

ENVIRONMENTAL  
DATA DIALOGUES IN MEXICO

How data provision can help understand better environmental sources of financial risk and integrate them more effectively into mainstream financial decision-making



## UN Environment Inquiry

The Inquiry into the Design of a Sustainable Financial System has been initiated by the United Nations Environment Programme (UN Environment) to advance policy options to improve the financial system's effectiveness in mobilizing capital towards a green and inclusive economy—in other words, sustainable development. Established in January 2014, the Inquiry's work was extended for another two years in late 2015, and came to a close at the end of March 2018. It has published three editions of its global, landmark report: the first in October 2015, the second in October 2016, and the third in October 2017. It published its final, global report in April 2018.

More information on the Inquiry is at: [www.unepinquiry.org](http://www.unepinquiry.org) or from: Ms. Mahenau Agha, Director of Outreach [mahenau.gha@un.org](mailto:mahenau.gha@un.org).

## About this report

This paper was prepared by the UN Environment Inquiry with support from the UN Environment World Conservation Monitoring Center (WCMC). It contributes to build a dialogue between users and providers of environmental data for its integration in financial decision-making. The views expressed in this discussion paper are those of the authors and contributors, and do not necessarily represent the views of the Inquiry or WCMC. Comments are welcome and should be sent to [marcos.mancini@un.org](mailto:marcos.mancini@un.org) and [katie.leach@unep-wcmc.org](mailto:katie.leach@unep-wcmc.org).

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## EXECUTIVE SUMMARY



Managing risk is central to the effective functioning and stability of financial institutions. All capital is deployed based on expected ‘risk-adjusted’ returns. If environmental risk is being underestimated, capital can be over-allocated to higher risk activities. Therefore, improving environmental risk can support more efficient allocation of capital for long-term stability.

Natural catastrophes can affect the efficiency and effectiveness of markets. Financial institutions are exposed to environmental risks in a diverse set of ways (e.g. physical, transition, credit risk, underwriting risk, business risk, operational risk, legal risk, liquidity). These environmental risks are likely to alter the supply and demand dynamic of many industries, leading not only to physical damages in assets in credit, investment or underwriting portfolios but also other financial downsides along the value chain.

Environmental data therefore underpins the appropriate analysis of these risks and facilitates the development and use of a wide range of risk analysis tools and techniques.

As environment-related risks become more important and financially material to the real economy, an appropriate understanding and provision of environmental data will drive market efficiency by reducing information asymmetries in environmental risks and market effectiveness through the proper pricing of environmental risks.

However, significant challenges in the accessibility of data remain due to a lack of standardization in methods and data formats, data restrictions, decentralized data repositories, uncertainty of data provision regulations or poor inter-agency collaboration.

Under the German presidency in 2017, the G20 Green Finance Study Group (GFSG) identified Publicly Available Environmental Data (PAED) and Environmental Risk Assessments (ERA) as institutional and market barriers to the promotion of green finance.

PAED is often inaccessible and can limit the ability of financial institutions and policymakers to analyse or appropriately manage environmental risk exposure. With heightened awareness of environmental degradation and climate change impacts, the ERA agenda has evolved from an early focus on due diligence at the project level, to consideration of environmental factors across credit risk functions and other asset classes.

It is recognized that without proper environmental data, investors, lenders and insurers cannot assess the financial relevance of environmental or climate aspects of their decisions. Unfortunately, to date, climate-related financial risks are generally not considered by mainstream risk assessment and management frameworks, and uncertainty around how international commitments (such as the Nationally Determined Contributions under the Paris Agreement) will translate into policy and 2°C decarbonization pathways makes it difficult for risk managers to integrate in portfolio analysis.



Two dimensions remain key for further inquiry:

- ⦿ Information from the market to financial institutions; and
- ⦿ Information from financial institutions to the market.

In Mexico, the largest financial institutions are financial groups. Their operations cover nearly the entire investment chain, from individual retail customers and institutional clients, to sell-side capital markets activities. In this context, the availability and quality of environmental and social (E&S) information is critical for these financial institutions to fulfil their role in servicing the rest of the financial system, and remains a key challenge.

Within this context and taking on the recommendations provided by the G20 GFSG on PAED, the Central Bank of Mexico wishes to take a more systematic approach to understand how the use of PAED can improve financial decision-making.

The objective of this paper is to catalyse a dialogue between environmental data suppliers (e.g. National Institute of Statistics and Geography (INEGI), Environment and Natural Resource Secretary (SEMARNAT), National Biodiversity Commission (CONABIO)) and environmental data users (e.g. banks, insurance companies, asset managers, asset owners) in order to further integrate the use of PAED at each stage of the financial supply chain.

In order to frame this dialogue, this paper aims to start by:

- 1 Understanding Mexico's environmental open data practices and how they compare to other countries leading the sustainable finance agenda (Open Data Practice Benchmark)
- 2 Building up a knowledge base for financial institutions to understand the potential exposure to natural capital and climate change risk (PAED Catalogue).

