starts with key evidence from both within and outside LAC on the effectiveness of the main instruments and necessary conditions to achieve sustainable use of natural capital from both terrestrial and coastal/marine ecosystems. Namely, the management of protected areas, the existence of property rights, the use of economic instruments such as payment for ecosystem services, and finally a revision of integrated planning instruments for coastal and marine ecosystems. Next, a subsection dedicated to pollution follows in which the SFD presents evidence on how firms can bolster economic performance considering environmental policies and analyzes the effectiveness of instruments for pollution abatement. Section II.B closes with a discussion of the importance of strong governance and mainstreaming environmental considerations in productive sectors for enhancing environmental performance. Section III provides a description of the status of natural capital and ecosystem services, focusing in on the three challenges for the LAC region.

[1] Over half of the SDGs are directly related to the environmental dimension: poverty, health, food and agriculture, water and sanitation, human settlements, energy, climate change, sustainable consumption and production, oceans, and terrestrial ecosystems. 86 targets are related to environmental sustainability, including at least one in each of the 17 SDGs (UNEP, 2016).

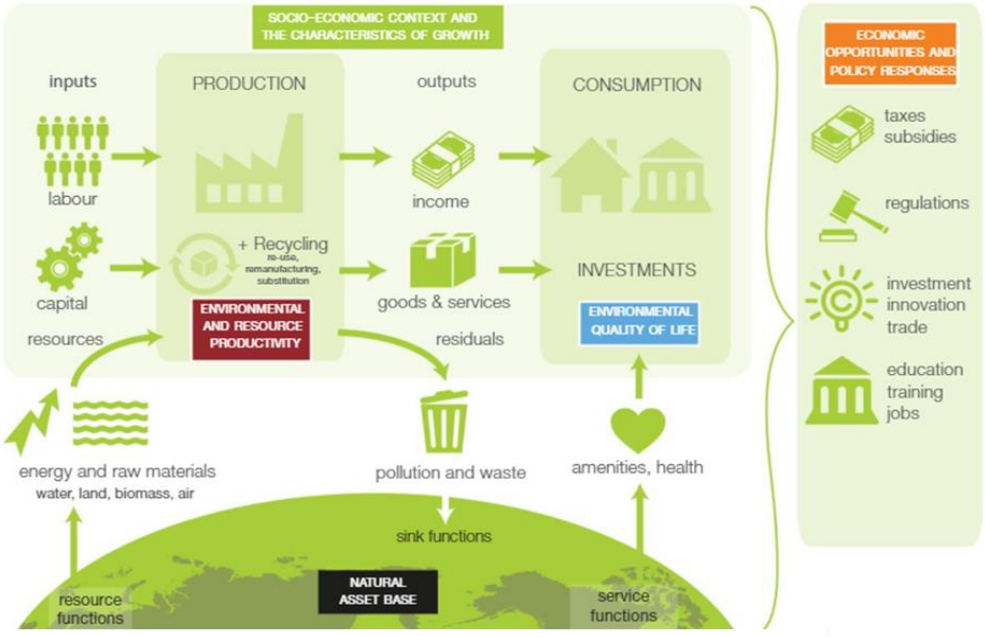
Section IV of the SFD synthetizes lessons learned from the IDB's operations directly in the environment and biodiversity and in its mainstreaming of environmental considerations in sectoral operations. The section closes with a reflection on the IDB's comparative advantage in the environment and biodiversity. Finally, Section V outlines the IDB's goals and principles, dimensions of success and lines of action in the environment and biodiversity.

II. Examining the International Evidence on the Effectiveness of Environment and Biodiversity Policies and Programs and Implications for the Bank's Work

A. Conceptual Framework

2.1 Natural capital or ecosystem assets are comprised of the naturally occurring living and non-living components of the Earth (European Commission et al., 2013). Natural capital includes assets in terrestrial, coastal and marine areas that generate flows of ecosystem services that benefit people. These ecosystem services are classified as provisioning services (e.g., water, food and fiber), regulating services (e.g., atmospheric and hydrological regulation), and recreation and cultural services (e.g., tourism and acquisition of knowledge) (Haines-Young and Potschin-Young, 2018). Figure 1 illustrates how natural capital assets and the flow of ecosystems services contribute to production and quality of life which are the basis for sustainable economic growth.

Figure 1. Natural capital assets as the basis for economic growth



Source: OECD, 2018

2.2 In a conventional view of the economy, output is the product of capital and labor. Generally omitted from this view are natural capital and ecosystem services, particularly those that have no price and whose property rights are difficult to define, assign and enforce. In the absence of prices, natural capital and ecosystem services are used and consumed at levels that may not be socially optimal. Government policy must consider the contribution of natural capital and ecosystem services to current and future economic prosperity.

2.3 The degradation of natural capital and the loss of ecosystem services also pose real costs to economies through their impact on productivity, health and environmental remediation. For instance, these costs have been estimated at up to 3% of GDP in Colombia and Peru (World Bank 2006, 2007). Thus, sustainable development requires the full cost of environmental harm to be explicitly considered in governments, firms and households decisions (Guerry et al., 2015; Daily et al., 2009).

2.4 **The wealth paradigm**. Traditional metrics for measuring economic development such as Gross Domestic Product (GDP), while capturing income flows, fail to inform us of the sustainability of a country's economic growth (K. Arrow et al., 2004; Stiglitz, Sen, & Fitoussi, 2010; Lange et al., 2018). Therefore, this SFD reframes the relationship between the environment, economic growth and competitiveness by acknowledging that sustainable economic development requires that current and future generations have enough assets, including natural capital, to empower them to prosper. This integrated view of how current and future well-being hinges on natural capital and ecosystem services is embodied in the Sustainable Development Goals and the Paris Agreement, two major commitments to which all countries of the region are signatories.

2.5 **Measurements of comprehensive wealth aim to capture changes in stocks and condition of natural capital and ecosystem service flows**. Comprehensive wealth is comprised of all capital assets, namely natural capital, manufactured capital and human capital (K. Arrow et al., 2004; K. J. Arrow, Dasgupta, Goulder, Mumford, & Oleson, 2012; Stiglitz, Sen, & Fitoussi, 2009; Stiglitz, Sen, & Fitoussi, 2010). In this view, sustainable development is an economic trajectory where intergenerational well-being is stable or increasing (Arrow et al., 2012). To effectively manage a country's economic development and assess progress toward sustainable development, it is imperative to have the ability to measure changes to the quantity and condition of a country's asset base.

2.6 This quantification is challenging, though proximate metrics are within reach as methods and data improve. The first international standard for environmental-economic statistics, the System of Environmental-Economic Accounting (SEEA) Central Framework (United Nations et al., 2014a), was published in 2014 and is on par with the System of National Accounts. Complementing the SEEA is the Experimental Ecosystem Accounting framework which links ecosystems with economic and other human activities (UN et al., 2014b). Just as the System of National Accounts has been fundamental to economic development planning since World War II, the SEEA can now contribute robust information describing the interactions between the environment and the economy.

B. Confronting the Challenges for Preserving Natural Capital

2.7 Governments can help preserve their natural assets through command and control measures and economic instruments (Blackman and Harrington, 2000, Coria and Sterner 2011). Command and Control policies directly regulate activities through legislation, for example, through emissions standards or land use restrictions. Economic instruments such as Payment for Ecosystem Services (PES) by contrast, are designed to create economic incentives to induce a desirable behavior (for instance, stop or reduce exploitation of a resource). Table 1 provides an overview of some of the most common command and control and economic instruments.

Table 1. Command and Control and Economic instruments

Type of Regulation	Regulatory Instrument	Direct	Indirect
Formal	Command and Control	Emissions standards Land use restrictions (protected areas)	Technology standards Control of stationary and/or mobile sources (e.g., License plate-base driving restrictions)
	Economic instruments	Emission fees Tradable permits[2] PES Certification of products Right-Based Management (fisheries) Mitigation or species banking	Taxes Subsidies Credit incentives
Informal	Public disclosure and voluntary policies		

Source: Adapted from Blackman and Harrington, 2000 and Blackman, 2010.

2.8 The section that follows presents evidence of the effectiveness of the most used instruments to address: (i) habitat destruction and overharvesting/exploitation of resources; and (ii) air, water and soil pollution. This is followed by a discussion of gaps in governance.

1. Habitat destruction and overharvesting/exploitation of resources

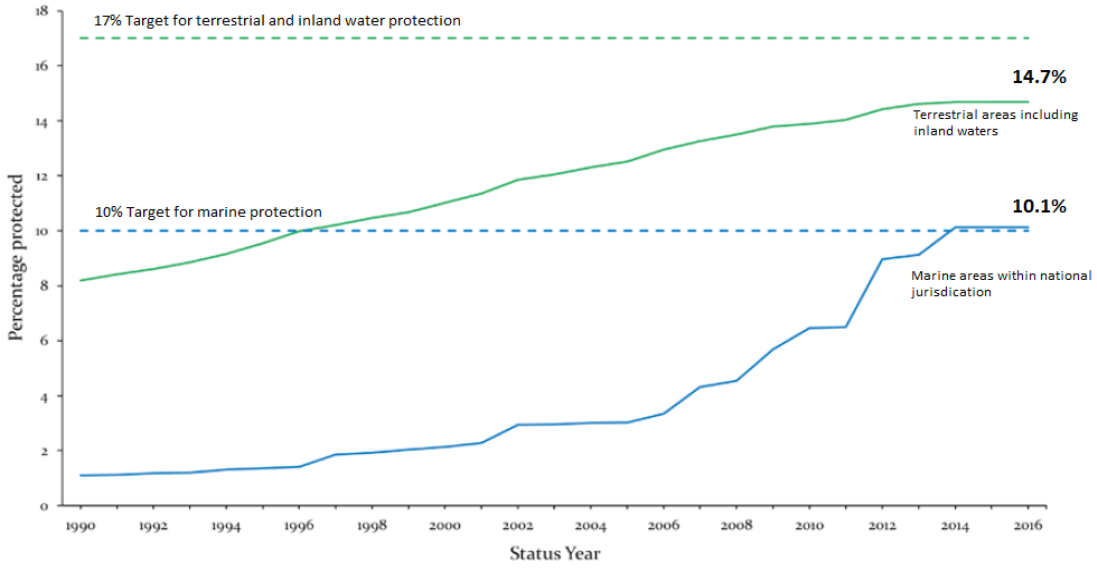
a. Terrestrial ecosystems

2.9 **Habitat conversion driven by unsustainable agriculture, logging and changes to freshwater systems present the greatest threat to the environment and biodiversity.** Globally, 51.4% of the planet's terrestrial area was converted to human-dominated land use by 2009. Over nine percent of this area was converted in the period 1993 to 2009. Over 90% of mangrove and tropical and subtropical forests were converted by 2009 (Watson et al., 2016). Given their suitability for agriculture, almost 46% of grasslands were converted by 2000, (Hoekstra et al., 2005), while an estimated 87% of wetlands have been lost in the last 300 years (Davidson, 2014). Habitat conversion is the principal driver of the 58% decline in vertebrate population since 1970, followed by overexploitation (WWF, 2016).

2.10 **Protected areas can be effective instruments for conservation when adequately funded and managed, and when part of an integrated management approach.** Protected areas are an important instrument for conservation worldwide. Aichi Target 11 aims to conserve 17% of terrestrial and inland water areas and 10% of coastal and marine areas, particularly those of importance for biodiversity and ecosystem services. Globally in 2016, there was 14.7% of protected terrestrial and inland water areas amounting to 19.8 million km^2. To achieve Aichi Target 11, an additional 3.1 million km^2 would need to be designated as protected area. As for representativeness, less than half of the planet's 823 terrestrial ecoregions have 17% of their total extent covered by protected areas while less than 20% of Key Biodiversity Areas are under complete protection (UNEP-WCMC and IUCN, 2016) (see Figure 2).

[2] Tradable permits are a combination of command and control and economic instruments since the aggregate use of the resource (or pollution) is capped.

Figure 2. Evolution of terrestrial and marine protected areas globally, 1990 to 2016



Source: UNEP-WCMC and IUCN, 2016

2.11 There is evidence that terrestrial protected areas can reduce deforestation in certain contexts (Joppa and Pfaff, 2010; Andam et al., 2008; Nelson and Chomitz, 2011). The International Union for Conservation of Nature (IUCN) defines six categories of protected areas according to its management objectives: (i) Category I: Strict Nature Reserve (Category Ia) and Wilderness Area (Category Ib); (ii) Category II: National Park; (iii) Category III: National Monument; (iv) Category IV: Habitat/Species Management Area; (v) Category V: Protected Landscape/Seascape; and (vi) Category VI: Protected Area with Sustainable Use of Natural Resources.[3] With except of Category Ia, all categories allow for human interaction. Based on available data, Categories I-IV are the most common globally, accounting for 48% of protected areas with Habitat/Species Management -Category IV- being the most common (28%). Eighty-four percent of protected areas are governed by governments, 4.5% through private governance, 1.8% shared governance and 0.6% are governed by indigenous people and local populations (UNEP-WCMC and IUCN, 2016) (see Table 2).

[3] For a more detailed explanation of the categories of protected areas, visit: https://www.iucn.org/theme/protected-areas/about/protected-area-categories

Table 2. Protected area categories and types of governance

Type of Governance	Strict Protection					Non-Strict	
	I.a. Strict Nature Reserve	I.b. Wilderness Area	II. National Park	III. National Monument	IV. Habitat/ Species Management	V. Protected Landscape/ Seascape	VI. Protected Area with Sustainable Use of Natural Resources
Government – National, sub-national or government-delegated management (e.g., to an NGO)							
Shared governance – Transboundary, collaborative or joint governance (co-management)							
Private governance – Individual landowners, non-profit organizations (e.g., NGOs or universities), and for-profit organizations (corporate landowners)							
Indigenous people and local communities							

Source: UNEP-WCMC and IUCN., 2016.

2.12 Nelson and Chomitz (2011) find that in LAC deforestation has been reduced by 3% using fire incidence as a proxy in strict protected areas; by 5% in non-strict protected areas; and by 16% in protected areas within indigenous territories. Similarly, Pfaff et al. (2013) consider various forms of protected areas in the State of Acre in Brazil and find that more deforestation was avoided in sustainable use protected areas than in strict protected areas. Blackman (2015) finds that in Guatemala's Maya Biosphere Reserve, multiple use protected areas are more effective in reducing deforestation than strict protection, though the effects may be smaller than those revealed when nonrandom siting is not controlled for. Pfaff et al. (2013) also indicate that threats of deforestation vary as economic and social conditions evolve, thus the effectiveness of a given category of protected area will depend on the specific conditions the protected area faces.

2.13 Regardless of the protected area category, adequate funding[4] and strong governance are critical for ensuring the effectiveness of protected areas. As indicated by Blackman et al. (2015), while protected areas have increased over the past three decades, many of them lack financial, human and technical resources required for effective conservation. Bruner et al. (2001), for example, found that protected area effectiveness correlates with basic management including enforcement. The authors indicate that significant gains in enforcement are possible through increased funding. In the case of Mexico's protected areas, Blackman et al. (2015) found that while protected areas can have conservation benefits even when under-funded; these underfunded areas can lead to increased deforestation where a lack of management creates conditions of perceived open-access. By 2015, only 17.5% of countries globally completed an effectiveness assessment for 60% of the reserves in their protected areas (UNEP-WCMC and IUCN, 2016). More

[4] Barbier et al. (2018) recommend designing a Global Agreement for Biodiversity to overcome the funding gap to achieve Aichi Targets. In the Global Agreement for Biodiversity, modeled on parameters similar to those of the Paris Agreement, companies and industries that benefit from natural capital and its ecosystem services are involved in establishing the targets for terrestrial, marine and coastal habitat and biodiversity conservation, and contribute to the financial needs for their conservation. The underlying idea of such a proposal is something that should be further explored to understand its feasibility and limitations.

protected area management effectiveness assessments are needed to understand their contribution to reducing habitat destruction.

2.14 While protected areas have increased in every region globally in the last two decades, the extent of forests has declined by 4% in the world, and in Latin America by 7%, largely driven by forest conversion to agriculture and other land uses (Lange et al., 2018). The sustainability of protected areas is also threatened by a phenomenon called Protected Area Downgrading, Downsizing and Degazettement (PADDD) (Pack et al., 2016). Mascia and Pailler (2011) found that PADDD can reduce legal protections of protected areas by: (i) allowing more human activity within them (downgrading); (ii) reducing their extension (downsizing); or (iii) eliminating their protected status (degazettement). PADD is particularly relevant to countries with large protected areas such as the Brazilian Amazon, where PADD events occurred in 6% of the potential protected area estate to allow hydropower projects and human settlements (Pack et al., 2016). Further research is needed to understand the drivers of PADD events and its effects on long-term conservation objectives.