### Open Data Practice Benchmark

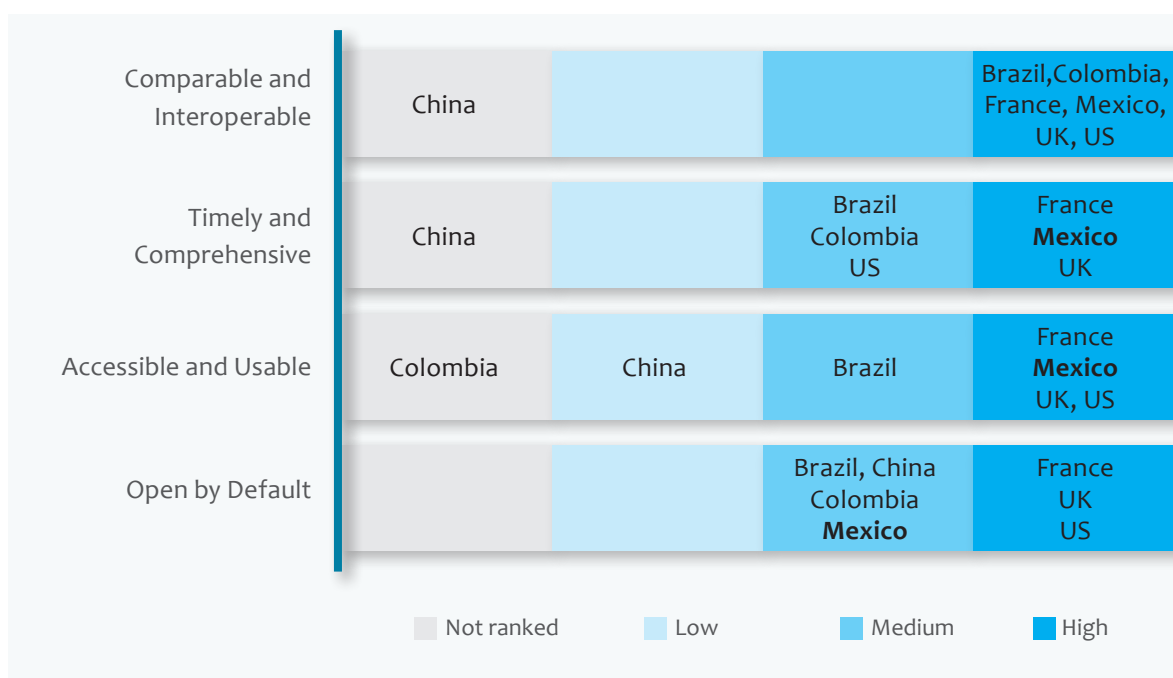
Following the 2030 Agenda for Sustainable Development, Mexico pledged to publish open data by signing the International Open Data Charter, a collaboration of 18 governments and 15 international organizations.

In this report, international open data practices and federated efforts, related to the use of PAED in the UK, the US, France, China, Colombia and Brazil were reviewed, and compared to current open data practices in Mexico. The International Open Data Charter principles were used to identify 'best practice'. Both France and the UK met the best practice standard for all the principles, and the US followed best practice for all but one. Our review showed that Mexico closely adheres to the principles and largely aligns with examples of best practice from other countries. In order to fully align with international best practice, it is recommended that Mexico: 1) create secure and confidential data use conditions, 2) disclose justifications for restricted data, 3) ensure any data alteration is published openly and 4) implement International Organization for Standardization metadata standards.

### Publicly Available Environmental Data Catalogue

National environmental data sets were reviewed, and the corresponding information was then collated into a spreadsheet as a PAED Catalogue using the Natural Capital Finance Alliance (NCFA) framework to determine the suitability of the information.

**FIGURE 1: ADHERENCE TO THE INTERNATIONAL OPEN DATA CHARTER PRINCIPLES**



Note: Each country is ranked as high (full alignment), medium (partial alignment) or low (no alignment). Not ranked indicates that there was little available information related to the principle.

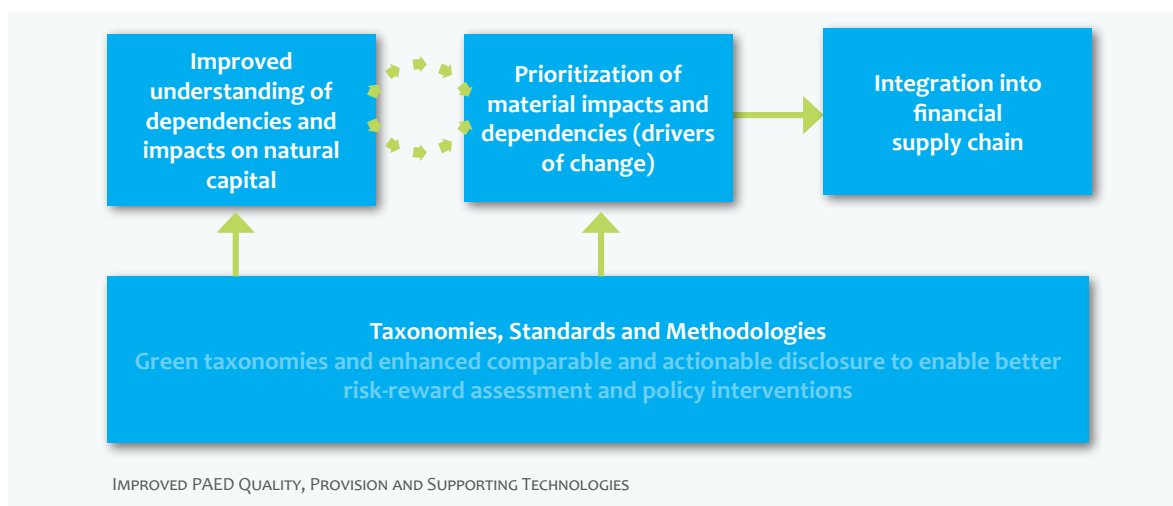
This report identified 186 different data sets, which cover 32 of the 35 data categories according to the framework developed as part of the Natural Capital Finance Alliance’s Advancing Environmental Risk Management project. The majority (94%) of the PAED entered into the catalogue come from governmental sources. About 63% of the data sets are drivers of change, such as pollution, that could potentially be integrated and affect financial decision-making if the information is provided in the right format for financial decision makers to consider. The rest of the data sets describe natural capital assets. The majority of data sets were available as online or downloadable maps, a format that currently prevents the scale up of environmental risk analysis beyond traditional project finance. Data from the private sector and non-governmental sources was not easily found.

Finally, most of the data was historical (98%), with only a few web portals providing data sets with forecasts or future predictions on, for example, weather conditions.

We noted the following gaps and challenges specific to the creation of a functional PAED catalogue:

- **Priority uses of data by financial decision makers have yet to be defined.** Clearly defining the information needs of different financial decision makers – from government and standard setters to investors, retail banks and insurers – will be important to develop a more tailored and comprehensive catalogue.
- **Data sets reported by national and regional sources (e.g. data focused on particular assets) will be required by some users, but may be more time-consuming to access than data sets with global coverage reported by international organizations.**
- **Data sets may require further analysis or interpretation of data to render them meaningful to assess risk.** Users may find raw data difficult to use and interpret.
- **Data credibility and the extent to which it is fit for purpose for decision-making will vary according to its source.**

**FIGURE 2: FRAMEWORK FOR UNDERSTANDING, PRIORITIZING AND INTEGRATING NATURAL CAPITAL IMPACTS AND DEPENDENCIES**



Source: Authors

## Next steps

To advance this environmental data dialogue to generate a more efficient and effective environmental data ecosystem for financial decision-making, a framework is presented together with some exploratory options:

### 1. Improved PAED Quality, Provision and Supporting Technologies

The analysis for risks and opportunities by financial institutions requires several types of environmental data. Databases are typically located in various sources or in non-traditional formats for financial institutions. It is therefore time-consuming for most financial firms that are relatively new to environmental analysis, to search and obtain such data or expand the scope of their ERA beyond project finance and below certain amounts.

Further improvement on this front could be made by encouraging a dialogue or the development of a national PAED task force to further explore:

- Establish a specific governance mechanism to advance PAED provision for the financial sector.
- Examine laws, regulations and market standards that price or help improve the pricing of externalities by providing market signals.
- Analyse current data provision and data gaps at different levels of aggregation (e.g. asset, firm, value chain, sectoral, regional, national) from both the public and the private sector.
- Consider the potential benefits of adopting technological developments to improve environmental data disclosure and use by financial decision makers.

### 2. Taxonomies and Standards

Data taxonomies and standards underpin the data ecosystem and structure the ways different actors in the data ecosystem interact with one another. In short, taxonomies and standards are part of the structural enabling environment for a functioning market and ecosystem for sustainable development data, as they enable market growth by redirecting capital flows towards more sustainable assets. Potential implications for the work of the PAED task force would be to:



- ⦿ Develop a sustainability taxonomy to help identify the underlying environment-related risk of brown vs green assets to enable market growth and reallocation of capital flows towards sustainable assets.
- ⦿ Implement the recommended disclosures of the Financial Stability Board’s Task Force on Climate-related Financial Disclosures (TCFD), as they provide a standardized common framework for disclosures in climate-related risks.
- ⦿ Consider the interconnectivity of TCFD implementation with existing financial statement and disclosure requirements as well as open data policies and standards.

### **3. Improve Understanding of Dependencies and Impacts on Natural Capital by the Business Sector**

There is an increasing amount of evidence highlighting the dependence of business on natural capital. In order to improve the understanding of dependencies and impacts on natural capital by businesses, it would be important for the PAED task force to:

- ⦿ Develop an analysis of environmental impacts and dependencies per sector prioritizing industries based on Mexico’s current production matrix, taking into consideration the potential implications of future technology shifts.

### **4. Prioritize Impacts and Dependencies to Natural Capital Assets and Drivers of Change Within Those Assets**

Based on the impacts and dependencies identified previously, the task force should undertake further research to prioritize impacts per industry based on financial materiality’ and environmental data availability in order to develop an environmental risk and information materiality assessment matrix.

### **5. Integrate into Financial Supply Chain**

The nascent state of environmental risk analysis and methodologies, the lack of commonly accepted future scenarios and the lack of clarity of future policy responses to environmental and climate challenges, have been identified as key barriers that hinder further consideration and integration of PAED into mainstream financial decision-making. In order to further environmental data and considerations into mainstream financial decision-making, the task force should further:

- ⦿ Identify key financially material sectors in banks portfolios.
- ⦿ Understand current ERA practices and how PAED is integrated in mainstream risk management processes in financial institutions.
- ⦿ Translate PAED materiality assessment matrix data sets into quantitative and standardized metrics of financial risk that are applicable in different investment contexts and to different sectors, companies and assets.
- ⦿ Map out different tools available (e.g. Carbon Risk Valuation Tool) and build capacity within the financial sector to understand key environmental sensitivities (e.g. potential disruptions) of businesses production processes.
- ⦿ Promote quantitative, portfolio-wide assessments of risk exposure based on sector, geographies and activities of the institutions.





# 1 INTRODUCTION



Every year since 2008, the World Economic Forum (WEF) works with experts and decision makers around the world to identify and analyse the most pressing risks that the world faces. As an outcome of this yearly engagement, the WEF publishes its *Global Risks Report*.

Given the deep interconnections between the environment and our economies, and the increasing evidence of the limits in planetary boundaries,<sup>2</sup> environment-related risks have prevailed among the top five risks since 2011 based on their likelihood to happen and, since 2017, on their impact.

Natural catastrophes can affect the efficiency and effectiveness of markets.<sup>3</sup> The increasing number of relevant losses and increased volatility in natural catastrophes<sup>4</sup> further accentuates these interdependences.

In Mexico, climate change affects 90%<sup>5</sup> of the territory and negative externalities estimated from environmental degradation are already valued as 4.7%<sup>6</sup> of GDP. Projections for the year 2100 estimate that the total annual costs could vary between 6.2% and 30% of GDP.<sup>7</sup>

Environment-related shocks can have first- and second-order effects on financial institutions. Recognizing this, in April 2015 the G20 asked the Financial Stability Board (FSB) to consider climate risk and, in December 2015, the FSB launched the industry-led Task Force on Climate-related Financial Disclosures to develop recommendations on climate-related financial disclosures.<sup>8</sup>

The work of the FSB TCFD, as well as work done by the G20 Sustainable finance Study Group (SFSG), has led to a growing recognition by G20 economies that “a proper framework for sustainable finance development may also improve the stability and efficiency of the financial markets by adequately addressing risks as well as market failures such as externalities.”<sup>9</sup>

The G20 Green Finance Study Group’s<sup>10</sup> objective has been to identify institutional and market barriers to green finance and, based on country experiences and best practices, analyse options on how to enhance the ability of the financial system to mobilize private green investment, thereby facilitating the green transformation of the global economy. To deliver on this objective, under the German presidency in 2017, the G20 GFSG identified Publicly Available Environmental Data and Environmental Risk Assessments as institutional and market barriers to the promotion of green finance.