2.15 To manage these threats, several studies suggest protected areas should be integrated in a landscape management approach that considers the interactions with related-productive systems and their relationship with the territory (DeFries et al., 2005; Dourojeanni and Quiroga, 2006; Bovarnick et al., 2010; Leverington et al., 2010; IUCN and Biodiversity Indicators Partnership, 2010).

2.16 **Clearly defined property rights and land tenure can reduce deforestation and improve management, but impacts are context-specific.** Several studies have emphasized that the lack of property rights and/or tenure security are important determinants of deforestation and overexploitation of fishery resources in LAC (Castilla and Defeo, 2001; Larson et al., 2006; Pacheco et al., 2008; and Locatelli et al., 2014). There is a well-developed literature that has found that clearly defined property rights and tenure security promote a more productive and sustainable use of resources and foster long-term investments (Kaimowitz, 1996; Triana et al., 2007; Barbier et al., 2011).

2.17 However, a more nuanced view of the impact of land tenure on environmental outcomes is emerging, suggesting that its impact is linked to various socioeconomic factors and governance and that the type of land tenure matters in different ways in different regions. For example, public land is particularly vulnerable to deforestation in South America; communal tenure was found to perform well in Central America, though not so well in Africa. Furthermore, while land tenure can consist of different configurations of rights, the security of tenure was found to be more critical. The effect of security of tenure on deforestation is case and site-specific (Robinson, Holland, Naughton-Treves, 2014).

2.18 Blackman et al. (2017) find that indigenous land titling in the Peruvian Amazon reduced forest clearing by more than three-quarters, and forest disturbance by two-thirds during the two-year period covering the year a land title is granted and the year that follows. As Robinson et al. (2017) point out, however, these outcomes are not necessarily generalizable, since the titling program did not cede full land rights; community management rights were constrained under the program, requiring communities to secure permits for forest management plans among other restrictions (Robinson et al., 2017). Ding et al. (2017) compare tenure-secure indigenous forestland in the Amazon basin of Bolivia, Brazil and Colombia with observationally similar areas outside of indigenous areas, and show that deforestation rates in tenure-secure indigenous areas are lower than those outside of these areas (Ding et al., 2017).

2.19 Examples of perverse outcomes of tenure security also exist. For instance, Liscow (2013) found that secure property rights in Nicaragua enabled agricultural investment, productivity and returns to agriculture to increase which drove greater rates of deforestation. An important finding is that some theoretical work that explores the impact of tenure security on deforestation over-emphasizes the impact of tenure insecurity in discounting future forest returns. Instead, in some cases the impact of tenure insecurity on investment may be more important. Land tenure security should be coupled with other policies to align private and social preferences and shift returns to land use in favor of sustainable management (Liscow, 2013; Robinson et al., 2014).

2.20 **Payment for Ecosystem Services (PES) to manage natural capital can be effective but should be evaluated according to their own objectives and implementation context.** PES is an economic instrument increasingly used to improve the management of natural capital and ecosystem services, particularly for water, forests and biodiversity (Balvanera et al., 2012). Wunder (2005) defines a PES as a voluntary transaction where a well-defined ecosystem service is sold by a service provider, and the provider ensures service provision. Muradian et al. (2010) offer a more nuanced view of PES which emphasizes some of the institutional and political economy issues that arise in its practical implementation.

2.21 In general, PES outcomes have been mixed (Pattanayak et al., 2010). Cases reported as successful include PES applications in: (i) United Kingdom and Australia, having succeeded in stopping mining activities in favor of the creation of protected areas (TEEB, 2010); (ii) Vietnam, China, and Japan, to prevent the destruction of forests by promoting the maintenance of watersheds and traditional landscapes (Hayashi and Nishimiya, 2010; Adhikari and Boag, 2013; Zheng et al., 2013); and (iii) Nicaragua, Mexico, and Peru, to protect groundwater recharge in forest areas (Pagiola et al., 2007; Muñoz-Piña et al., 2008). In addition, several studies indicate that some programs helped to empower local communities and organizations and contributed to institutional strengthening. These programs include the Forest Partner Conservation Incentive Program in Ecuador, the CONAFOR Program in Mexico, as well as other programs led by the National Commission of Natural Protected Areas CONANP, and the FONAFIFO Program in Costa Rica (Larson et al., 2006; Corbera et al., 2007; Asquith et al., 2008; de Koning et al., 2011; Constantino et al., 2012; Kothari et al., 2013; Bremer et al., 2014).

2.22 Börner et al. (2017) review experimental and quasi-empirical evaluations of PES programs and find that in settings with high levels of baseline compliance and potential for adverse selection, effectiveness is generally low. Overall, several cases showed positive but small environmental impacts, though not necessarily smaller impacts than those achievable with other instruments. Tacconi et al. (2013) find that barriers to success include financial management shortcomings and conflicts in the allocation of benefits. There is a generalized view that ineffective governance and a lack of information on the value of ecosystem services reduce PES effectiveness (Clements et al., 2010; Kronenberg and Hubacek, 2013; Mahanty et al., 2013). There also is significant scope for improving the science underpinning PES. Naeem et al. (2015), for example, evaluated 118 PES projects and found that 60% of the projects did not adhere to four basic scientific principles essential for the integrity of the programs. These principles were related to: (i) baseline data; (ii) monitoring of key ecosystem services and environmental factors; (iii) consideration of the dynamic nature of ecosystems; and (iv) metrics related to risk (Naeem et al., 2015).

b. Coastal and Marine Ecosystems

2.23 **Marine Protected Areas (MPAs) are an important policy instrument to ensure biodiversity conservation in coastal and marine areas, however they should be regarded as a tool within a comprehensive policy and regulatory framework.** Several studies show that establishing Marine Protected Areas (MPAs) (either full or partially restricted) increases the biomass, abundance, and average size of exploited marine species, inside and outside the boundaries of the MPAs (Kerwath et al., 2013; Halpern, 2003; Lester et al., 2009; Halpern et al., 2009; Sciberras et al., 2013; Bucaram et al., 2018). Despite all these benefits, some caveats and limitations remain: (i) MPAs cannot offer protection from other environmental pressures, such as pollution, therefore, other policy measures need to be in place to address sectoral issues (Allison et al., 1998); (ii) MPAs only offer limited protection for migratory species if not part of an exhaustive MPA network designed to protect essential habitats (Agardi et al., 2011; Ketchum et al., 2014; Klimley, 2015; Bucaram et al., 2018); and (iii) MPAs are often located in areas without significant threat or without a clear identification of habitats, limiting their cost-effectiveness and environmental impact (Klein et al., 2015; Weeks et al., 2009). The latter issue is common for various MPAs in LAC which were enacted with limited biological information, and as a result they are not meeting their conservation objectives (Recio-Blanco, 2016; Fraga, 2008; Guarderas et al., 2008).

2.24 Moreover, financing the management of MPAs is often a major challenge, which may result in “paper parks” where on-the-ground protection measures are almost nonexistent (Kuempel et al. 2018; Gill et al. 2017; Leverington et al. 2010; Watson et al., 2014). Instruments such as trust funds, taxes, fines, and other mechanisms can be part of an MPA financing portfolio to ease the burden on government budget (OECD, 2017). There are several experiences of LAC countries that have implemented trust funds to contribute to MPAs financial autonomy, allow for long-term planning of financial resources, and avoid bureucratic delays. For instance, in Belize, a Protected Area Conservation Trust (PACT) was established in 1996, funded principally via a conservation fee on visitors and a commission from cruise ship passengers (Drumm et al., 2011). On the other hand, in Mexico, a remnant from a US$25 million GEF grant was used to capitalize, in 1997, a Protected Areas Endowment Fund (FANP for its acronym in Spanish), which grew with several donations, interests from the fund, along with federal allocations, entrance fees and an EU grant. FANP has been channeling funds annually to various protected areas, including four marine parks along Mexico (González-Montagut, 2003), and currently has an approximate net worth value of US$76 million.

2.25 Without clear understanding of costs and benefits of MPAs and the different impacts in the triple bottom line (economic, social and environmental aspects), political economy issues may compromise their permanence (Christie, 2004). Therefore, as with terrestrial protected areas, a governance system that incorporates the voices of all stakeholders involved is also an important factor for both the optimal functioning and the intertemporal sustainability of any MPA (Mascia et al., 2010; McCay and Jones, 2011). Research is increasingly demonstrating that social engagement is a key factor for successful MPAs (Rossiter and Levine, 2014). Specifically, according to Fox et al. (2011), an MPA is more likely to be successful in attaining its conservation targets when there are policies that: (i) foster participation of stakeholders in the design and modification of rules governing marine resources (Pollnac et al., 2001; Christie et al., 2003); (ii) promote self-governance rights for resource users (Cudney-Bueno & Basurto, 2009); and (iii) encourage shared leadership of management interventions (Christie et al., 2003a; Gutierrez et al., 2011).

2.26 Most of the MPAs, globally[5] and in LAC, are multiple-use sites, in which many extractive activities are allowed, including those that can undermine efforts to protect biodiversity (Guarderas et al. 2008; Smith et al. 2014; Hearn and Bucaram, 2018). Furthermore, even when MPAs are well-designed and managed, MPA managers usually lack any authority over the activities outside the borders of the MPA and therefore, cannot address their negative externalities on the ecosystems (Hearn and Bucaram, 2018; Ketchum et al., 2014; Klimley, 2015). Consequently, the processes for designating and managing MPAs should be linked to Marine Spatial Planning (MSP) tools, and ecosystem management mechanisms (Cicin-Sain and Belfiore, 2006; Lausche et al., 2013; Recio-Blanco, 2016).

2.27 Preferably, MPAs should be considered a subset of MSP (OECD, 2017). MSP aims at managing the conservation and sustainable use of the marine ecosystems by a system of defined areas for fixed activities such as aquaculture, for mobile activities such as fishing and shipping, and for conservation (OECD, 2017). The existing and future uses of the marine ecosystems are increasingly competing for space; some may conflict with each other and many may harm the environment if not controlled. MSP considers all the existing and future needs for the marine environment in a holistic way (Slater and Reid, 2017). MSP can and should be linked to other planning processes such as Integrated Coastal Zone Management (ICZM),[6] which has proven to be effective in promoting multisectoral development in the coastal setting. MSP and ICZM both seek to address issues of fragmented governance in marine settings, and have similar principles, such as the importance of stakeholder participation (Smith et al., 2011; Douvere and Maes, 2009; Chua, 1993; Shipman and Stojanovic, 2007).

2.28 However, there are also challenges in the implementation of ICZM alone, such as: (i) lack of coordination between institutions, which makes difficult scaling-up or down ICZM initiatives due to tensions among national and local governments; (ii) deficient communication between the science sector and policymakers; (iii) low levels of public participation in the decision-making process; and (iv) weak accountability of local authorities (Ballinger, 2005; Stojanovic et al., 2004; Shipman and Stojanovic, 2007; Stojanovic and Ballinger, 2009). Region-specific lessons learned from Belize, Barbados and the Bahamas demonstrate that, to be effective, ICZM must combine: (a) strong institutional coordination mechanisms; (b) reliable quantitative information on coastal risks and processes that can be readily incorporated to the management plans; (c) active public participation in the decision process; and (d) capacity to adapt plans and strategies to unanticipated challenges and obstacles (Silva et al., 2016). Linking MSP and ICZM entail adding a layer of institutional interactions between the authorities of both domains, which may be cumbersome in weak institutional environments.

2.29 MSP and ICZM have been strengthened by applying the Ecosystem-Based Management (EBM) approach, which focused on managing human activities to ensure biodiversity conservation and maintain ecosystem function over long periods of time (Levin and Lubchenco, 2008; Palumbi et al., 2009; Ellis et al., 2011).The five key principles of EBM are: (i) adaptive management; (ii) appropriate spatial and temporal scales; (iii) use of

[5] Only 0.59 points of the 3.41% of global MPA coverage was established as no-take MPAs, where extractive activities are prohibited.

[6] A common definition of ICZM is the one provided by the European Commission: *"[…] a dynamic, multidisciplinary and iterative process to promote sustainable management of coastal zones. […] ICZM seeks, over the long-term, to balance environmental, economic, social, cultural and recreational objectives, all within the limits set by natural dynamics. 'Integrated' in ICZM refers to the integration of objectives and to the integration of the many instruments needed to meet these objectives. It means integration of all relevant policy areas, sectors, and levels of administration. It means integration of the terrestrial and marine components of the target territory, in both time and space."*

scientific knowledge; (iv) understanding of ecosystem connections; and (v) stakeholder involvement (Long et al., 2015; Mangel et al., 1996; Link, 2010). Even though EBM has many benefits that can strengthen any integrated management of coastal and marine areas, there are some challenges that have been identified from its implementation around the world: (a) challenges with stakeholders' engagement and discrepancies about objectives, roles and responsibilities; (b) high level of uncertainty affecting an ecosystem; and (c) multiple geographic and jurisdictional scales that cannot be simultaneously addressed (Wasson et al., 2015; Smith et al., 2017; Slocombe, 1998). With respect to lessons learned in the implementation of EBM, Wondolleck and Yaffee (2017) analyzed several experiences with marine EBM around the world, including cases in LAC (i.e., Glover's Reef Marine Reserve in Belize, Biosphere Reserve in Colombia and Caleta el Quisco in Chile). The authors found the following key aspects of a successful EBM: (i) to balance top-down authority with bottom-up engagement; (ii) to motivate engagement through voluntary programs; (iii) to clearly define the authorities, their purpose and scope; and (iv) to create incentive mechanisms that sustained commitment and leadership at all levels.

2. Air, water and soil pollution

2.30 **Environmental regulation can promote efficiency and innovation to reduce pollution.** There are two general views on how firms react to stricter environmental policies and regulations to prevent and control pollution. The first is the pollution haven hypothesis which states that stricter environmental policies increase costs and shift pollution-intensive production to regions where abatement costs are lowest. The second is the Porter hypothesis which states that stringent environmental policy promotes efficiency, reduces costs and induces development of new technologies to prevent and control pollution (Dechezleprêtre and Sato, 2017). A review of the evidence on environmental regulation and competitiveness finds that the form of regulation can be as important as its stringency, and that the impact can be different given the specific characteristics of the firms and sectors concerned (Iraldo et al., 2011). Testa et al. (2011), for example, find that more stringent environmental regulation proxied for by inspection frequency stimulates investment in advanced technology and innovative products in the building and construction sector for some EU countries.

2.31 Margolis and Walsh (2003) examine 109 studies published between 1972 and 2002 and find that 54 of these studies point to a positive relationship between corporate social performance, which can include environmental practices and competitiveness. Seven show a negative relationship, while the remainder are inconclusive. Managi and Kaneco (2009) reach similar conclusions for China. The authors emphasize that ensuring competitiveness requires implementing flexible and cost-effective economic and political instruments. Albrizio et al. (2014) develop an environmental policy stringency indicator comprised of both market and command and control instruments to examine the impact of environmental policy stringency on productivity in OECD countries. The authors find that at the country level, there is a negative impact on productivity growth one year ahead of the policy change (announcement effect), which is offset within three years of policy implementation. At the sectoral level, more stringent policy enhances productivity for the most technologically advanced industries; the least productive third of all firms, however, experience a decline in productivity growth.

2.32 Jaffe et al. (1995) is a well-cited study which finds little evidence in support of environmental regulation having an adverse impact on manufacturing sector competitiveness in the United States. Dechezleprêtre and Sato (2017) focus on the manufacturing sector and regulations targeting emissions and find that since Jaffe et al.

(1995) conclusions of studies –that employ more robust databases, more advanced econometric techniques and finer levels of data disaggregation– have only strengthened the authors' conclusions. Additional findings suggest that generally, the cost of implementing environmental policies is small compared with other determinants of cost, and greater cost burdens are highly concentrated in energy-intensive sectors. For those sectors where this is the case, there is an opportunity for research to contribute to assessing policy options to minimize adverse trade and investment impacts while maintaining incentives to innovate. Indeed, Dechezleprêtre and Sato (2017) demonstrate that there is strong evidence that environmental regulation induces innovation in the development of cleaner technology.