Open data is defined as information content and/or data that is made available to anyone, free of charge and for re-use or redistribution without restriction. For data to be deemed truly open, it must comply with two dimensions: 1) data must be legally open, placed in a public domain with liberal or no use constraints, and 2) data must be technically open, machine readable, in usable formats and accessible without registration restrictions.” PAED is a form of open data that applies to environmental data reported by non-corporate entities (such as government agencies, international organizations, and



non-governmental organizations) and scientific institutes.<sup>12</sup> With the demand for open data recently extending to corporate entities, as shown by the FSB TCFD recommendations,<sup>13</sup> the scope of PAED in this review has been broadened to include information disclosed by corporate entities.

PAED is often inaccessible and can limit the ability of financial institutions and policymakers to analyse or appropriately manage environmental risk exposure. With heightened awareness of environmental degradation and climate change impacts, there is an increasing trend for financial institutions to consider environmental risks and the costs associated with them. For example, valuation risks associated with a predicted ten-fold increase in carbon prices are likely to cause the share price of carbon-intensive investments to drop by 70-80%. Further, loan delinquency ratios are predicted to increase for high-polluting industries (such as cement, metal production and oil and gas) as regulators enforce stricter environmental policies.<sup>14</sup> The increased frequency of natural catastrophes will also lead to higher insurance premiums to counter the effects of liability risks, thereby increasing the cost of non-environmentally friendly investment.<sup>15</sup>

Improved access to environmental data enables governments and the private sector to adapt to increasing environmental risks and global pressures, and to mainstream environmental protection through the Sustainable Development Goals (SDGs). However, significant challenges in the accessibility of data remain due to a lack of standardization in methods and data formats, data restrictions, decentralized data repositories, uncertainty of data provision regulations and poor inter-agency collaboration.

Mexico has shown significant improvement in open data practices in recent years, ranking 16th globally and establishing itself as the regional leader for open data in Latin America.<sup>16</sup> This has come as a result of the 2030 Agenda for Sustainable Development, under which Mexico pledged to increase publication of open data.<sup>17</sup> World leaders such as the UK and the US appear to be plateauing in their open data progress with a wave of new open data adopters challenging best practice. Since 2015, the Mexican government has defined a clear governance framework to support open data policies, for example creating provisions for open data in the General Transparency Law, publishing an Executive Decree on Open Data and developing an Open Data Implementation Guide.<sup>18</sup> Policy coordination is shared between the Coordination of the National Data Strategy within the Office of the President and the Digital Government Unit within the Ministry of Public Administration.<sup>19</sup> Special attention has been given to collaborating with experts and advocates of open data practices, data quality and training. This is backed by a national Open Data Advisory Board that includes representatives from multiple sectors, providing an integrated approach that fosters further impact from open data.<sup>20</sup> Yet, there is a need to increasingly link and adapt data provision (supply) to emerging needs presented internationally by the finance sector (demand), seeking to understand its dependencies on different environmental sources of risk (e.g. natural capital, climate change) and develop appropriate tools to enhance ERA in financial decision-making.

The Bank of Mexico is looking to promote ‘best in class’ practices and recognizes the increasing likelihood and interconnectedness between environment-related shocks and financial system stability. It asked the UN Environment Inquiry for an initial grounding paper to encourage the development of a national dialogue to understand how environmental sources of financial risk can be more effectively integrated into mainstream decision-making by financial institutions, as “more traditional approaches to incorporating environmental factors into risk management systems are insufficient.”<sup>21</sup>

As part of this initial document, the UN Environment Inquiry has partnered with the UN Environment World Conservation Monitoring Centre (WCMC) to develop a national stocktake of environmental data available for financial institutions to analyse environmental risk. This initial paper draws on the experience of the UN Environment WCMC to develop and share data and knowledge-based tools to help decision makers understand how they depend and impact upon biodiversity. It also draws on the Inquiry’s experience in engaging with governments and financial regulators to advance options to improve the financial system’s effectiveness in mobilizing capital towards a sustainable and inclusive economy.

The paper has been developed based on two input papers for the GFSG under the German Presidency of the G20.

- 1 *Enhancing Environmental Risk Analysis in Financial Decision-making*
- 2 *Improving the Availability and Usefulness of Publicly Available Environmental Data for Financial Analysis*

This paper is structured around the introduction and seven core sections: 1. 'Introduction' covers the practical and theoretical starting point for this work; 2. 'Methodology' describes the approach to the analysis and benchmark of open data in Mexico as well as the framework for the development of the PAED Catalogue; 3. 'Green Finance in Mexico' summarizes international sustainable finance trends as they relate to the use of environment-related data by the financial sector. It also highlights key milestones in Mexico's sustainable finance agenda; 4. 'Why does ERA Matter?' highlights the importance of ERA in financial institutions to understand current exposure to environmental risk; 5. 'Financial Regulators and PAED' presents the case for regulator involvement in the promotion to use environmental data in mainstream financial decision-making; 6. 'International Open Data Practices' showcases current PAED practices in the benchmark countries established in the study; 7. 'Comparison to Open Data Practices in Mexico' presents the current status of open data practices in Mexico; 8. 'Conclusions' proposes some next steps to make PAED more available to the financial sector and further facilitate its adoption.

Looking to promote a dialogue around the use of PAED by the financial sector, this paper has been written for two main audiences: environmental data suppliers (e.g. INEGI, SEMARNAT, CONABIO) and environmental data users (e.g. banks, insurance companies, asset managers, asset owners). Each may have different expertise and use different vocabularies.

The focus of this paper is how to catalyse a dialogue between environmental data suppliers and environmental data users in the financial sector in order to promote more sustainable and responsible financial markets through the use of PAED to:

- Reduce information asymmetries;
- Price risks of unsustainable projects more appropriately; and
- Reallocate capital to a climate-friendly, more inclusive and environmentally friendly economy.