2.33 **Economic instruments can be effective in reducing pollution though they require solid monitoring and oversight capacity.** In principle, with an effective governance framework combined with command and control measures, economic instruments can help reduce the cost of pollution abatement (Tietenberg, 1990; Stavins, 2001; Goulder, 2013; Russell and Vaughan, 2003). Examples of the successful use of economic instruments in developed economies include: (i) emissions taxes and fees in the Netherlands, Spain, Portugal, United Kingdom, and Finland, where the introduction of vehicle registration taxes based on emissions capacity has spurred the purchase of less polluting vehicles (Potter and Parkhurst, 2005); (ii) credit incentives in Finland, Japan, and France that encourage the adoption of clean technologies (OECD, 2009), or targeted subsidies that promote the adoption of conservation practices in agriculture in the European Union (Laukkanen and Nauges, 2014); and (iii) tradable rights and negotiable permits, used successfully to reduce air pollution, such as the Sulfur Dioxide Allowance Trading System (also known as the Acid Rain Program as part of the Clean Air Act)[7] in the United States. This Trading System effectively reduced sulfur dioxide emissions by 43% in 2007 compared to 1990 emission levels with relatively little government intervention and high rates of compliance, allowing power plants to determine how they would reduce their emissions (Chan et al., 2012).

2.34 Economic instruments require solid institutional capacity with effective permitting, monitoring and enforcement, as well as political support, before implementation (Blackman et al., 2018; Blackman, 2009; Caffera, 2010; Bell, 2003). Caffera (2010) showed that in the case of Santiago de Chile's Total Suspended Particles' Emissions Compensation Program, to reduce administrative costs, permits were defined in terms of emissions capacity in perpetuity, instead of actual emissions. While costs may have been reduced in the short run, this system inhibited market development. In both Colombia's Discharge Fee for Water Effluents and Costa Rica's discharge fee, a fee is charged to the pollution source depending on how much it pollutes and the environmental quality of the receiving waterbody. Thus, one polluter may benefit from a second neighboring polluter increasing discharge, since it degrades the receiving waterbody and thus reduces the fee assessed on the first polluter. These conditions disincentivize sources to abate pollution and reduce the instruments' capacity to achieve an efficient allocation of abatement responsibilities. As the preceding examples demonstrate, institutional capacity is a necessary precondition for effective implementation of economic instruments. Further evidence is needed, however, on the efficacy of economic instruments applied in different contexts in developing countries (Blackman et al., 2018).

[7] The Clean Air Act Program in United States was created in 1970 (and revised in 1977 and 1990) to protect public health from air pollution from a diverse array of pollution sources. The annual benefits of air quality improvements from the 1990 Clean Air Act amendment will reach a level of approximately US$2.0 trillion in 2020.

3. Gaps in governance

2.35 **The quality of environmental governance is critical for improving environmental performance**. According to UNEP, environmental governance requires the smooth functioning and interrelationship of the following components: (i) the institutional framework at its various levels; (ii) the regulatory framework in its normative and policy aspects; (iii) the management instruments used to implement institutional actions and enforce the policy and legal framework; (iv) financing and sufficient resources to provide the necessary means for management; (v) information systems and their accessibility; (vi) oversight and accountability; and (vii) participation and collaboration mechanisms that include civil society engagement, as well as mechanisms for collective action (UNEP, 2012).

2.36 The political and socioeconomic context is a relevant factor on the effectiveness of an environmental governance system. Regulatory and institutional capacity efforts to improve performance need to be coupled with strong political support, even in countries with an adequate level of institutional capacity (World Bank, 2008). In addition, political stability, sectorial pressures, and corruption are dimensions that should be considered when assessing governance effectiveness (Kaufman et al., 2010). General findings in this regard include: (i) corruption contributes to environmental degradation because it diminishes the stringency of environmental policy (Welsh, 2004; Fredricksson and Mani, 2002); (ii) policy stringency increases with a higher degree of rule of law (Fredricksson and Mani, 2002); and (iii) citizen rights to access environmental information, as embodied in the Aahrus Convention,[8] are critical to fostering accountability and improving environmental outcomes (Sanchez Triana, 2008; Henry, 2010).

2.37 The quality of an environmental governance system is also related to the effective implementation of monitoring and enforcement mechanisms. The empirical evidence shows that countries that have exhibited strong environmental performance also exercise their capacity to monitor and penalize violations that cause environmental damage (INECE, 2009; OECD, 2009). For example, Shimshack (2014) demonstrates that the imposition of economic sanctions and random inspections directly reduce pollution, deter future violations, and even encourage positive behavior beyond compliance levels. However, monitoring and enforcement practices are unlikely to be fully cost effective. Similar conclusions are reached by Escobar and Chávez (2013), Dasgupta and Wheeler (1998), and Dasgupta et al. (2000), who point out that inspected facilities exhibit better environmental performance than non-inspected facilities.

2.38 **The involvement of civil society in environmental governance can contribute to effective environmental management in contexts of strong regulator capacity.** Co-management systems[9] for protected areas can be successful under certain conditions, especially if they have suitable institutional and economic support. Such is the case of the Maya Biosphere Reserve (Guatemala) or *El Imposible* National Park (El Salvador). However, studies by Blackman et al. (2014) and Bowler et al. (2011) indicate that the

[8] The Convention on Access to Information, Public Participation and Access to Justice in Environmental Matters, (Aarhus, June 25, 1998), signed by thirty-five Sates and the European Community provides for the right of everyone to receive environmental information that is held by public authorities. Public authorities are obliged, under the Convention, to provide information to any person within one month of his/her request and to actively disseminate environmental information in their possession.

[9] In a co-management system, two or more social actors (public and/or private) negotiate, identify and mutually guarantee a fair distribution of management of their functions, rights, and responsibilities in terms of the administration of a territory or natural resource. Co-management is also known by the terms participatory management or collaborative management, among others.

effectiveness of co-management systems is context-specific. In general, these co-management models require an integrated governance and institutional coordination system with clear rules regarding financial and operational management (PROARCA et al., 1999; Constantino et al., 2012).

2.39 Women can perform an active role in environmental management, even though they are still, to a large extent, absent from the decision-making and political processes. (Shanley et al., 2011; Matthews et al., 2012; FMAM, 2013; Harper et al., 2013). The evidence shows that women in LAC perform a critical role in managing water, forest and other natural capital assets in communities to ensure family well-being (UNECLAC, 2012).[10]

2.40 Civil society can also be an active partner in the understanding of environmental issues. Citizens are contributing to scientific research by collecting, processing and analyzing data for monitoring biodiversity and to provide solutions for environmental issues. Projects such as eBird[11] from the CornellLab of Ornithology, and citizen science water and air quality monitoring networks, have provided positive outputs. Limitations regarding data quality and privacy on citizen science projects would need to be studied in further detail.

2.41 **The availability of appropriate information enables policy-makers, businesses, and the civil society to take informed actions**.[12] The requirement that all stakeholders and all affected parties be well informed and duly consulted is a consolidated and proven good practice. In general, participatory processes in communities allow projects to be duly accepted and supported, which in turn leads to better outcomes (Seymour et al., 2005). Also, public disclosure of environmental performance may yield positive environmental outcomes, more so in the presence of strong formal regulation (Blackman, 2010).

2.42 ECLAC (2018) finds three key aspects of enabling access to environmental information: (i) increasing the measurement and quality of environmental information; (ii) promoting maximum disclosure of environmental information; and (iii) ensuring the government has the capacity to produce, process and disseminate information readily and easily available to the public in a systematic way. In addition, it suggests countries need to build up citizen and firm demand for more and better information. Therefore, education on environmental matters is necessary to guarantee access, specially to vulnerable populations.

2.43 Statistics and indicators are essential to monitor national and international goals embodied in National Development Plans and 2030 Agenda's Sustainable Developments Goals. However, information on the environment and natural capital in LAC is insufficient, dispersed, and often not up to date. This prevents any systematic monitoring of quality and quantity of natural capital or evaluating the effectiveness of regulatory and economic instruments (Awe et al., 2015). On par with the System of National Accounts,

[10] Another illustration is the case of fisheries management project in Senegal, which succeeded in consolidating a trained group of 200 women fish processors. These women held fishermen accountable for abiding by size regulations and bans, among other standards, thus forcing fishermen to improve their practices to secure a market for their catch (Coastal Resources Center, 2014).

[11] eBird is the world's largest biodiversity-related citizen science project, with more than 100 million bird sightings contributed each year by eBirders around the world. A collaborative enterprise with hundreds of partner organizations, thousands of regional experts, and hundreds of thousands of users, eBird is managed by the Cornell Lab of Ornithology.

[12] The right of access to public information, along with environmental rights, now has constitutional status in most of LAC countries. Access to environmental information has been recognized as a right by several countries, worldwide and in the region, based on the Principle 10 of the Rio Declaration on access to information, public participation and justice in environmental matters (including remedy for damages), and the Aarhus principles. In March 2018, 24 LAC countries adopted the first binding regional agreement to achieve the full exercise of access rights. The agreement will be open for signature of the 33 LAC countries at UN Headquarters in New York, US, from September 27, 2018 to September 26, 2020.

implementation of the SEEA is an opportunity for integrating natural capital and ecosystem services in decision making at all levels (Banerjee et al., 2012). According to the 2017 Global Assessment of Environmental-Economic Accounting, 69 countries have SEEA implementation programs in place, with 22 more countries (86% of which are developing countries) indicating plans to begin compiling accounts. The number of countries implementing SEEA is on an upward trend, up 28% from the 2014 Assessment (United Nations, 2018).

2.44 **Integrating environmental issues into sectoral policies and across levels of governance is essential to bridge tensions between environmental and economic targets. Therefore, ensuring coherence among policies is needed.** Managing natural capital from the perspective of income instead of wealth ignores the fundamental underpinnings of sustainable development by transferring the cost of negative environmental externalities to future generations (WCED, 1987; Ostrom, 1990; Anderson and Ostrom, 2008). The concept of environmental mainstreaming was widely discussed during the 1990s and tied with the debate on governance for sustainable development. More recently, mainstreaming environmental considerations across sectors (such as agriculture, tourism, energy, transport, trade, water and sanitation, health, and technology and innovation) and across levels of governance (municipal, provincial, national) has been discussed and promoted at various international environmental fora (the United Nations Framework Convention on Climate Change–UNFCCC, Convention on Biological Biodiversity–CBD, UN ESOC, 2016; NGO Stakeholders Forum, 2016; ICSU, 2017). There is consensus that integrating environmental issues into sectoral policies will be key for meeting international commitments such as those established in the 2030 Agenda for Sustainable Development (Nilsson and Persson, 2017).

2.45 Seymour et al. (2005), Dalal-Clayton (2009), the European Commission (2009b), and Research and Resources for Sustainable Development (RIDES) (2008), among others, examine cases and propose guidelines for effectively integrating environmental sustainability in economic sectors. Environmental mainstreaming acknowledges that: (i) the environment is not a sector and sustainability goes beyond implementing safeguards, mitigating damage, and applying controls; and (ii) investments in infrastructure and improvements in productivity in various sectors have the potential to create and maximize environmental benefits, reduce costs, and prevent reputational risks, if these investments are designed and implemented with a strategic and multisector vision.

2.46 Often, where environmental competences (legal and institutional) are assigned to specific sectors, there are institutional and regulatory overlaps, gaps, and/or misalignement in their environmental competences. According to Lafferty (2004), integrating environmental matters into productive sectors should be accompanied by a commitment to avoid contradictions between environmental and sectoral policies. OECD (2017) describe a few challenges to policy coherence in the context of the 2030 Agenda: (i) balancing a cross-sectoral approach with concrete priority actions; (ii) ensuring that short-term interests do not compromise long-term objectives; and (iii) convening interest groups which are spread widely and pursue various economic activities.

2.47 The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services- IPBES (2018) concluded that, for most countries of the region, the environment has not been effectively mainstreamed across development sectors, which is still viewed as a separate sector in national planning. According to the authors, a broad array of policy instruments used by a range of actors to support the management of biodiversity and environmental matters have not added up to overall effectiveness at the national or subregional scales, although they are often effective locally. Progress on mainstreaming

environmental matters to development sectors has been identified in the international arena, including by the Conference of the Parties to the Convention on Biological Diversity at its thirteenth meeting in December 2016.

2.48 **There is a growing evidence of the successful integration of natural capital at the project level**. For example, in the Reventazón Basin in Costa Rica, a hydroelectric power company financed soil conservation practices upstream thereby reducing erosion by 97% and saving the company US$1 million (Bovarnick et al., 2010). The Camisea Gas Project was designed as an "off-shore on land" project, treating the development as if it were at sea and thus not requiring the construction of new roads (Mata, 2012). An integrated approach to enhancing coastal resilience in Barbados resulted in positive environmental and economic benefits, with up to 30% of tourists drawn to improved beaches and a willingness to pay of $51 BBD per visit to maintain the improvements (Banerjee et al., 2018). Other examples of natural capital mainstreaming include the development of an ecosystem-based masterplan for development in the Bahamas and a sustainable tourism program in Belize (Schueler, 2017). Silva et al. (2017) review the coastal risk mitigation with green infrastructure experience in LAC and find that successful projects have commonalities including stakeholder involvement, scientific grounding, strong governance, and political will (Silva et al., 2017).

2.49 Environmental Impact Assessment is a policy tool to incorporate environmental considerations at the investment or project level. However, using it effectively requires avoiding practices that can turn it into a costly licensing instrument (Acerbi et al., 2014; Triana and Enríquez, 2007). Low effectiveness occurs when: (i) public participation and interagency coordination are implemented after key decisions have already been made; (ii) there is a lack of alternatives that respond best to the environmental concerns (Ahmed 2012); and (iii) in absence of a policy and regulatory framework which balances the use of command and control, economic instruments and information and disclosure tools (Acerbi et al., 2014). Moreover, an Envirionmental Impact Assessment is not the appropriate tool for evaluating strategic-level interventions that are related more to political factors than technical issues. In these cases, they should be complemented with approaches that assess environmental considerations in policies, plans and programs. Strategic Environmental Assessment (SEA) is a tool that can meet these needs when applied at the earliest stages of investment and public policy planning (OECD, 2006).

III. KEY CHALLENGES FOR THE REGION AND PROBLEMS THAT THE BANK SEEKS TO ADDRESS

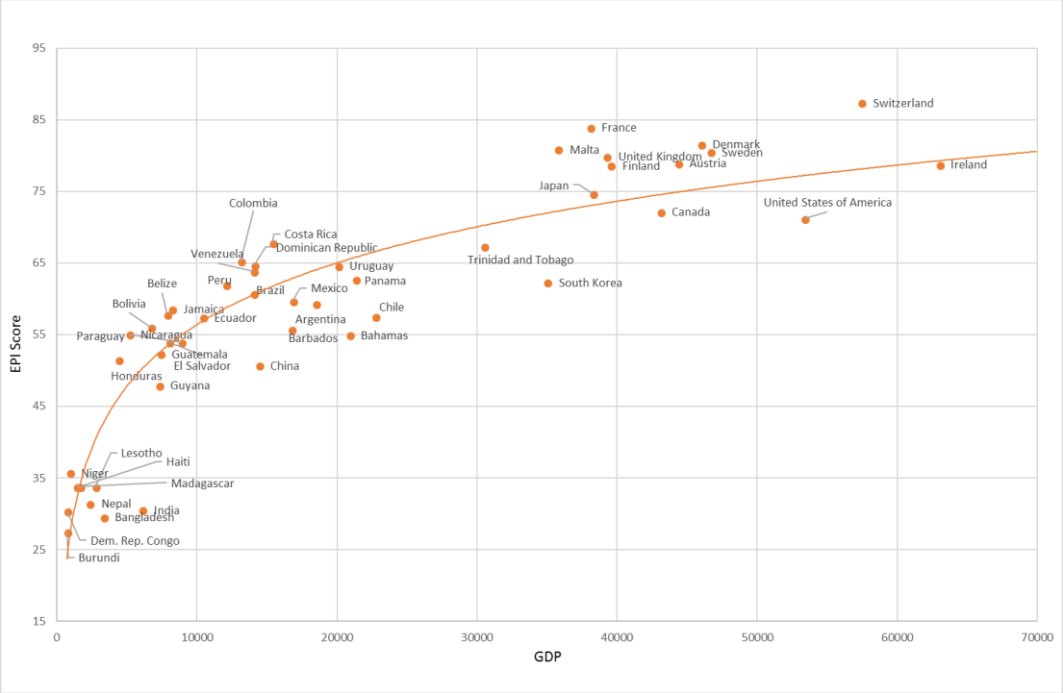
3.1 The Environmental Performance Index (EPI) from Yale is the only measurement that has been systematically monitoring the relative performance of countries since 2002. The EPI measures performance in two broad aspects: (i) ecosystem vitality (measuring performance in: biodiversity and habitat, fisheries, forests, agriculture, climate and energy, air pollution, and water resources); and (ii) environmental heath (air quality, water and sanitation, and heavy metals). According to the 2018 EPI, LAC[13] is situated in the middle of the EPI global ranking, below Europe, North America, Eastern Europe and Eurasia, with similar rankings to the Middle East, North Africa and the Pacific, and above Asia and Subsaharan Africa.