Going forward, this dialogue will facilitate an in-depth analysis of the barriers and drivers to integrate the use of PAED at each stage of the financial supply chain.



## 2 METHODOLOGY



Financial regulators would like to encourage the development of a national dialogue between environmental data suppliers and environmental data users in the financial sector. The objective of this dialogue is to increase the understanding of how environmental sources of financial risk can be more effectively integrated into mainstream decision-making by financial institutions, thereby promoting more sustainable and responsible financial markets through the use of PAED to:

- Reduce information asymmetries;
- Price risks of unsustainable projects more appropriately; and
- Reallocate capital to a climate-friendly, more inclusive and environmentally friendly economy.

To meet these objectives, the financial sector needs to build up an understanding of its impact and dependencies on the environment (e.g. natural capital, climate change). This paper aims to start by:

- 1 Understanding Mexico's current environmental open data practices and how they compare to other countries leading the sustainable finance agenda (Open Data Practice Benchmark)
- 2 Building up a knowledge base for financial institutions to understand the potential exposure to natural capital and climate change risk (PAED Catalogue).

### OPEN DATA PRACTICE BENCHMARK

International open data practices were reviewed based on the key principles of the International Open Data Charter and related to both dimensions (legal and technical) of the World Bank's definition of open data. The key principles include: 1) Open by Default, 2) Accessible and Usable, 3) Timely and Comprehensive, and 4) Comparable and Interoperable.<sup>22</sup> In this review, good practice is defined as the existence of policy, laws or disclosure requirements within corporate or non-corporate entities that adhere to the principle in question.

To understand how current open data practices in Mexico compare to international best practice, this report reviews open data practices and national efforts in Brazil, China, Colombia, France, Mexico, the UK and the US, particularly related to PAED, in accordance with the International Open Data Charter principles. These countries were selected by the Central Bank of Mexico based on previous research on disclosure requirements considering regional leadership (e.g. Brazil, Colombia) and G20 leadership (e.g. France, China, the UK and the US). As a collective, the best practices from these countries provide a benchmark for comparison with current open data practices in Mexico, and ultimately inform a more systematic approach for the use of PAED in financial decision-making in Mexico.

### KNOWLEDGE BASE TO UNDERSTAND THE POTENTIAL EXPOSURE TO NATURAL CAPITAL RISK (PAED CATALOGUE).

National environmental data sets were reviewed, and the corresponding information was then collated into a spreadsheet as a PAED Catalogue. To build up this catalogue, we:

- 1 Determined a set of suitability criteria to measure whether the data is fit for purpose for financial decision-making

The schema chosen for the data categories was the NCF framework as it builds on, synthesizes and improves existing systems (including the Green Growth Framework developed by the Organisation for Economic Co-operation and Development (OECD)). The NCF framework identifies a set of eight natural capital assets that can be associated with 27 drivers of change. These drivers of change are environment-related shocks, either acute (e.g. flooding) or chronic (e.g. sea level rise) that can have financial impacts in different industries.

- 2 Determined data sets available publicly

An initial search for websites was undertaken with recommendations from Tania Urquiza of CONABIO, Marcos Mancini from UN Environment and Rafael del Villar from the Bank of Mexico. Further websites were searched to increase the number of data categories covered.

- 3 Collated information into a spreadsheet

Data was entered into the spreadsheet in relation to the relevant data category. Some data sets fit into multiple data categories, and so were included on a row per data category to allow for greater searchability and analysis of the data categories. Many of the websites and portals had a large amount of data (for instance the biodiversity section alone on CONABIO’s data portal had over 4,000 data sets). When websites had a large number of data sets, they were combined into categories or subcategories, and entered as a group. For this reason, some of the metadata may not be recorded for each individual data set.

**FIGURE 3: NATURAL CAPITAL FINANCE ALLIANCE FRAMEWORK**



Source: NCF



### 3 GREEN FINANCE IN MEXICO: FROM MOMENTUM TO TRANSFORMATION



The mainstreaming of the green finance agenda has evolved from an early focus on due diligence at the project level to consideration of environmental factors across credit risk functions and other asset classes.<sup>23</sup> Today's risk environment is increasingly seeing impacts that were previously considered by financial institutions to be externalities becoming, or threatening to become, more material.<sup>24</sup> Considering this, environmental, social and governance (ESG) considerations are shifting from the periphery to the core of business models, linking efforts across risk management, strategy, governance and capacity building.

Evidence of the mainstreaming of the ESG agenda in financial institutions includes:

- The increasing inquiries from banking regulators to understand the exposure of financial system to climate-related risks;
- The establishment of the Central Banks and Supervisors Network for Greening the Financial System (see Box 1);
- The substantial increase by asset owners in their selection (31%) and monitoring (25%) of external managers;<sup>25</sup> and
- The continued consolidation of ESG data providers and increased use of data technologies to mine company's ESG data.<sup>26</sup>

#### BOX 1. CENTRAL BANKS AND SUPERVISORS NETWORK FOR GREENING THE FINANCIAL SYSTEM

“The Central Banks and Supervisors Network for Greening the Financial System (NGFS) is a group of Central Banks and Supervisors willing, on a voluntary basis, to exchange experiences, share best practices, contribute to the development of environment and climate risk management in the financial sector, and to mobilize mainstream finance to support the transition toward a sustainable economy”. The NGFS was set up at the Paris ‘One Planet Summit’ in December 2017. It has three workstreams:

##### WS1 – Microprudential/Supervisory:

This workstream is conducting a mapping of existing country experiences and supervisory practices (e.g. environmental and climate information disclosure by banks and assets managers) in relation to climate-related physical and transition risks to better understand the extent to which a financial risk differential exists between ‘green’ and ‘brown’ assets.

##### WS2 – Macrofinancial:

This workstream has set out a multi-year programme to:

- *Understand how climate change impacts the macroeconomy.* To do so, it will develop an analytical framework to size the impact of climate-related risks (physical and transition) both in the central case and in the event of tail scenarios.