3.2 LAC countries are broadly distributed over the middle half of EPI rankings. This dispersion is in part related to the different levels of development across countries, since the EPI

[13] EPI divides the region in two: Latin America on one hand, and the Caribbean on the other. However, regional average scores are similar for both regions (58.2 and 57.6, respectively).

scoring shows a positive relationship with GDP per capita (see Figure 3). However, another related factor, perhaps even more relevant, is the difference on levels of effective governance, particularly their institutional capacity, and mainstreaming of environmental matters across productive sectors (Blackman et al., 2014; UNEP, 2010; 2009).

Figure 3. EPI Score vs. GDP per capita

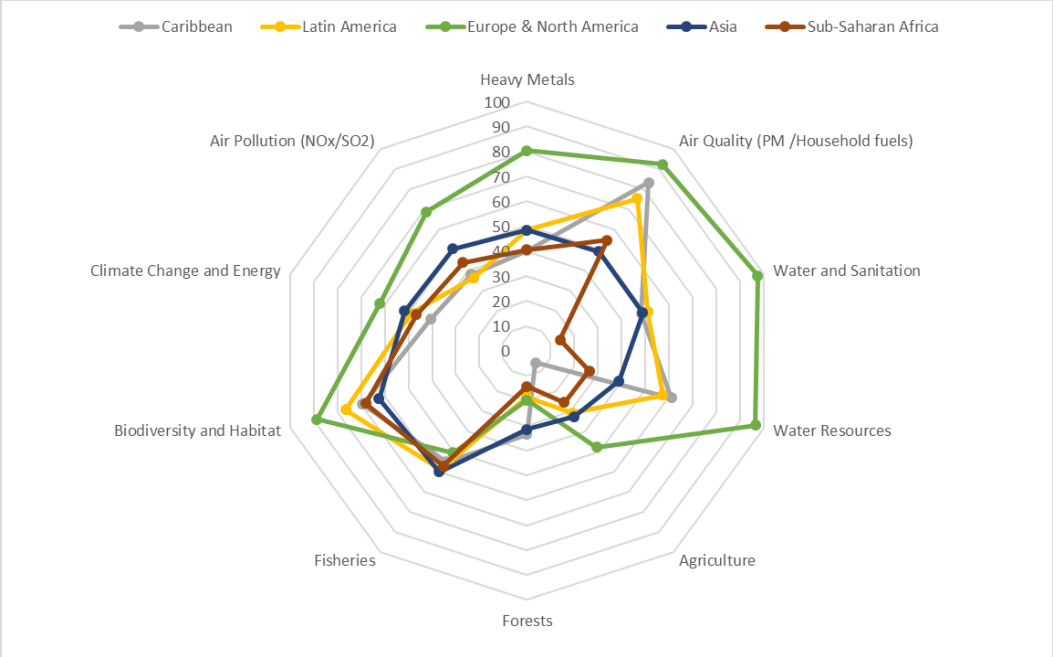


Source: Environmental Performace Index, 2018

3.3 According to the EPI, as illustrated in Figure 4 below, the region needs to pay special attention to management of its forests, pollution (in its air, water and soil categories), agriculture, and climate change and energy.[14] Although, LAC score relatively well in the conservation of biodiversity and habitat, it is important to highlight that the score reflects commitmments on protected areas and their ecologically representativeness; however, it does not capture their vulnerability to unsustainbale use and human disturbance.

[14] Each indicator and category have a different weight, please see EPI Methodology.

Figure 4. Regional EPI average score per EPI category



Source: Environmental Performace Index, 2018

3.4 The following paragraphs present a brief diagnostic of the region's natural capital assets and ecosystem services, and the challenges and threats they face due to: (i) habitat destruction and overharvesting/exploitation of resources (particularly those related to the management of forests and coastal and marine ecosystems); (ii) main drivers of pollution; and (iii) insufficiency of protecting mechanisms and gaps in governance.

A. Natural Capital and Ecosystem Services Status

3.5 **Terrestrial and Marine Ecosystems Services**. LAC is a biodiversity powerhouse with the greatest diversity of species and ecosystems on the planet, and a quarter of its mangrove forests and one half of its tropical forests (UNEP-WCMC, 2016; Bovarnick et al., 2010). It is home to 11 of the Earth's 14 terrestrial biomes (Blackman et al., 2014), 7 of the world's 17 megadiverse countries, 7 of the world's 25 biodiversity hotspots (UNEP, 2010a), and 20% of key biodiversity areas of the planet (IPBES, 2018).

3.6 The LAC region has a global importance due to the size of forests ecosystems (935.5 million hectares). The region hosts a diversity of terrestrial ecosystems such as the Atlantic forests of South America which are home to 20,000 plant species, 40% of which are endemic. Central America has highly diverse forests, though these forests have been reduced by 11% since 1990 (FAOSTAT, 2015). The Andes Polylepis forests represents some of the most threatened neotropical vegetation and biodiversity on the planet. Large areas of temperate grasslands are found in LAC, including the Río de la Plata grasslands which span over 750,000 km^2.

3.7 Forests in LAC are truly multifunctional, contributing to the rural livelihoods of millions (food security, fuel, fiber) and economic development directly through provisioning ecosystem services (504 million m^3 of roundwood in 2014 in LAC [UNEP-WCMC, 2016]), and indirectly through regulating ecosystem services such as climate and hydrological

regulation, soil retention and soil nutrition.[15] However, the utilization of forest resources in the region has focused mainly on the extraction of wood and non-timber forest products, with less attention to the value of other ecosystem services.

3.8 The LAC region is also rich in a wide variety of coastal and marine ecosystems, such as mangrove forests, seagrass beds, and coral reefs. Of the 66 Large Marine Ecosystems (LME) of the world, ten are in the region (IOC-UNESCO and UNEP, 2016).[16] LAC seas host approximately 70% of the world´s marine species and some of the planet's most significant marine biodiversity hotspots (UNEP, 2012). For instance, the Caribbean region hosts the second largest barrier coral reef in the world and more than 30 different mangrove ecoregions along 37,000 km^2 of tropical and subtropical coastline (Miloslavich et al., 2010; Miloslavich et al., 2011; Siikamäki et al., 2012). Coastal and marine ecosystems in LAC deliver a wide range of provisioning services for the human population (World Bank, 2017), such as fisheries, tourism, oil and gas exploration, marine transport and shipping, renewable energy sources, mariculture, marine biotechnology and carbon capture and storage. Fisheries and tourism are two of the most important services since they contribute significantly to the economic development of coastal regions.

3.9 Supplying the increasing demand for provisioning services, such as food, energy, minerals and forest products, and recreational services such as tourism, often comes at the cost of decreasing the supply of regulating and cultural services –e.g., increased provision of agricultural crops or extraction of minerals and raw materials may reduce soil quality, climate regulation and water regulation (Elmqvist et al., 2011), (see Table 3, below). Without acknowledging those trade-offs and the interaction between ecosystem services and human well-being, the challenges of overexploitation of resources, pollution, and the lack of strong governance systems can lead to natural capital net loss.

[15] These various ecosystem services can be mapped to numerous Sustainable Development Goals. In a very direct way, forests contribute to SDG 2 of ending hunger and promoting sustainable agriculture, and SDG 15 of protection/restoration/sustainable use of terrestrial ecosystems. Forests also play a role in achieving other SDGs, such as SDG 1 (ending poverty), SDG 6 (protecting water-related ecosystems), SDG 7 (sustainable energy), and SDG 13 (climate change) (FAO, 2016). With all these interactions between forests and globally agreed upon development goals, integrated planning and management and a multi-sectoral approach are critical to sustainable development.

[16] California Current (Mexico, United States), Gulf of California (Mexico), Gulf of Mexico (Mexico, Cuba, and United States), Pacific Central-American (Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru), Caribbean Sea (all Caribbean Islands, Belize, Colombia, Costa Rica, Guatemala, Honduras, Mexico, Nicaragua, Panama, and Venezuela), Humboldt Current (Argentina, Chile, and Peru), Patagonian Shelf (Argentina and Uruguay), South Brazil Shelf (Brazil and Uruguay), East Brazil Shelf (Brazil), and North Brazil Shelf (Barbados, Brazil, French Guiana, Guyana, Suriname, Trinidad and Tobago, and Venezuela).

Table 3. Selected ecosystems services and their relevance for LAC

Type of service	Ecosystem service	Relevance for LAC
Provisioning	Food	LAC is the largest global exporter of food, critical to global food security (IPBES, 2018). The region contributes 14% of total agriculture exports worldwide. In the region, 42.5 million people experience food insecurity.
	Minerals/Energy[17]	LAC supplies 45% of global copper, 50% of silver and drawing 25% of total investment in mining (UNEP-WCMC, 2016). Large oil reserves exist in the region with increasing interest in the Amazon Basin. LAC is the second largest producer of coal in the world and one the largest exporters of bioenergy.
	Forest products	LAC produced over 13% of the world's roundwood output (about 504 million m^3). Near 5.6 million tons of food from forest are consumed annually in the region (FAO, 2017a).
	Water	In 2015, only about 9% of the LAC's forest cover (82 million acres) was managed for soil and water conservation, well below the world's average (a third of the forest area). Water per capita and water quality is declining across the region, creating an increase dependency on infrastructure for provisioning water services (IPBES, 2018).
Regulating Services	Carbon sequestration	Total carbon stocks in living forest biomass have declined since 1990, from 116.1 billion tonnes to 107.3 billion tonnes, due to the loss of forest area.
	Natural disaster mitigation	LAC is one of the most disaster-prone areas in the world with over 2,000 intense disasters registered between 1970 and 2015, affecting over 250 million people. Losses are tending to increase in the region, twelve-fold comparing the periods 1970-1979 and 2000 to 2009 (EM-DAT, 2013; Hori et al., 2017). Disasters between 1980 and 2016 generated losses of around US$282 billion (Guerrero, 2018). Natural mangrove forests and other costal vegetation reduces the effects of tsunamis, hurricanes, floods, and other natural disasters. Forest along rivers and other waterbodies reduce the risk of flooding. Forest also reduce soil erosion from heavy rains and hurricanes and serve as water filters retaining sediments and particles from forest fires. Coastal ecosystems can provide up to US$720 million annually in protection benefits through mitigating impacts on wind, waves, storm surge, erosion and infrastructure damage (Lemay et al., 2016).
	Erosion Control	About 14 percent of the world's soil degradation occur in the LAC region mostly due to water erosion, agricultural practices and deforestation (FAO, 2018).
Recreational and cultural services	Cultural customs	With almost 40% of the Amazon in indigenous territories, LAC's tropical rain forests present a high representation of culturally distinct indigenous populations with deep cultural connections to the forest around them.

[17] Hydrocarbon exploration and mining activities pose significant challenges and risks for natural capital due to their extractive nature (UNEP-WCMC, 2016).

Type of service	Ecosystem service	Relevance for LAC
	Tourism	Travel and tourism are responsible for 8.6% of regional GDP in 2017, 7.6% of total employment. LAC is ranked fourth out of 13 global regions in its importance to contribution to GDP (WTTC, 2018).

B. Challenge 1: Habitat Destruction and Overharvesting/Exploitation of Resources

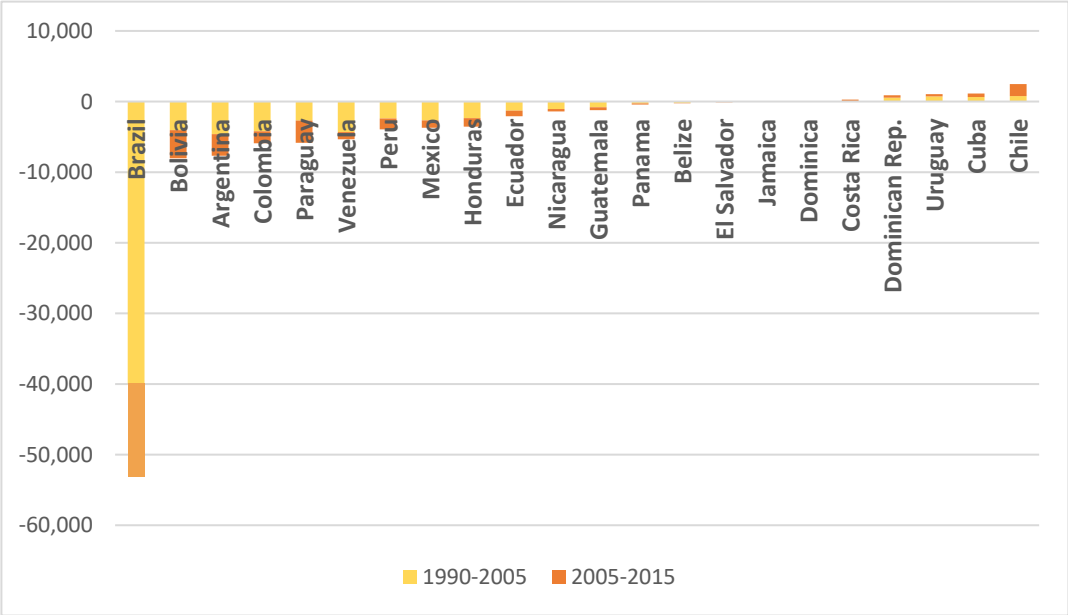
3.10 The process of environmental deterioration in part fueled by the region's demographic and economic growth continues. The latest estimates of population for LAC are on the order of over 652 million, with an annual projected growth rate of 1% from 2015 to 2020 (1.3% urban, -0.3% rural; CEPALSTAT, 2018). Between 1990 and 2013, the population of LAC grew 38.5%, and the region's gross domestic product (GDP) rose 106%, while GDP per capita rose 49% (ECLAC, 2014).

3.11 More and more pressure is being put on the ecosystems of the various regions of LAC, including *Mesoamerica*, the Amazon, the *Los Llanos* plains, the Chaco wilderness, and the Andean regions. For example, biodiversity in the Pantanal and Cerrado regions, in Brazil, is threatened by conversion for livestock and agriculture, the introduction of invasive species, and pollution from agrochemicals, mining, and urban waste from neighboring cities (Alho, 2011; WWF, 2011). Similarly, wastewater, agricultural production, and mining are directly affecting water life in the Orinoco River, which harbors more than 1,000 species of fish (Barletta et al., 2010). The following paragraphs will focus on the main trends on habitat destruction and overharvesting of resources in terrestrial and marine ecosystems including: (i) deforestation; (ii) water stress; and (ii) coastal and marine human activities.

3.12 **One of the biggest threats to terrestrial ecosystems is deforestation, which has declined in recent years but remains high**. Pasture for cattle and commercial cropland are the main drivers of deforestation in LAC, accounting for over 70% and 14% of the forest area lost in 2010 (De Sy et al., 2015). In the Amazon, agribusiness production for international markets has been the main cause of deforestation since 1990, because of practices such as extensive grazing, cultivation of soy and palm oil plantations (FAO, 2016a). The underlying driving forces of tropical deforestation are economic, institutional, technological, cultural and demographic factors acting synergistically rather than by single-factor causation, some examples include: (i) weakness in environmental and institutional governance responsible for forests; (ii) uncertainties regarding land title and property rights; and (iii) failure to integrate the value of natural capital and ecosystem services in decision-making, at the national, firm and household levels, of particular interest are policies affecting decision making in the agricultural sector (Geist and Lambin, 2002; Kaimowitz et al., 2004; UN-ECLAC, 2012).

3.13 Between 1990 and 2015, LAC's forested area was reduced from 51% of its land area to 46.3% in 2015 (World Bank Development Indicators). Since 1990, 9.5% of forests have been lost in South America and 25% in Mesoamerica, though the Caribbean has experienced gains of 43.4%. Deforestation of the Gran Chaco region is of special concern with changes in land use in 0.5 million hectares of forest in 2013 alone; this clearing is largely driven by demand for cattle in Paraguay and soybean in Argentina (UNEP-WCMC, 2016). Figure 5 shows that most of the countries in the region continued losing forests between 2005 and 2015, following a downward trend since 1990. Only Costa Rica reversed forest cover loss from 1990 to 2005 (-1.4% of country area) and gained 5.2% between 2005 and 2015. Forest area in Chile, Uruguay, Cuba and the Dominican Republic have continuously increased since 1990.