- Understand how climate change and the transition impact upon financial stability. It will examine the financial stability implications of increased climate-related risks and look to understand how they appear in the risk profiles of different financial instruments and on the balance sheets of different financial institutions. It will also seek to understand how climate-related risks can create broader systemic risk either by aggregating microprudential risks or directly through macroprudential impacts.

**WS3 – Mainstreaming Green Finance:**

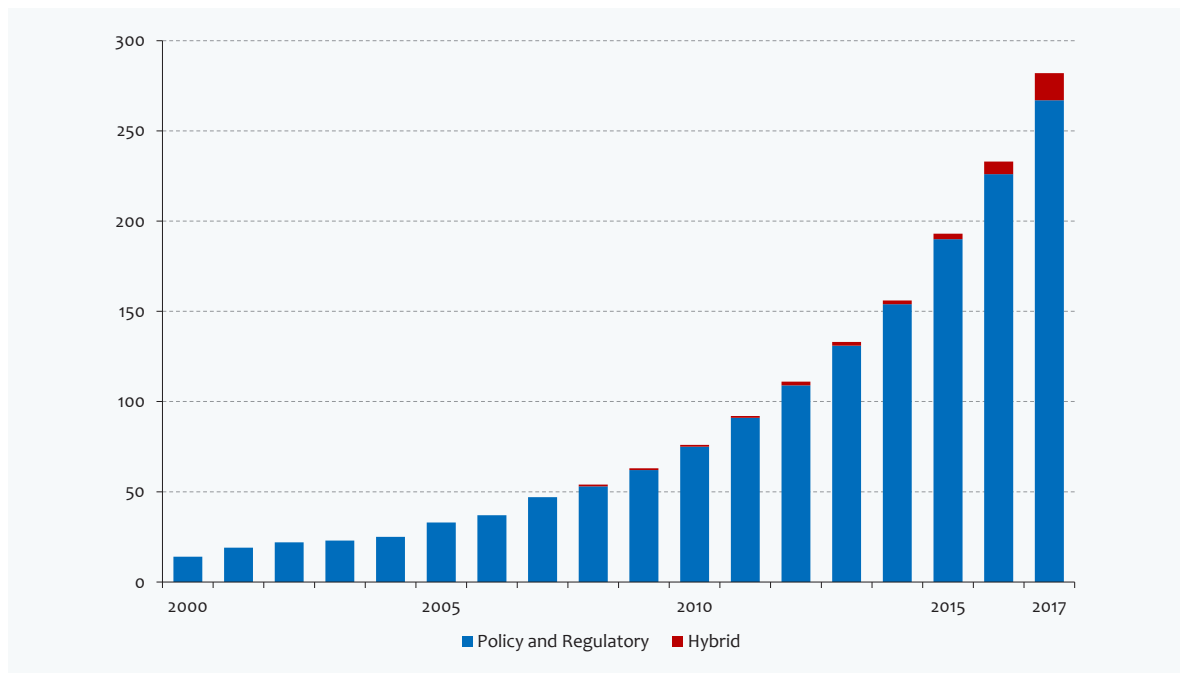
The purpose of WS3 is to outline the role that central banks and supervisors could play in promoting the scaling-up of green finance. This workstream is mapping existing incentives to scale up green financing. WS3 will notably work on a comparative approach to green taxonomies, green bonds labelling and the prevention of ‘greenwashing’, the regulation of second opinion provider and their methodologies.

At the international level, relevant government-backed initiatives are under way and awareness of the importance of environmental factors and the use of environmental data by financial institutions business models has been increasing. Evidence of this is the doubling of national and sub-national sustainable finance measures between the end of 2013 and the end of 2017.<sup>27</sup>

International measures to promote sustainable finance have quadrupled from eight in 2013 to 33 by the end of 2017 (e.g. FSB TCFD, G20 SFSG, Sustainable Insurance Forum (SIF), Financial Centres for Sustainability, Sustainable Stock Exchanges initiative).

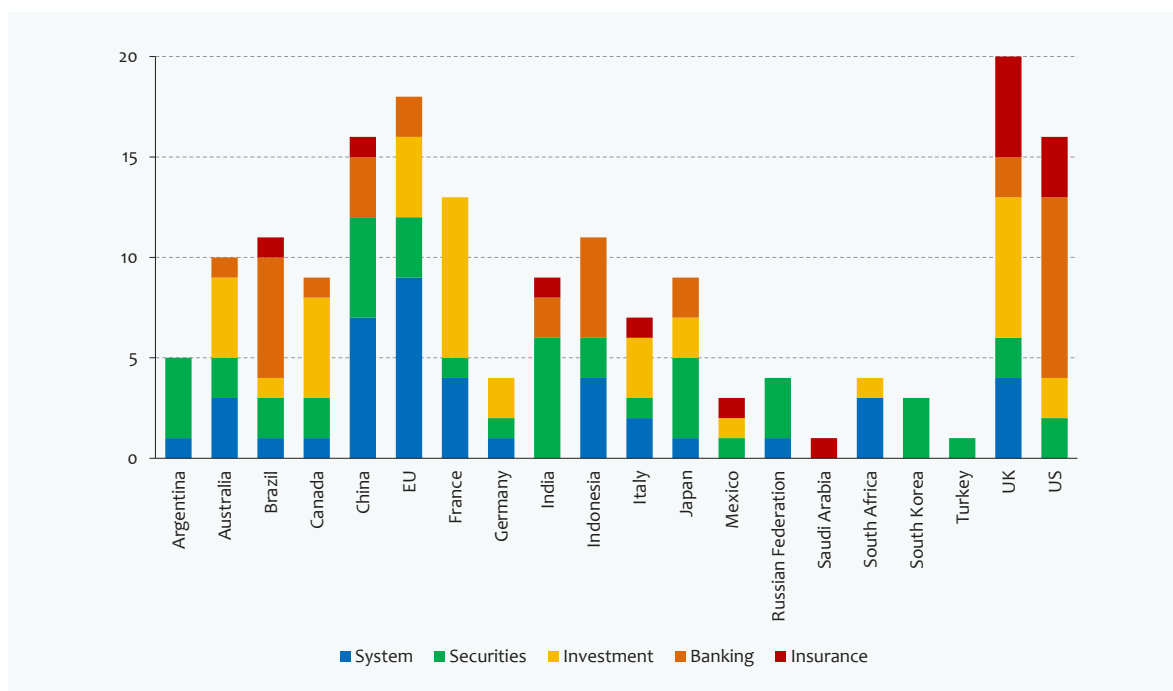
The different structures of financial systems in either developed or developing countries have been reflected in the number of sustainable finance-related measures either group has adopted. Developed countries have focused more on investment followed by securities, and developing countries have focused on banking followed by securities.