Figure 5. Change in forest area by country, from 1990 to 2015



Source: FAO, 2015

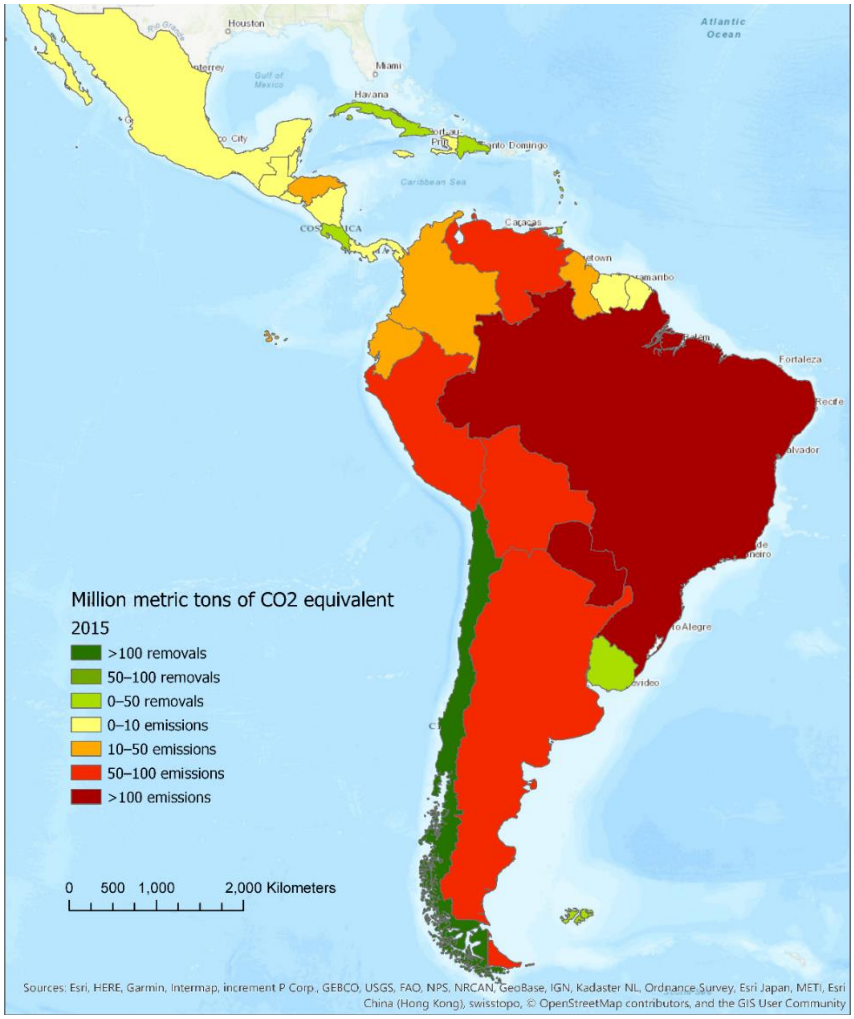
3.14 However, the rate of loss has decreased from 4.45 million hectares per year between 1990-2000 to 2.18 million per year between 2010-2015. This corresponds to a net loss reduction from 0.44% per year in the period 2000-2010 to 0.23% per year in the period 2010-2015. The net changes in the forest area are the result of governments' commitments to reduce deforestation and afforestation and reforestation efforts. Brazil was the main driver in the drop of deforestation during that period. In Brazil, deforestation has been driven primarily by demand for agricultural land; and recent analysis suggest that between 68%-90% of forest conversion between 2000-2012 was illegal (Lawson, 2014). Strong enforcement efforts to tackle illegal forest conversion and logging were important factors in the decline of deforestation. Other factors included the expansion of protected areas, initiatives to limit the expansion of beef and soy production in forest areas, lower prices for some of the agricultural commodities, recognizing indigenous territories, and incentives created by Norway's pledge of up to US$1 billion in a results-based compensation in 2005 (Boucher, 2014). However, after 10 years of decline, deforestation in Brazil's Amazon is on the rise. Brazil's National Institute for Space Research (INPE) estimated that almost 7,989 km^2 of forest (the size of Puerto Rico) were cleared between August 2015 and July 2016, representing a deforestation rate of 29% above previous year and 75% above the 2012 level, when deforestation was at its lowest (Tollefson, 2016). The loss of forest cover in Brazil during this period was caused maybe in part to unprecedented forest fires in the Amazon and probably due to a relaxation of law enforcement efforts (Seymour, 2018).

3.15 Although the LAC region contributes only 11% of global CO_2 emissions, it leads the world with the largest share of emissions from deforestation (47%) (Alcorn, 2014).[18] Most of the

[18] These corresponded to annual emissions from deforestation of 1,159 Mt CO_2, counterbalanced by annual net removals in forest of −458 Mt CO_2.

countries in the region are net emitters of CO_2 from forest and forest conversion to other land uses (see Map 1).[19]

Map 1. Net CO_2 emissions and removals from forest and forest conversion to other land uses, 2015



Source: FAOSTAT, 2015

3.16 In addition to deforestation, degraded lands (lands that have lost some degree of their natural function and productivity) represent over 20% of forest and agricultural lands in LAC. About 300 million hectares of forest lands are classified as degraded forests, woodlands and savannas (Bai et al., 2008; Minnemeyer et al., 2011). Restoring degraded land could bring financial rewards to the region while also reducing CO_2 emissions. Landowners could increase their incomes by using restoration to replenish agricultural yields and bolster food security, sell forest products, and earn money from ecotourism (Vergara, 2016).

[19] While South and Central America are net emitters (685 Mt CO_2 per year, and 40 Mt CO_2 per year), the Caribbean region presents a net sequestration of -25 Mt CO_2 per year.

3.17 **Increasing water demand for various uses compromises water security.**[20] The long-term availability of water for its various uses poses a challenge not just for secure human water supply but also for energy generation and agricultural production. The growing demand for irrigated land, the potential impacts of large planned infrastructure (hydropower, mining) projects, and the rapidly increasing urban population point to potential use conflicts among the various sectors and greater environmental pressures in general (Mahlknecht and Pastén Zapata, 2013). According to the FAO, in the last decade, water withdrawals have doubled in LAC and at a higher rate than the world average. In the region, water is primarily used for: agriculture (72%), domestic consumption (17%), and industry (11%). In 2015, there were 12 million hectares of land irrigated for agriculture; most of this water was sourced from surface water (UNEP-WCMC, 2016). Expansion of irrigation in the region has been occurring at an average annual rate of 250,000 ha over the past 50 years. Expansion of irrigation is not without its consequences as 26 of 77 river basins evaluated across LAC were found to face severe water scarcity for at least one month per year (UNEP-WCMC, 2016). By 2050, according to OECD (2012) estimates, demand for water will rise 55% which will result in 40% of the population occupying river basins under severe water stress.

3.18 In view of this, countries have in recent years initiated significant legal and institutional reforms regarding water resource management. These countries include Mexico (2014), Peru (2009), Uruguay (2009), and Paraguay (2007). Nevertheless, legislation on water resources management are still inadequate in many countries (Dourojeanni, 2010). One of the main difficulties for sustainable water management is the quality of available information. In most countries, data are incomplete, heterogeneous, isolated, and in many cases collected by entities with very specific objectives and thus of little use to other outside users (Mahlknecht and Pastén Zapata, 2013; UN-ECLAC, 2012).

3.19 Moreover, an institutional mapping of water management shows great disparity in the various ministries and levels of government responsible for water management, with overlapping functions and contradictory applications of sector policies. A long-term resolution will require functional systems of integrated management built on three core pillars: (i) strengthening governance; (ii) use of economic instruments; and (iii) information systems on the quality and quantity of water resources (UN-Water, 2008; UNEP, 2010d).

3.20 **Human activity and the concentration of populations along the coastline threaten the health of LAC coastal and marine ecosystems**. The percentage of coastal population in LAC is higher than any other region in the world. About half of the entire LAC population lives less than 100 km from the coast (Blackman et al., 2014). Every city or urban agglomeration in the Caribbean islands is less than 100 km from a coral reef (Barragan & de Andres, 2016). Marine and coastal ecosystems are of great importance for the economy of LAC and its inhabitants with a large percentage of economic activities in the tourism, fishing and transport sectors (Bovarnick et al., 2010; FAO, 2016; UNEP, 2010a; World Bank, 2009). However, this population concentration creates direct and indirect demands on coastal and marine systems that can lead to habitat destruction and degradation of mangrove forests, coastal wetlands, and coral reefs, and introduction of

[20] There is no single, widely accepted definition of water security, In the literature there are four different focusses to water security: increasing human welfare, enhancing social equity, improving long-term sustainability, and reducing water-related risks (Hoekstra et al., 2018). The IDB understands water security as the existence of an acceptable level of water with an acceptable level of risk that allows to satisfy various uses, the conservation of quality, and the consideration of climate change issues in the planning of infrastructure, flow management and risk management for natural disasters, such as droughts and geophysical disasters.

invasive species,[21] all of which can result in the loss of livelihood opportunities (Halpern et al., 2008).

3.21 For instance, although one third of the world's mangrove areas are in South and Central America (Giri et al., 2010; Thomas et al., 2017), mangrove forests coverage in the region have been reduced steadily, primarily due to coastal development activities (Valiela et al., 2001; Polidoro et al., 2010), including agriculture, aquaculture, and urban-tourism projects (Yáñez and Lara, 1999; UNEP, 2010b; Thomas, 2017). In LAC, the Atlantic and Pacific coasts of Central America, are areas of special concern because as many as 40% of mangroves species in those areas are threatened with extinction (Polidoro et al., 2010). Aquaculture production in LAC is progressing at rates above world averages in recent years. This expansion of the aquaculture sector has imposed an important pressure on mangroves ecosystems in the region, which provide the ideal conditions for this activity (FAO, 2016b; Wurmann, 2017). The current situation for the coral ecosystems in LAC is equally concerning, it is estimated that 66% of the region's coral reefs are damaged (Sherman et al., 2009). This trend is not expected to change. On the contrary, 20% of the coral reefs are projected to be lost over the next 20 years (UNEP, 2010a) in the west coast of South and Central America, the Gulf of Mexico, and the Caribbean (Burke and Maidens, 2004; UNEP and CATHALAC, 2010; Jackson et al., 2014). This expected contraction of coral reefs is the result of different phenomena, some of them related to climate change, and others related to economic activities of the coastal population such as: sedimentation from upland, deforestation, poor agricultural practices, coastal development, pollution from toxic substances, water acidification and overfishing (UNEP, 2016; Thomas et al., 2017).

3.22 Unsustainable commercial fishing is a significant driver of marine biodiversity loss in LAC. There has been a high level of fishing pressure in LAC coastal and ocean waters, which has produced negative effects to the health of the stock of important commercial species such as: anchovy, Chilean herring, Chilean jack mackerel and South American pilchard among others (FAO, 2014). This unsustainable fishing of commercial species not only affects the health of marine ecosystems, but it also produces significant economic losses.[22] Given this situation, LAC countries have taken actions to recover commercial fish populations such as enacting legislation and management plans, establishing marine protected areas, and training of fishermen in sustainable fishing practices (CBD, 2015).

3.23 The effects of unsustainable fishing are also reflected in the high level of incidental catch (i.e., bycatch) of non-target species which include other fish species and even marine mammals and birds. Worldwide as much as 40% (or 63 billion pounds) of global catch is considered as bycatch. In LAC there are many fisheries with a bycatch greater than 25% of the total catch (Davies et al., 2009). The levels of bycatch are heterogenous by industry, but in most the cases it has showed an upward trend around the world (Kelleher, 2005). Bycatch is a difficult problem to tackle in any fishery due to several challenges, such as: (i) poor data and inadequate quantitative methods complicate accurate measurement of bycatch; (ii) absence of awareness and commitment of fishing communities; and (iii) lack of sound and robust policies to regulate and mitigate bycatch (Lewinson et al., 2011).

[21] Marine transport is one of the main sources of introduction of invasive species in LAC coastal and marine areas which affect the biological health of those ecosystems (Lopez and Krauss, 2006).

[22] According to the World Bank (2017), approximately US$83 billion was lost per year due to mismanagement of fisheries around the world. From that figure, approximately US$20 billion corresponds to losses generated annually in LAC alone.

Box 1. How LAC countries are managing their fisheries?

LAC countries have promoted the use of Right-Based Management (RBM) systems, such as: (i) rights to harvest a fraction of a specific total allowable catch; (ii) rights to exclusive harvest within a geographic region; and (iii) rights to manage a resource stock collaboratively through a group with well-defined membership (Defeo et al., 2014). The diversity of RBM schemes implemented in fisheries in LAC has been influenced by: (i) local fishery contexts; (ii) institutional, resource and ecosystem dynamics; and (iii) governance capacities in place (Orensanz and Seijo, 2013). However, the sustainability performance of most RBM systems applied in LAC has not been assessed (Orensanz and Seijo, 2013), except for a few cases (i.e., the Chilean Jack Mackerel fishery, the Mexican abalone fishery, the Red Spiny Lobster fishery in Baja California, Mexico, the Loco fishery in Chile, the Peruvian anchovy fishery). In spite of that, the few impact evaluations of RBM systems have concluded that they are superior to traditional command and control systems (Castilla and Gelcich, 2008; Begossi and Brown, 2003; Castilla, 2010; Grafton et al., 2011; Costello and Kaffine, 2008; Kroetz et al., 2017; Jardin et al., 2012) and therefore, it can be argued, that the implementation of RBM systems could help to the sustainability of the marine species intended to protect.

C. Challenge 2: Water, Soil and Air Pollution

1. Water and soil pollution

3.24 In the LAC region, water quality is in critical condition, as reflected in the level of degradation of important aquatic ecosystems, whether land-based (rivers, wetlands, lakes) or coastal-marine. Water quality is significantly impaired in the region due to point sources of pollution (untreated wastewater, chemical pollutants from industrial waste, mining effluents), and non-point sources of pollution (deforestation, agricultural activities —both crop and animal production, including grazing— and wildfires). While the region has improved its wastewater coverage indices, it is estimated that more than 70% of wastewater in LAC is still discharged untreated into rivers, lakes, or the sea (Jouravlev, 2014). For instance, in El Salvador, 20% of riverbeds are catalogued as being in poor environmental condition, with indicators of organic pollution well above of acceptable levels. This is associated with an infant mortality rate from gastrointestinal diseases of 16 per 1,000 live births (Ministry of Environment and Natural Resources–MARN, 2014). A similar situation occurs in Peru, where 59 water basins are influenced by 1,376-point pollution sources from wastewater discharges, landfills, and mining environmental effluents, with high concentrations of thermotolerant coliforms, arsenic and cadmium (ANA, 2014).

3.25 Approximately 25% of the bodies of water in LAC have high concentrations of fecal coliforms (more than 10000 nmp/100ml). These high levels of contamination represent a challenge both to urban and rural areas in the region, since, according to Environmental Water Quality World Water Quality Assessment (2016), 25 million inhabitants of rural areas in LAC are in contact with contaminated surface waters from the cities (UNEP, 2016). Chile is approaching a level of urban wastewater treatment of close to 100%, and Mexico, Brazil and Uruguay treat over half of their urban wastewater (Lentini, 2015), but in other countries of the region, the levels are very low: Belize, the Caribbean, Colombia, Peru, and Bolivia (20%); Ecuador, Argentina, and Venezuela (10%); and Central America (5%) (Mahlknecht and Pastén Zapata, 2013). Latin America and the Caribbean would need to invest more than US$33 billion to increase the level of wastewater treatment to 64% by 2030 (Mejía et al., 2012).

3.26 Agriculture-related water pollution is another important source of water quality degradation in the region (WWAP, 2017). Nonpoint source pollution primarily through the use of

pesticides and fertilizers, is a serious consequence of agricultural expansion in LAC. Pesticide use in LAC represents 52% of world consumption (Furley et al., 2017) and the use of fertilizers has increased from 89 kg/ha in 2002 to almost 126 kg/ha in 2013 (FAO, 2016). Salinization from irrigation, and the use of raw, instead of reclaimed, water for irrigation are other sources of agriculture-related pollution (Willaarts et al., 2014).

3.27 Another important source of chemical pollution to air, soil and water are mining effluents, particularly from dispersed and informal mining. Specifically, mercury pollution from Artisanal and Small-scale Gold Mining (ASGM) is an issue of concern due to its prevalence in the region and its impact to human health. Globally, ASGM is the largest contributing sector to mercury emissions (37%); slightly higher than fossil fuel combustion sources. Per capita, mercury emissions from ASGM in LAC are the highest in the world at 0.46 g (AMAP/UNEP, 2013). Data on mercury releases to soil and water from ASGM are difficult to obtain, however, AMAP/UNEP estimates that LAC contributes to more than 36% of global releases. The average ASGM mercury consumption in the region was approximately 700 ton/y in 2015, with significant increases in the estimates for Peru, Ecuador and Suriname (UNEP, 2017). It is worth highlighting the case of Peru, the largest gold producer in LAC, which concentrates its ASGM sector in the Amazonian region of Madre de Dios. In spite of the Peruvian Government's efforts to limit gold mining activities, the artisanal mining in Madre de Dios increased by 40% between 2012-2016, exacerbating mercury-related health problems and deforestation of this Amazonian area (Asner and Tupayachi, 2016).