**FIGURE 4: TOTAL MEASURES AT SUB-NATIONAL, NATIONAL AND REGIONAL LEVELS, 2000-2017**



Source: UN Environment Inquiry (2018)

**FIGURE 5: POLICY AND REGULATORY MEASURES BY ASSET CLASS IN G20 MEMBERS**



Source: UN Environment Inquiry (2018)

These trends are also in line with the reporting and data disclosure instruments identified in the 2016 Carrots & Sticks Report.<sup>28</sup>

**FIGURE 6: TRENDS IN SUSTAINABILITY REPORTING INSTRUMENTS**

		2006		2010		2013		2016	
Reporting Instruments	Mandatory	35	58%	94	62%	130	72%	248	65%
	Voluntary	25	42%	57	38%	50	28%	135	35%
	Total	60		151		180		383	
Countries and Regions		19		32		44		71 (64 with instruments)	

Source: KPMG, GRI, UN Environment and Centre for Corporate Governance in Africa (2016)

Back in 2013, a sustainable financial system simply referred to one that was stable, resilient to shocks, and avoided the kind of turbulence exhibited in the global financial crisis. Now, a more positive and profound meaning is emerging; one that focuses on how the financial system can serve the transition to sustainable development.<sup>29</sup> In fact, in 2018 the G20 defined sustainable finance as financing and related institutional and market arrangements that contribute to the achievement of strong, sustainable, balanced and inclusive growth. It thus linked the G20’s core mission of strong, sustainable, balanced and inclusive growth with sustainable finance (finance that supports the SDGs).

Actions to integrate critical sustainability considerations into the financial system have been also gaining momentum at the national level. Nationally, a diverse set of market actors has been driving the sustainable finance agenda forward, and a series of key milestones can be highlighted.

- ⦿ The Central Banks and Supervisors Network for Greening the Financial System was launched, and the Bank of Mexico is actively participating in its working groups looking to understand the links between environmental risks and financial stability.
- ⦿ The Consejo Consultivo de Finanzas Climáticas (Climate Finance Advisory Group) launched the Green Bonds Principles MX that are consistent with the Climate Bonds Initiative (CBI) and the International Capital Market Association (ICMA).
- ⦿ Development banks in Mexico have started to implement environmental and social risk management systems including Bancomext (September 2017) and FIRA (May 2018) with implementation in other development banks including Banobras, NAFIN and SHF under way.
- ⦿ The National Commission of the Savings System for Retirement, the regulatory body of the Retirement Fund Funds (AFORES) encouraged the integration of ESG in investment decision-making.
- ⦿ A pilot related to the monitoring, reporting and verification of green finance by commercial (Banorte, Citibanamex, HSBC) and development banks (BANCOMEXT, FIRA) to measure green finance activities and their impacts has been launched.
- ⦿ A drought stress testing tool was developed jointly by the NCFE, the German Development Cooperation (GIZ) and three banks from Mexico (Banamex, Banorte and FIRA).
- ⦿ The Mexican Stock Exchange and the Buenos Aires Stock Exchange (BCBA) agreed to work together in the development of environmental markets.
- ⦿ Mexico leads Latin American issuance in the green bond market with the Mexican development bank, Nacional Financiera, issuing the first green bond in local currency and Mexico City's US\$2 billion green bond is listed in Singapore.
- ⦿ The Government of Mexico announced its intention to establish a carbon market by 2018 and signed a collaboration agreement with the Mexican Stock Exchange to launch a voluntary pilot programme of an emissions trading system that will comprise 60 domestic and international companies.
- ⦿ The Bank of Mexico together with ITAM, the GIZ's Emerging Markets Dialogue on Finance (EMDF), the University of Cambridge Institute for Sustainable Leadership's (CISL) lead a project on the integration of environmental scenario analysis in financial decision-making.

Data underpins market development. As environment-related risks become more important and financially material to the real economy, an appropriate understanding and provision of environmental data will drive market efficiency by reducing information asymmetries in environmental risks and market effectiveness through the proper pricing of environmental risks.

As financial regulator, the Bank of Mexico wishes to further support this national effort and is therefore focusing on five strategic areas:

- ⦿ Greening national development banks;
- ⦿ Promotion of sustainable infrastructure;
- ⦿ Greening financial intermediaries;
- ⦿ Implementation of the TCFD recommendations; and
- ⦿ Encouraging the increased use of PAED in ERA and financial decision-making.

## 4 WHY DOES ERA MATTER?



Managing risk is central to the effective functioning and stability of financial institutions. All capital is deployed based on expected risk-adjusted returns. If environmental risk is being underestimated, capital can be over-allocated to higher risk activities. Therefore, improving environmental risk analysis – known as ERA – can support more efficient allocation of capital for long-term stability.

Financial institutions are exposed to environmental risks in a diverse set of ways (e.g. physical, transition, credit risk, underwriting risk, business risk, operational risk, legal risk, liquidity). These environmental risks are likely to alter the supply and demand dynamic of many industries leading not only to physical damages<sup>30</sup> in assets in credit, investment or underwriting portfolios, but also other financial downsides along the value chain.