3.28 **Solid waste**. The Municipal Solid Waste (MSW) regional average collection rate is 89.9% (as a percentage of the population). Compared with a worldwide average of 73.6%, LAC has a high level of coverage, reflecting the priority the region gives to this service. Adequate MSW final disposal coverage (i.e., in sanitary landfills) is approximately 55% (as a percentage of the population),[23] which means that there is still a large amount of waste that is not disposed and/or treated adequately (mainly in controlled and open dumps) (45%). The controlled and /or open dumps are not always located in appropriate areas (such as sensitive areas such as sloping hillsides, ravines, and riverbanks), having the risk of creating problems of pollution because of potential improperly controlled gas emissions and leachate and generating propitious conditions for the development and proliferation of disease-bearing vectors (Díaz, 2009). The absence of planning instruments and capacities at the municipal level is one of the main obstacles encountered in facing the problem of waste. Barely 19.8% of municipalities in LAC have solid waste management plans, and only in Uruguay (73.9%), Argentina (74%), Peru (57.2%), and Chile (53.4%) do more than 50% of municipalities have such plans. As far as recycling is concerned, it has been estimated that only 2.2% of all MSW[24] in LAC is recycled under some sort of formal arrangement. Recyclable materials' recovery is mostly performed by the informal sector; however, few countries have begun to set recycling goals, including Brazil, where indices for specific materials have been implemented (IDB, 2010; UN-ECLAC, 2012). From an integrated solid waste management point of view, still there is room for several areas to be improved, not only including the enhancement of the final disposal practices, furthermore to improve the recovery rates, to formalize the recycling sector of the and to develop better minimization rates and policies. The situation for other streams (such as hazardous o industrial waste) is still in a more primitive stage of development.

3.29 **Marine pollution**, derived from poor waste management from in-land, is an environmental, economic and health problem affecting coastal and ocean regions in LAC.

[23] Since a universal definition of what a sanitary landfill is does not exist for LAC this figure could vary.
[24] Since the statistics are not including the informal sector the figure could be much larger.

Pollution from land-based point and non-point sources has spread across the seas, altering the chemistry and structure of marine ecosystem (i.e., dead zones). Marine pollution produces damage to human and marine wildlife health. According to NOAA, 80% of pollution to the marine environment comes from the land because of runoff. Specifically, in the case of the Caribbean, marine pollution is considered a significant issue, that threatens the sustainability of both marine ecosystems and marine biodiversity of the region (UNEP, 2008). However, this is not a problem exclusive to the Caribbean. Approximately two thirds of the total waste generated in LAC ends up in open-air dumps which poses a risk for releasing that waste into the sea (UNEP, 2008). In addition, 80% of wastewater dumped into the region's seas is untreated (Diaz and Rosenberg, 2018). This waste-related pollution from in-land could impact coastal ecosystems and consequently the health of local communities and marine biodiversity. At the same time, it could also impact tourism and fishery activities, threatening the livelihoods of coastal communities.

Box 2. Fighting Plastic Pollution

Plastic pollution is one of the most common finds during international coastal cleanups (Ocean Conservacy, 2017). To solve this issue, many governments in recent years have focused on bans or levies to plastic bags at the national and subnational level: Belize; Argentina (Buenos Aires); Brazil (Sao Paulo); Chile (National and Punta Arenas); Ecuador (Galápagos); Guatemala (several cities); Guyana, Honduras (local); and Mexico (Querétaro) have implemented bans; while Colombia and Mexico City implemented a combination of bans and levies, and Rio de Janeiro in Brazil a levy, only. Finally, Jamaica, Uruguay and Costa Rica announced imminent action on plastic bags and to some extent on foamed plastics. Costa Rica aims to eliminate single-use plastics by 2021 (UNEP, 2018). More research is needed to understand the impacts of these policies.

2. Air pollution

3.30 According to 2018 WHO Global Urban Ambient Air pollution data, most cities in LAC[25], with information of on ground level air pollutants, do not meet WHO Air Quality guidelines for particulate matter (PM) with a diameter of 10 microns or less (PM_{10} and $PM_{2.5}$). PM_{10} and $PM_{2.5}$ are the most health-relevant air pollutants since they can penetrate and remain inside the lungs. UNEP and the Climate Clean Air Coalition (2016) estimate that 64,000 to 81,000 premature deaths in LAC were associated with exposure to ambient $PM_{2.5}$. Moreover, most LAC countries have not adopted WHO guidelines, with the exception of Bolivia, Peru and Guatemala (Riojas Rodriguez et al., 2016). This represents nearly 150 million people living in cities that do not meet the guidelines. However, this figure may be underestimated since only 22% of LAC population count with information on ground level air pollutants (Riojas Rodriguez et al., 2016).

[25] Of 564 cities with more than 100,000 inhabitants in LAC, only 117 cities distributed among 17 of 33 LAC countries had official information on ground level air pollutants in 2014 (Riojas Rodriguez et al., 2016).

Box 3. Pollution-related disease and its prevalence among marginalized populations

Pollution was responsible for nine million premature deaths in 2015, 16% of total global mortality (Global Burden of Disease–GBD, 2015; Landrigan et al., 2017). At a global scale, costs to labor productivity arising from air pollution-related premature mortality has increased since 1995, up to US$170 million in 2015. In LAC, premature death from ambient pollution[26] has increased from 131,000 to 173,000 from 1990 to 2015, while labor losses were US$9.2 billion in 2015 (Sall and Narain, 2018).

Deaths caused by non-communicable diseases from ambient air, chemical, and soil pollution are increasing, while deaths from diseases associated with household air pollution, water pollution, and poor sanitation, are slowly declining –although they still kill millions of people, particularly children in low-income countries (Landrigan et al., 2017). LAC presents the same trend (also known as the epidemiological transition), moving away from infectious diseases and toward chronic, noncommunicable disease related to pollution produced by economic growth (Laborde et al., 2015). Countries such as Argentina, Chile, and Uruguay have completed the epidemiological transition. However, Brazil, Colombia, Costa Rica, Mexico, and Venezuela are passing through it, dealing with epidemics both from infectious and chronic diseases. On the other hand, countries such as Ecuador and Guatemala infectious diseases are still the predominant causes of morbidity and mortality (Marinho et al., 2013).

Regardless of having gone through the epidemiologic transition or not, in countries at every income level, pollution-related disease is most prevalent among vulnerable and marginalized populations (Landrigan et. al., 2017). For the poorest, which are exposed to higher risk factors and have less access to services, periodic medical care costs from chronic diseases compete with basic expenses (IDB, 2017). Women are also disproportionately affected by pollution, since they typically are the primary responsible household activities, and therefore, exposed to higher concentrations of indoor pollutants. A higher fraction of premature deaths for women is attributed to indoor air pollution at any age (World Bank and IHME, 2016). Menstrual hygiene, the prevalence of waterborne diseases, and spending time collecting water are other pollution-related issues that affect more women than men (IDB, 2017; Demie et al., 2016).

3.31 Short-lived climate pollutants are another type of air pollutant that also negatively impact human health and contribute to climate change. The good news is that they remain in the atmosphere only a relatively short period of time and, hence, can be quickly controlled through policy interventions and technological changes (UNEP, 2011). Black carbon, which lasts days to weeks in the atmosphere, hydrofluorocarbons (~15 years), methane (~a decade), and tropospheric ozone, also known as smog (~weeks to months) are the four main short-lived climate pollutants.

3.32 Although LAC is only responsible for 10% of total global anthropogenic emissions of black carbon, excluding those from forest and savannah fires, black carbon is a relevant substance from the local pollution perspective since also contribute to the formation of $PM_{2.5}$ and it is usually co-emitted with polycyclic aromatic hydrocarbons (PAHs), substances known for their carcinogenic effects (UNEP and CCAC, 2016). Brazil and Mexico account for 60% of LAC black carbon emissions. The main culprits are: the transport sector, which is the major contributor in most countries, and the residential combustion of solid fuels, which contributes with a higher proportion in Chile, Paraguay and Central American countries (UNEP and CCAC, 2016). Other relevant sources are the agriculture and industrial sectors, particularly the brick manufacture. According to UNEP and CCAC estimates, black carbon emissions will decrease in the coming decade if countries implement their planned urban air pollution abatement strategies, which heavily target the transport sector. However, emissions will increase again without the introduction

[26] In contrast, premature deaths from indoor air pollution in LAC, due to households' reliance on fossil fuels for cooking and/or heating, have decreased from 206,000 in 1990 to 65,000 in 2015. This decline reflects improvements in access to cleaner fuels but also a baseline adjustment in mortality from pollution-associated illnesses, independent of exposure, aging and other factors (Sall and Narain, 2018).

of new measures, for instance, from sources such as residential heating and cooking (UNEP and CACC, 2018).

3.33 Methane is a greenhouse gas, but it is also a precursor to the formation of tropospheric O_3, which in turn affects human health, agriculture yields and the quality of vegetation. The main sources of methane in LAC are agriculture (50%), fossil fuels production and distribution (coal, oil and gas) (40%) and waste management (10%). Finally, O_3, which is not emitted directly but formed by reactions of precursor gases such as methane, carbon monoxide and oxides of nitrogen, is responsible for 5,000 premature deaths (Ainsworth et al., 2012).

Box 4. Impacts of Climate Change on Natural Capital

The retreat of Andean glaciers, the drying up of wetlands and heathlands caused by climate change are substantially altering stream flow patterns (Parry, 2007; Anderson et al., 2011). Climate change will continue to impact the Amazon ecosystem and it will threaten LAC terrestrial biodiversity due to species range shifts. It will also reduce agricultural yields, livestock and fisheries, although there may be opportunities in adaptation such as increasing rice yield in several LAC countries or higher fish catch potential in the southernmost South American waters (Reyer et al., 2015).

Climate change related impacts such as increase in sea surface temperature and ocean acidification could alter the region's marine and coastal biodiversity (Rijnsdorp et al., 2009; Cheung et al., 2010). Specifically, coral reefs, mangroves, fish species, and other benthic marine invertebrates are threatened by those climate-induced phenomena (IPCC, 2014). For instance, it is predicted that the Mesoamerican coral reef will collapse by mid-century (between 2050 and 2070) due to ocean acidification, causing major economic and environmental losses (IPCC, 2014). Regions like the Southern Gulf of Mexico and the Caribbean are particularly vulnerable to sea level rise and changes in the seasonal storm behavior (Day et al., 2008; Taylor, 2012; IPCC, 2013). Also, there is climate modelling evidence that suggests an increase in the occurrences of El-Niño, which could affect the Pacific coastline of LAC (IPCC, 2001; Yeh et al., 2009; Cai et al., 2014). It is estimated that nowadays in LAC more than 7.5 million inhabitants and US$334 billion in built capital are exposed to flooding (Reguero et al., 2015). With extreme sea levels, changes in storm behavior, and population growth, over nine million people could be exposed and vulnerable to flooding by the end of the century (Reguero et al., 2015).

D. Challenge 3: Gaps in Governance

3.34 **Insufficiency of protecting mechanisms**. To one degree or another, LAC countries have established various types of legal instruments aimed at protecting terrestrial and coastal and marine ecosystems, particularly by enacting protected areas and national parks (Dourojeanni and Quiroga, 2006), however their management is still inadequate. Thus, the protected area surface in LAC has grown to exceed 20% of the territory, from 1,966,400 km^2 in 1990 (8.8%) to 4,634,067 km^2 in 2014 (23.1%) (UNEP-WCMC, 2014; World Bank Development Indicators, 2018). The increase in the declaration of protected areas, including the number of laws and regulations associated with biodiversity, does not appear to have resulted in better biodiversity indicators, as described below.

3.35 According to the IUCN and the Biodiversity Indicators Partnership (2010), the LAC region obtained a score of 0.51 (on a scale of 0 to 1) in management effectiveness of protected areas, surpassing only Africa (0.49). In addition, 46% of the protected areas in the region are subject to clearly inadequate or seriously deficient management, and only 16% are under management that has been rated as acceptable. Several studies show that protected areas are in large part fragmented, poorly managed (Brandon et al., 1998; Dudley and Stolton, 1999; DeFries et al., 2005; Leverington et al., 2010), or insufficiently financed (Bruner et al., 2004; Bovarnick et al., 2010). Less than half of LAC countries have completed a review of their national biodiversity strategies.

3.36 According to Barcena (2002), it is estimated that of the 1% of GDP that LAC countries allocate to environmental protection,[27] less than 0.01% is used to protect natural protected areas. This is equivalent to US$1.18 per protected hectare per year. These budget allocations plus funds from international sources cover less than 54% of the minimum financial needs of existing protected land areas in LAC, or 34% of what would be needed for optimal management. In terms of global financial needs for managing already existing protected areas in LAC, it is estimated that approximately an additional US$317 million would be required per year to address the minimum operating needs of these areas, plus US$700 million per year to ensure they are properly managed (Bovarnick et al., 2010). In addition, not all ecosystem types are well represented in the existing protected areas network of the region. According to TNC estimates (2007), US$22 million per year would be required to expand the protected areas network to cover gaps in the representativeness of ecosystem types in many countries of the region.

3.37 The enactment of MPAs is intended to stop some key threats to marine ecosystems (e.g., overexploitation, habitat degradation, and invasion of alien species) (Roberts, 2005). The Convention on Biological Biodiversity established the Aichi Target 11 that commits signatory countries to enclose 10% of marine environments in "effectively and equitably managed" protected areas by 2020. In the case of LAC, by 2015, the region had only protected 3.4% of their total marine area; and only two LAC countries had met the 10% target: Ecuador (13%) and Nicaragua (10%) (UNEP-WCMC, 2016). Nevertheless, important advances have been made in the region through the enactment of new large MPAs in the last years. For instance, in 2017, Mexico enacted the Revillagigedo Archipelago National Park (150,000 km^2). Meanwhile, during the same year, Chile established two new MPAs: (i) the Rapa Nui-Rahui (740,000 km^2); and (ii) Cabo de Hornos and Islas Diego Ramírez (100,000 km^2), as well as expanded one: the Juan Fernández MPA (450,000 km^2).

3.38 To increase the number of MPAs is not enough to assure protection of marine environments in the region. There are still many challenges for the sustainable management of marine ecosystems and biodiversity within or outside MPAs in LAC. In fact, despite the increase on the coverage of MPAs in LAC in the last decade, they had not fully accomplished their desired conservation effect (i.e., improvement of marine ecosystems' health) due to design, funding, governance and enforcement problems (Guarderas et al., 2008; UNEP, 2012). Therefore, there are still multiple opportunities to strengthen the effectiveness of MPAs in LAC such as: (i) incorporating a wide-range of MPA financing instruments; (ii) reinforcing social engagement in their governance systems; and (iii) establishing new networks of MPAs or combinations thereof to enhance protection out of MPAs boundaries (Kuempel et al., 2017; Guarderas et al., 2008).

3.39 **Gaps in governance.** Interventions such as public-private co-management arrangements, co-management by indigenous peoples, Payment for Ecosystem Services (PES) mechanisms, development of non-timber resources, and nature tourism have high potential for contributing to enhancing natural capital and ecosystem services but require solid environmental governance and long-term planning.

3.40 In terms of institutional structure and legal frameworks, all countries of the region have some type of general (not sector-specific) framework law for environmental management, and many have sector-specific laws and regulations, including Environmental Impact Assessment (EIA) regulations. Furthermore, the institutional capacity to monitor, verify and

[27] By comparison, national expenditure on environmental protection relative to GDP in the EU-28 was on average 2.1% in 2015 (Eurostat, 2017).

enforce those regulations varies among countries and public management systems. A forthcoming IDB study on the regulatory framework and institutional capacity of five LAC countries regarding air and water quality finds that, although sometimes incomplete, most of the countries have in place a regulatory framework for the stewardship of air and water resources, albeit more developed for the latter. However, applying the adopted legislation has not always been feasible due to insufficient human and financial resources in the environmental agencies, lack of data on environmental indicators, and specially lack of policy coherence and coordination among different levels of governance and/or sectors. In addition, each socioeconomic context and lack of political support are underlying factors affecting the implementation and enforcement of existing legislation. The study has also found that command and control is the instrument of choice, with a significant absence of positive measures to incentivize compliance. The results point out the need to: (i) set in place regulatory analytical requirements (environmental, social, and economic analysis) prior to establishing environmental regulations; and (ii) ensure cooperation among authorities to promote policy coherence and an adequate mainstreaming of environmental matters.

3.41 Notwithstanding the foregoing discussion, several diagnostic assessments and studies of these issues (Gómez et al., 2006; INECE, 2009; Bovarnick et al., 2010; Acerbi et al., 2014; Blackman et al., 2014) highlight the following challenges and weaknesses in the LAC region:

a. **Limited mainstreaming of environmental matters in sectoral planning**. While environmental initiatives have emerged in recent years in productive and infrastructure sectors such as transportation, energy, agriculture, tourism, housing, and others, the intersectoral coordination needed to implement environmental legislation continues to be dispersed and isolated. In addition, many sector policies are inconsistent with environmental objectives in their management of a specific resource (e.g., water) or territory.

b. **Low levels of environmental investment and public expenditure.**[28] Several studies have attempted to determine the levels of public spending aimed at protecting the environment and natural capital, using various methodologies (Eurostat, 2005; OECD, 2007b, etc.) as well as the United Nations System of Environmental-Economic Accounting (SEEA) (European Commission et al., 2012; Oleas-Montalvo, 2013). The findings of these studies show that environmental investment and public expenditure in LAC equal less than 1% of GDP. Only Brazil, Mexico, and Costa Rica exceed 0.6% of GDP, far from the OECD average, which is in the vicinity of 1% of GDP (IDB, 2012; European Commission et al., 2012; UN-ECLAC, 2012; IDB, 2013a).

c. **Shortcomings in the use of EIA and environmental permitting systems.** While the use of EIA procedures is now well established in most LAC countries and the pertinent authorities have ample experience, there are evident shortcomings and limitations (Triana and Enriquez, 2007; Acerbi et al., 2014). Particularly noteworthy is the lack of institutional capacity for project monitoring, which often is not performed after the relevant license or permit is issued (Astorga, 2006). All this has affected the credibility of the EIA process. The inclusion of environmental aspects at the strategic level in the design of policies, plans, and programs continues to be

[28] Environmental public expenditure is defined as spending by public institutions on significant activities directly aimed at preventing, reducing, and eliminating environmental pollution or any other degradation of the environment resulting from human activity, as well as on natural resource management activities not aimed at the development of resources or production.

subject to significant limitations and gaps and is in most cases insufficiently developed in the legislative framework (ECLAC and MINAMBIENTE-Colombia, 2009; OECD, 2007a; IUCN-ORMA, 2007; VBRFMA, 2007; CAF, 2010; Utrilla, 2011).

d. **Noncompliance with laws.** All the foregoing weaknesses create a relatively generalized situation in which the regulatory and legal provisions are not fully complied with and/or compliance is not verified. In many cases, fines are assessed but never paid, in others, companies prefer to pay fines rather than comply with environmental requirements (Russell and Vaughan, 2003; Akella and Cannon, 2004). In this context, permitting systems become transaction costs with little added value for the companies or for environmental conservation.

e. **Insufficient use of economic instruments.** The use of economic and market instruments in LAC as part of the environmental management toolkit has taken place in varying contexts, such as in introducing tradable property rights to fisheries or implementing disposal fees. However, the management emphasis continues to be primarily on administrative and command-control systems that are generally poorly managed. While the number of PES programs implemented in recent years has increased significantly, their effectiveness and value for money remains to be demonstrated (Salzman et al., 2018).

f. **Lack of information and environmental accounts**. In the LAC region, there is a notable absence of systematized environmental information at the sector level. As a result, natural capital and the ecosystem services it generates are not adequately taken into accounting in policy design. The greatest information deficit is in understanding the supply and demand of ecosystem services and their contribution to productive processes particularly in the case of aquatic, coastal and marine systems (Ferraro and Pattanayak, 2006; Pullin and Knight, 2009; Arroyo et al., 2010; UN-ECLAC, 2012; Blackman et al., 2014). With the first internationally recognized standard for environmental-economic statistics now published, countries now have a rigorous framework which enables them to produce and monitor environmental indicators and account for natural capital and ecosystem service impacts in decision making (United Nations et al., 2014a; United Nations et al., 2014b).

g. **Vulnerability to disaster risks.** The severity of disasters triggered by natural phenomena (e.g., hurricanes, droughts, floods, earthquakes) in LAC has in all cases been shown to have greatest impact on the poorest and most unprotected population groups, including indigenous peoples, Afro-descendants, and women (World Bank, 2006, 2007; UNEP, 2010d; UN--ECLAC, 2012). According to the IDB's Index of Governance and Public Policy in Disaster Risk management (iGOPP),[29] none of the 23 LAC countries analyzed to date obtains a notable or outstanding rating, and more than half obtain an incipient or low valuation. These results point out at the need to strengthen the regulatory and institutional frameworks in relation to disaster risk management.

3.42 The region's environmental challenges and associated gaps in governance and institutional arrangements, largely reflect the fact that environmental public policy and allocation of investments for natural capital conservation are not always a political and economic priority. This is due in part to a short-run perspective that emphasizes perceived short-run trade-offs between economic growth and the environment, due in part to short

[29] The IGOPP aims at identifying legal, institutional and budgetary constraints regarding disaster risk management.

political cycles. Sustainability requires a long-term view that takes into account the returns that natural capital and ecosystem services provide over extended time horizons. To this point, a comprehensive assessment of costs and benefits that incorporate the valuation of ecosystem services to human health and well-being may contribute to better understand the costs of inaction. Furthermore, it is essential for countries, regardless of their income level, to develop appropriate management and governance instruments geared towards public and private entities that internalize environmental externalities and create markets such that natural capital and ecosystem services are considered in national, firm and household-level decision making processes.

IV. Lessons Learned from the Bank's Experience in Environment and Biodiversity

A. Reports of the Office of Evaluation and Oversight (OVE)

4.1 The Office of Evaluation and Oversight (OVE) recently concluded an evaluation of the IDB's Environmental and Social Safeguards. OVE's evaluation focuses on the analysis of compliance with Environmental and Social safeguards, withouth analyzing the mainstreaming role that the IDB has. Therefore, the scope of the evaluation does not capture the work of the operational sectors of internalizing environmental and social aspects in their projects. Nevertheless, although the evaluation does not analyze the Bank's role in supporting the environmental governance of LAC countries, it recognizes the Bank can have a high impact on local capacity through specific operations. Furthermore, the evaluation is consistent with the findings of this SFD on the need to foster civil society engagement and to integrate environmental considerations in productive sectors. OVE found that where IDB projects developed long term engagement with local communities and innovative approaches to key safeguards issues, such communities became an integral part of project design and improved their livelihood opportunities, even if they had been displaced because of project interventions (OVE, 2018).

4.2 Focusing greater attention on the social aspects of sustainability and on considering climate risks in relevant projects were recommendations of previous OVE sectoral evaluations (OVE, 2012; OVE, 2013 and OVE, 2014a) that are consistent with this SFD. In addition, OVE's recent review of IDB and IDBInvest project performance (OVE, 2016) found that three of the four environmental projects evaluated lacked guaranteed financial resources to maintain investments which contributed to a less than Satisfactory rating in terms of sustainability. Placing a greater emphasis on the sustainability of investments was also recognized as relevant in OVE's Country Program Evaluation (CPE) for Ecuador (CPE, 2012-2017).

4.3 Consistent with the evidence presented in this SFD, OVE has also highlighted the importance of strong environmental governance. For instance, the CPE for Guyana (2012-2016) underscores the importance of a robust institutional and regulatory system for environmental conservation. OVE highlighted the work under the Environment Sector Strengthening Policy Based Programmatic Series in Guyana (GY-L1039 and GY-L1043), which enhanced Guyana's environmental policy and regulatory framework and developed a monitoring, reporting, and verification system to measure deforestation and forest degradation. The program helped Guyana gain access REDD+ funds and funding from the Government of Norway. The CPE in Bahamas (2010-2017) also emphasized the importance of strong governance which is currently an issue in the energy and water sectors.

B. Lessons Learned from Projects

4.4 This section assesses the Bank's recent experience with the environment and natural capital, referring to Bank reports and analyzing a relevant sample of operations. Analysis of loan Development Effectiveness Matrices (DEM) is not included since the environment and natural capital considerations are transversal and increasingly mainstreamed in Bank operations in the conventional economic sectors. As such, most Bank investments that address the environment or natural capital are components of operations rather than standalone projects, with some exceptions such as Policy-Based Loans for Environmental Governance (for instance, the Program for the Strengthening of Environmental and Natural Resource Management in Bolivia, BO-L1183).

4.5 In 2017, 45% of loans approved during the year were aligned to the transversal themes of climate change and environmental sustainability and accounted for US$5.1 billion of lending (IDB, 2017). In addition to investments directly in environmental governance and climate policy, these investments that mainstreamed the environment and climate change considerations targeted key sectors such as renewable energy, energy efficiency, wastewater treatment, solid waste, sustainable infrastructure, urban recovery and resilience, clean production, climate change adaptation in agriculture, green credit lines, sustainable tourism, and disaster risk management.

4.6 To extract key lessons learned related to the environment and natural capital, a review of 35 Bank operations was conducted which included 5 completed projects and 31 projects in implementation.[30] Selection criteria was that the operation explicitly included the environment and natural capital considerations among its objectives or components, and that the operation should either be fully disbursed or in an advanced stage of execution. The sample included operations across sectors including water, sustainable cities, climate change, energy, transportation, and agriculture. The review strategy was comprised of analysis of Project Completion Reports (PCRs), Project Monitoring Reports (PMR), Loan Proposals and Technical Notes, as well as interviews with team leaders and specialists in environmental management. Hereafter, the main lessons learned are described.

4.7 **Strong environmental management and modern governance systems are essential requirements for enhancing environmental sustainability in LAC countries**. Since the 1990s, the Bank has supported countries in strengthening policy frameworks and environmental governance, initially by fostering the creation and strengthening of national environmental authorities (ministries or environmental agencies) and the development of regulatory frameworks. Subsequently, support has evolved toward formulating and implementing economic instruments for environmental management and conservation. More recently, the Bank seeks to modernize systems to optimize environmental management and contribute to competitiveness and sustainability. The operational experience, both in policies and investment programs show that improving environmental performance is conditioned by: (i) institutional frameworks at various levels of government; (ii) laws and regulations that translate policies into practical rules and behavioral norms to facilitate implementation; (iii) the alignment of management instruments that enable effective implementation of institutional actions; (iv) the long-term allocation of resources that empowers executing units and provides them with autonomy; (v) information systems accessible to all the citizens; (vi) transparency and accountability; and (vii) mechanisms that foster the engagement of civil society.

[30] Among the projects 15 were approved from 2015-2018 and the remaining 16 in previous years.

4.8 **Improving institutional capacity and mainstreaming the environment and natural capital across productive sectors are key aspects to improving environmental performance**. The Bank has worked in improving institutional capacity in the region through capacity building with national and subnational environmental authorities and mainstreaming the environment and natural capital through supporting the design of economic instruments to internalize environmental externalities. The Program for the Strengthening of Environmental and Natural Resource Management in Bolivia (BO-L1183), and the Improvement of the Competitiveness of Tourism and the Development of Tourism Corridors in Argentina (AR-L1071), provide valuable lessons in terms of modernization of the regulatory and institutional framework and environmental management. Key lessons learned include: (i) loan objectives should be consistent with the financial resources available and mechanisms that enable effective management; (ii) capacity building and raising awareness in environmental issues at different levels of government and across sectors can yield dividends; (iii) engaging institutions and communities is critical at the preparatory phase of operations, to: address concerns/requests; manage expectations, and secure their support throughout the execution phase; (iv) ensure solid institutional capacity and expertise in regulatory agencies; and (v) foster coordination among governmental institutions and levels (sectoral, municipalities, regions and national institutions) to align goals and ensure an adequate enforcement of environmental legislation.

4.9 The Sustainable Tourism Program II (BL-L1020) in Belize is a good example of interinstitutional coordination which achieved the alignment of economic and conservation objectives; in this program, the environmental sustainability of the tourism destination was a critical factor for enhancing tourism revenue and local economic development. Another example is the Environmental Management Program for Misicuni Watershed in Bolivia (BO-L1053; 2241/BL-BO) which demonstrates the value of mainstreaming the environment and natural capital throughout the project cycle, and in this specific case, an investment in water resource infrastructure.

4.10 **Improved information systems are critical for informing decisions and enhancing transparency**. In Bolivia, the Policy-Based Loan BO-L1183 (3921/BL-BO) supported information systems for monitoring and reporting information related to mining, water and air pollution. The data generated provides an evidence-base for government and citizen action. In this respect, this operation has contributed to: (i) a manual for the design and operation of air quality monitoring networks that standardizes measurement methods and data interchange protocols; (ii) creating an inventory of the main sources of water pollution; and (iii) development of a field-based methodology for tracking mining-related environmental liabilities following international best practices.

4.11 The Bank supports investments aimed at reducing pressure on the global environment and natural capital, where strong monitoring systems are needed to evaluate project outcomes. For instance, the Programmatic Policy-Based Loan Strengthening of the Environmental Sector II (GY-L1043; 3422/BL-GY) has approved a Low Carbon Development Strategy to coordinate interests in land-use planning. Operational experience derived from this project demonstrates the significance of developing a monitoring and verification mechanism based on robust indicators to enable monitoring trends in deforestation and forest degradation. Nevertheless, most projects lack adequate mechanisms to measure impact in a systematic and comprehensive way. Thus, further work is required in the development of monitoring systems and improving information access to facilitate effective monitoring and meaningful impact evaluations that can inform future interventions.

4.12 **Using rigorous and cutting-edge methodologies for impact evaluation can shed light in the relationship between natural capital and economic growth.** The Bank has carried out operations in shoreline stabilization, coastal ecosystem recovery, and coastal access improvement in which it has applied rigorous and cutting-edge methodologies to identify and quantify their economic and social impacts. For instance, Barbados' Coastal Infrastructure Program (BA-0019; 1386/OC-BA) included an innovative impact assessment, which used remote sensing luminosity data as a proxy for the economic activity in the coastal area (Corral and Schling, 2017). Results showed that in the first three years after the completion of the coastal stabilization works, local economic impacts were positive and lasted at least an additional two years. This evaluation demonstrated that investment in coastal stabilization serves not only to preserve the fragile ecological conditions of coastal ecosystems, but also contribute to sustainable economic growth.

4.13 **Incorporating ecosystem-based management into national planning**. A few interventions in Integrated Coastal Zone Management (ICZM; e.g., coral reef restoration to protect beaches, green/soft coastal engineering, real-time ocean and coastal monitoring and community science for climate change adaptation) have been piloted in The Bahamas (BH-T1029, BH-T1038, BH-T1040), Jamaica (JA-G1001, JA-G1002), Trinidad and Tobago (TT-T1034, TT-T1038) and Haiti (HA-L1095). In the case of The Bahamas, a disaster and climate-resilient ICZM plan combined with a pilot ecosystem-based development plan for Andros Island, the first of its kind in the Caribbean, are being developed as a comprehensive approach to national economic development planning. Similar initiatives are also being implemented in Latin America. For example, in 2013, the Bank approved the Program to Support the Sustainable Development of the Department of San Andrés, Providencia and Santa Catalina Archipelago (CO-L1125; 3104/OC-CO), which includes a component for improving coastal infrastructure and incorporating coastal erosion risk management in physical planning. From these interventions, the Bank has learned the importance of focusing ICZM on resilience and ecosystems-based management, promoting the integration of different approaches such as Disaster Risk Management, Climate Change Adaptation and Ecosystem-based Adaptation.

4.14 **The private sector is a key protagonist in driving innovation that fosters enhanced environmental performance.** Valuable lessons are extracted from the private sector's development and adoption of environmental management programs and clean production technologies. First, raising awareness and providing training to stakeholders is essential to ensure the adoption of the programs. Second, economic instruments, such as forest certification can improve environmental performance by, for example, encouraging firms to produce and use sustainably managed timber. For instance, the Forest Sustainability and Competitiveness Program (AR-L1067; 2853/OC-AR) establishes a forest certification program in Argentina to guarantee sustainable extraction of timber through an independent verification program.

4.15 **Greater community engagement ensures a higher rate of acceptance and sustainable outcomes.** The Environmental Sanitation and Urban Development Program in the Mané Dendê River Basin (BR-L1487; 4302/OC-BR) highlights the desirability of promoting the active participation of the community in the drafting and approval of resettlement schemes. The lessons learned from the Integral Management of the Caroni River Watershed Program (VE-L1006; 1687/OC-VE) reveal that generating self-management capacities within the local communities allowed for the operation to be maintained in the event of unexpected changes in the country's macroeconomic context. Moreover, the project, Managing the Human-Biodiversity Interface in the Southern Marine Protected Areas of Haiti (HA-G1036; GRT/FM-16314-HA) offers lessons on the

importance of reconciling conservation with community priorities and cultural values of traditional communities.

4.16 In general, lessons from the Bank's operational experience emphasize the importance of early evaluation of risks associated with projects located in areas of potential conflict with rural communities, with the aim of: (i) resolving in a consensual and decisive manner questions related to access and use of resources; (ii) mitigating socio-environmental conflicts that may stem from an intervention; and (iii) strengthening good governance through agile communication between authorities and communities that enables potential issues to be anticipated and addressed in early stages. The lack of adequate consultation was found to be a major social driver of conflicts, along with lack of community benefits and reduced access to resources. In addition, the most common environmental drivers of conflict were ecosystem degradation and pollution, among others (IDB, 2018).

4.17 Moreover, it is noted that programs addressing solid waste management, such as the Project for the Development of Solid Waste Management Systems in Priority Areas (PE-L1092; 2759/OC-PE), or river basin and wastewater management, such as the Environmental Recovery Program for the Amatitlan Lake Basin (GU0066; 1651/OC-GU), among others; generate positive effects in the health of the population. The mentioned programs will limit, on one hand, uncontrolled fires or improper disposal of the waste generated; and on the other, the degradation process of watershed resources.

4.18 Lastly, the Bank's operational experience highlights the relevance of identifying business opportunities to: (i) give priority to those opportunities that provide a higher environmental and social impact (for instance, in terms of preservation of culture, the environment, or management of natural capital); (ii) foster community ownership and commitment to sustainability; and (iii) leverage sovereign guaranteed operations with MIF support (e.g., matching grants) and IDBInvest operations.

C. The Bank's Comparative Advantages in Environment and Biodiversity

4.19 The Bank's comparative advantage is its proven capacity to mainstream natural capital and ecosystem services in its operations, both public and private, and it has demonstrated this, for example in the transport sector (Mandle, Griffin et al., 2016), coastal infrastructure and resilience (Schueler, 2017) and in integrating natural capital accounts in decision-making frameworks (Banerjee, Cicowiez et al., 2017). The Bank has provided support on the natural capital and biodiversity agenda through its diverse portfolio, from specific projects in protected areas and economic instruments for enhanced environmental performance to specific project components in conventional sectors. The Bank has a track record of demonstrating natural capital mainstreaming in its work, for It also illustrates the Bank's great potential for leveraging resources and scaling-up its operations, in view of its ability to resort to a variety of economic instruments to satisfy the different needs of member countries both large and small.

4.20 With ministries of finance acting as the focal point for dialogue with the Bank, the IDB holds a privileged position for its ability to advance the mainstreaming of natural capital and ecosystem services in economic policy and internalizing environmental externalities across sectors. Similarly, with IDBInvest and MIF, the IDB Group has an array of financial instruments and mechanism at its disposal which provide it with a unique comparative advantage compared to other institutions working in the natural capital space. This positions the Bank to undertake coordinated actions to face complex challenges related to infrastructure, for example, by strengthening capacity for infrastructure planning, while leveraging private investment for its implementation.

4.21 Furthermore, the IDB has been working with LAC countries on strengthening their existing systems of safeguards for identifying and managing environmental and social impacts. The IDB holds a regional dialogue to increase knowledge, capacity and implementation of environmental compliance and licensing in the region. The Bank has been reinforcing its strategic positioning on these subjects, helping to generate knowledge and strengthening the establishment of strategic partnerships with both the public and the private sector.

4.22 The Bank's multi-donor fund for Biodiversity and Ecosystem Services, the BIO Program[31] was illustrative of the IDB's comparative advantage in mainstreaming natural capital in productive sectors and the value added of providing technical assistance to support loan operations as well as leverage new ones. Based on the experience of the BIO Program, the Bank is launching the IDB's Natural Capital Lab, a new space where public and private sectors can work together on driving innovation in conservation and integrated landscape management for terrestrial and marine ecosystems. The Lab will test new models in natural capital finance, accelerate deployment of new technologies, develop initiatives to create enabling regulatory frameworks for innovation, and serve as a strategic resource through its engagement in the relevant natural capital international fora.

4.23 In addition, the Resource Allocation Scenarios and Global Environmental Benefits Targets for the 7th replenishment of the Global Environment Fund (GEF-7), for which the Bank serves as an implementing agency, has a sharper focus on the drivers of environmental degradation. The GEF-7 emphasizes the need for: (i) combating the pricipitious decline in global biodiversity; (ii) mitigating the reduction or loss in the biological and economic productive capacity of the land resource base; (iii) helping countries' harness their *blue economy* potential and support the management of transboundary freshwater and marine resources; and (iv) reducing and eliminating chemicals of global concern (such as mercury) and their waste in the environment.

4.24 The Bank will prioritize its actions on the environment and biodiversity based on its positioning and comparative advantage in member countries as a source of development financing. Such comparative advantages are reflected in the following aspects: (i) governance, policy framework, and institutional development; (ii) competitiveness, infrastructure, and private sector development; and (iii) social inclusion. In general, the Bank will not take on a leading role on issues that are in the direct purview of specialized environmental agencies and entities.

V. GOALS, PRINCIPLES, DIMENSIONS OF SUCCESS, AND LINES OF ACTION TO GUIDE THE BANK'S OPERATIONAL AND RESEARCH ACTIVITIES

A. Goal and Principles of the Bank's Work in Natural Capital and Ecosystem Services

5.1 The goal of the Bank's work is to help the countries of the region achieve high levels of environmental sustainability, reflected in: (i) the sustainable management of natural capital and enhanced supply of ecosystem services as an engine of economic growth and sustainable livelihoods, especially for the most marginalized populations; and (ii) the reduction of environmental pollution and degradation to improve the health and quality of life of the region's inhabitants.

[31] The BIO Program was established by the IDB in 2012 for a five-year period (2013-2017) (GN-2703). It had four lines of action, namely: (i) integrating natural capital in productive sectors; (ii) investing in priority regional ecosystems; (iii) strengthening environmental governance; and (iv) promoting private sector investment.

5.2 For purposes of this SFD, the guiding principles for future Bank interventions are as follows:

a. **Mainstreaming,** environmental considerations, natural capital and ecosystem services considerations are mainstreamed across economic sectors. This implies that environmental matters, natural capital and ecosystem services are explicitly accounted for in investment design and decision making.

b. **Competitiveness,** the region's natural capital is a key contributor to its competitiveness in domestic and international markets and represents its comparative advantage. Sustainable management of natural capital ensures that as a pillar of wealth, is basis for stable intergenerational well-being.

c. **Health and Social inclusion,** natural capital and the ecosystem services they provide along with a clean environment are of critical importance to the sustainable livelihoods and health of local populations, rural communities, and indigenous peoples.

d. **Transboundary scope,** emphasizing that the environment and biodiversity do not acknowledge borders and take the form of biological corridors, cross-border rivers, and transnational regional ecosystems, both land and marine, requiring joint and integrated action among countries.

B. Dimensions of Success, Lines of Action, and Activities

5.3 To achieve the goal of increasing environmental sustainability, three dimensions of success are proposed, each with its own main lines of action and activities. These dimensions of success and actions are based on the empirical evidence and the challenges faced by the LAC region. The aim is to ensure that the proposed interventions rely on proven models or that interventions are piloted to guarantee their effectiveness in the specific contexts in which they are carried out. In addition, the priority actions will enable the Bank to promote innovation and best practices and support member countries in fulfilling their commitments under international agreements.

5.4 **Dimension of Success 1. Make progress towards sustainable management of natural capital and enhance its contribution to economic growth.**

5.5 The empirical evidence and the diagnostic show that the sustainable use of natural capital and the enhancement of environmental quality result in the provision of wealth, intergenerational equity, and quality of life. The evidence shows that an integrated view that incorporates the value of ecosystems services is necessary to protect and enhance natural capital assets. There are two lines of action related to this first dimension of success:

5.6 **Line of Action 1**. Promote an integrated management of terrestrial, coastal and marine ecosystems with investments that aim to protect and enhance natural capital assets.

5.7 **Operational Activities**:

a. Promote integrated management of coastal and marine areas through an ecosystem-based approach for the sustainable development of coastal areas and use of marine ecosystem services.

b. Promote integrated management of forest ecosystem with other land uses such as agriculture and urban development to minimize the loss of ecosystem services provided by remaining forest cover, such as buffer zones around agricultural areas to minimize soil erosion and promote green spaces in urban areas.

c. Implement economic instruments, when feasible, to incentivize the sustainable use of natural capital.

d. Support capacity building for strengthening management and development of financial models for protected areas, biological corridors, and other ecosystems, including large-scale cross border ecosystems and regionally significant biological corridors.

e. Seek opportunities to implement mechanisms for securing medium- and long-term financing beyond political cycles to ensure effective governance and implementation of environmental programs including protected areas management and payment for ecosystem services programs.

f. Support governments combat ilegal or inadequate use/exploitation of natural resources through field inventories and monitoring, remote sensing analysis, other remote sensors such as drones.

5.8 **Line of Action 2.** Promote systematic mainstreaming of the environment in productive sectors, including opportunities for public and private investment.

5.9 This line of action requires crosscutting, multisector interventions, both within the Bank and at the interagency level in the countries, on issues such as natural resources management, urban sanitation, land tenure security, integrated water resources management, and climate change, among others. To a large extent, these actions are prioritized in other sectoral SFDs: Agriculture and Natural Resource Management (GN-2709-5), Water and Sanitation (GN-2781-8), Transportation (GN-2740-7), Tourism (GN-2779-7), Gender and Diversity (GN-2800-8), and Integration and Trade (GN-2715-6); and those to be approved: Energy and Climate Change.

5.10 **Operational Activities:** This SFD prioritizes the following activities that were not identified in the aforementioned SFDs and significantly contribute to the first dimension of success:

a. Integrate natural capital considerations in the Bank’s routine public policy and investment analysis (e.g., cost-benefit analysis) and encourage member countries to do the same.

b. Prioritize consideration of natural capital and ecosystem service impacts of interventions in sectors with the potential for high environmental and social impact including mining, hydrocarbons, hydroelectric power, urban development, and others.

c. Identify missing markets and promote market development for the provision of ecosystem services that are currently uncompensated.

d. Promote investments in sustainable use of natural capital and ecosystem services, based on rigorous analysis of main constraints per productive sector and, when appropriate, site-specific.

e. Promote corporate reporting on environmental sustainability indicators

f. Promote corporate procurement policies (by the industry sector) and lending policies (by the financing sector) that ensure the sustainable production of forest products and services; supports chain of custody (tracking of forest products as the move through the supply chain) and guarantees that banks and financing institutions don’t contribute financing activities that degrade the environment and communities living around them.

g. Develop strategic partnerships with private and nonprofit entities for the protection of natural capital.

h. Support the development of green infrastructure to build greater resilience and reduced risk and vulnerability to natural disasters.

5.11 **Dimension of Success 2. LAC people's health and well-being, including those of children, women, indigenous people and natural capital-dependent communities, are improved by: (i) reducing exposure to pollutants; (ii) reducing vulnerability to disaster risks.**

5.12 The empirical evidence and the diagnostic show that human health and well-being are closely linked to the health of the environment. Marginalized urban and rural populations, including children, women, elderly and indigenous and natural capital-dependent communities, are the most affected and exposed to pollutants, natural disasters, and environmental degradation. A clean environment, the integrity of natural capital, and the ecosystem services it provides are critical to the quality of life of many, particularly of the most marginalized populations. There are two lines of action related to the second dimension of success:

5.13 **Line of Action 1**. Invest in pollution management in air, water and soil and raise awareness on health-related pollution impacts:

5.14 **Operational Activities**:

a. Invest in improving measurement of quality indicators to monitor pollution and its effect on health and well-being.
b. Promote comprehensive assessment of costs and benefits that incorporate the environmental burden of disease.
c. Invest in pollution prevention and control measures to reduce air, water and soil pollution.

5.15 **Line of Action 2.** Promote investments to reduce threats and the vulnerability of exposed populations. For example, creating buffer zones that protect water bodies from agricultural runoff and pollution; promoting the use of mangrove forests in reducing impact of storms, tsunamis and erosion in coastal areas; or promoting urban green spaces in cities.

5.16 **Operational Activities:**

a. Support implementation of integrated disaster risk management measures, incorporating priority risk identification and reduction and climate change adaptation actions.
b. Foster the financial protection of disaster risk, and promote continuous improvement in readiness, response and recovery practices for disaster phenomena.
c. Support the development of structural and nature-based infrastructure to build greater resilience and reduced risk and vulnerability to natural disasters and climate change.
d. Promote urban environmental management, including the development of urban greenspaces, and reduction of disaster risks and climate threats.

5.17 **Dimension of Success 3. Environmental governance systems operate efficiently and effectively**

5.18 The evidence presented and the diagnostic of the environmental challenges facing the region indicate that environmental performance is determined essentially by: (i) the quality of governance institutions and, public policies including regulatory and market based; (ii) the adequate mainstreaming of environmental matters into productive sectors to

sustainably manage natural capital for enhanced ecosystem service provision; and (iii) the involvement of civil society in the decision-making process, including its access to sufficient environmental information. There are three lines of action for the third dimension of success:

5.19 **Line of Action 1.** Strengthen and improve the performance of environmental governance systems at the regional, national and subnational level, for the application of environmental regulations and standards, strategic management, and monitoring, oversight, and enforcement of the law.

5.20 **Operational Activities**:

a. Build institutional capacity for sustainable environmental management in ministries of the environment, other line ministries, and other entities responsible for policy design and legal and regulatory compliance, including municipalities and provincial and/or regional governments.
b. Identify legislative gaps and assist in the development of environmental laws and regulations that ensure a sustainable use of natural capital.
c. Support strengthening environmental management and governance capacity at the municipal and local levels, reinforcing participatory processes for local and community empowerment.
d. Build capacity of personnel in relevant agencies to perform due diligence on bidders and contractors as well as to manage conflict of interests.
e. Promote mechanisms to report prohibited practices and other irregularities, and that these reports are communicated to IDB's Office of Institutional Inegrity for IDB's financed activities.
f. Offer technical and analytic services for natural capital accounting under the System of Environmental-Economic Accounts (SEEA) and other venues to enable development of a robust information system for monitoring the status of natural capital and ecosystem services and for their consideration in decision-making processes.

5.21 **Line of Action 2.** Improve policy coherence among sectoral and environmental policies to effectively address environmental considerations.

5.22 **Operational Activities**:

a. Promote policy reforms that consider inter-linkages between sectoral and environmental policies to ensure coherence between economic and environmental goals and commitments under international agreements.
b. Provide evidence-based advice on environmental policies (regulatory and market-based), including sector-specific policies to provide adequate sustainability incentives and reduce private investment disincentives.
c. Build capacity for the performance of Strategic Environmental Assessments (SEAs), to increase their effectiveness.
d. Promote the use of spatial planning instruments to balance tensions between economic, social and environmental objectives.

5.23 **Line of Action 3.** Increase involvement of civil society and access to environmental information.

5.24 **Operational Activities**:

a. Where strong formal regulation is present, promote co-management of ecosystems by linking stewardship to the unique role that local communities can play in natural capital management.

b. Support interventions that protect natural capital and ecosystem services upon which the livelihoods of indigenous people are based.

c. Identify opportunities to empower women, ensuring that they share in the benefits of the sustainable management of natural capital and that they participate in the decision-making process.

d. Build capacity in the region by training the local workforce on sustainable practices and land stewardship.

e. Increase the measurement and quality of environmental information and build governmental capacity to produce, process and disseminate information readily and easily available to the public in a systematic way.

f. Promote maximum disclosure of environmental information.

g. To promote educational activities for the civil society to use the environmental information that the agencies will make available so that there is independent monitoring and more accountability in the use of the resources.

5.25 **Analytical and Knowledge Generation Activities:** it is proposed that the Bank prioritize the following activities for the three dimensions described above:

a. Undertake analytical studies to measure/benchmark the quality of environmental governance and performance in LAC, providing indicators that are comparable across countries to enable the Bank to prioritize its support for improving environmental governance in its investments across economic sectors.

b. Support the development of geographic information tools (aimed to assist decision making) that allow data integration across the different sectors and regions.

c. Continue to develop methods for integrating natural capital and ecosystem services in the Bank's economic analysis of loans, grants and policy proposals, as well as in the development of country strategies.

d. Conduct rigorous empirical research on the efficacy of command and control and economic regulation.

e. Undertake and disseminate economic assessments of the impact and effectiveness of economic instruments used in the region, identifying best practices and the key determinants of success in their use.

f. Undertake studies on climate change resilience in the context of the integrated management of coastal areas and their ecosystems, focusing on the development of policy instruments, impact assessment models, and monitoring systems.

g. Identify opportunities to promote citizen science for collecting, processing and analyzing data for monitoring biodiversity and to provide solutions for environmental issues.

h. Undertake sectoral dialogues in the region to analyze existing knowledge in and generate new knowledge on environmental key issues.

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