Environmental data therefore underpins the appropriate analysis and facilitates the development and use of a wide range of risk analysis tools and techniques. Key financial sectors are already developing such tools and techniques to better understand the financial implications of the increasing scale, likelihood and interconnected nature of these environmental sources of risk.

Without proper environmental data investors, lenders and insurers cannot assess the financial relevance of environmental or climate aspects of their decisions. Unfortunately, to date, climate-related financial risks are generally not considered by mainstream risk assessment and management frameworks and uncertainty around how international commitments (such as the Nationally Determined Contributions under the Paris Agreement) will translate into policy and 2°C decarbonization pathways makes it difficult for risk managers to integrate in portfolio analysis.

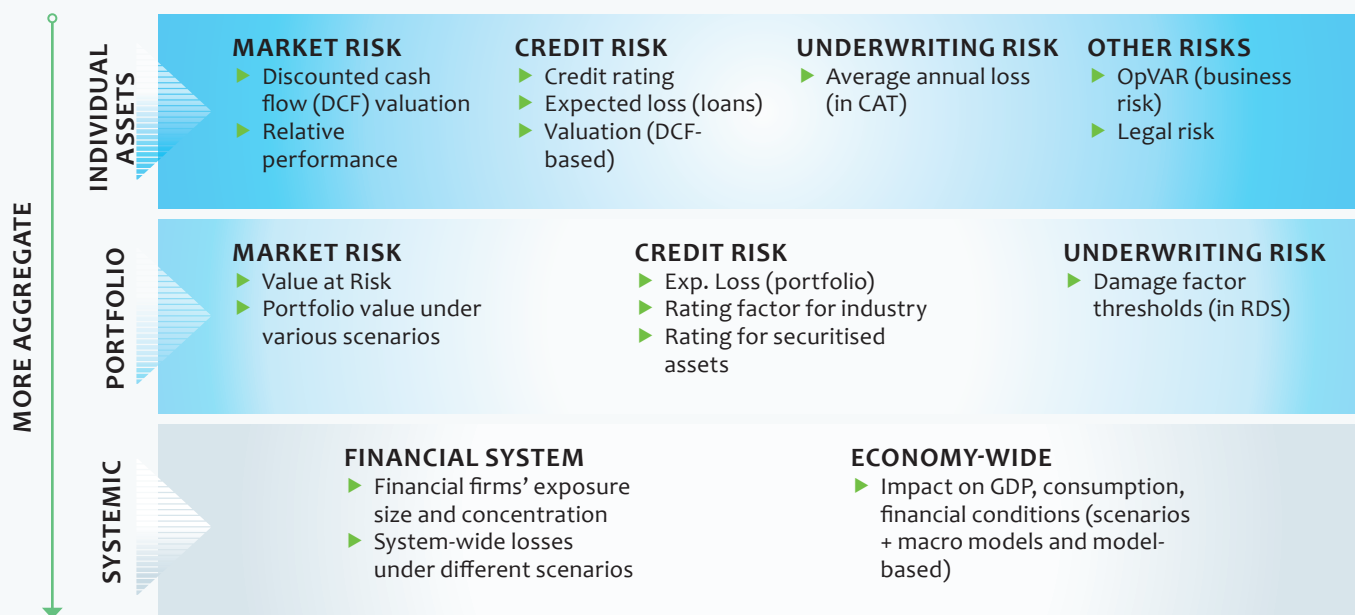
In 2016, the GFSG identified two main environmental sources of risk that could result in financial risk: physical risk (e.g. climatic, geologic and exosystemic) and transition risk (e.g. policy, technology and sentiment).

Additionally, the GFSG defined an archetypical toolbox for ERA,<sup>31</sup> recognizing that the financial tools applied will ultimately depend on the needs and constraints of different assets classes through which financial actors are exposed to climate risk.

Internationally, several studies have shown the potential impact on corporate margins for carbon-intensive industries. In consequence, credit rating agencies have developed methodologies that consider ESG variables in their credit assessment. Models to define strategic assets allocation based on scenarios that combine both climate change and carbon risk or stress testing of portfolios against specific climate change shocks, have also been among some of the tools developed.

Clear indication on future carbon prices, information on the dependency of industry to fossil fuels or other financially material natural capital dependencies can help evaluate these risks. To this extent, shadow pricing and impairment tests for the most exposed assets and sectors have emerged as tools to perform this analysis and have shown to affect the economic valuation of carbon- and water-intensive sectors.

**FIGURE 7: ENVIRONMENTAL RISK ASSESSMENT TOOLS**



Source: Bank of England et al. (2017)

Regardless of the financial tools applied to understand environmental risks, the limiting data variable will determine the tool's predictive power.

Overall, the materiality of environmental risks throughout the investment chain is poorly understood.<sup>32</sup> Market actors need to further understand the conditions under which the risks associated with the transition to a low-carbon, environmentally friendly economy may be material for the financial sector. They also need to understand how to price and respond to these risks. Adapting environmental information for the use of the financial sector is the initial first step.

**Two dimensions remain key for further inquiry:**

- ◉ Information from the market to financial institutions

This is the information that financial institutions integrate into the different steps of their ERA process or use to identify further green finance opportunities. An initial catalogue of potential sources of PAED was developed as part of this document and further analysis is required to determine the suitability of this data for integration into mainstream financial decision-making.

- ◉ Information from financial institutions to the market

This is the information that financial institutions provide to their stakeholders. Its demand has increased substantively in recent years, as there is a growing recognition that financial institutions can be exposed to environment-related risks through their credit and investment portfolios. Therefore, these can act as important levers of change in the transition to a more inclusive and environmentally friendly economy by scaling up green finance.

In Mexico, the largest financial institutions are financial groups. Their operations cover nearly the entire investment chain, from individual retail customers and institutional clients to sell-side capital markets activities. In this context, the availability and quality of E&S information is critical for these financial institutions to fulfil their role in servicing the rest of the financial system – and remains a key challenge.



## 5 FINANCIAL REGULATORS AND PAED



Why should financial regulators encourage the increased use of PAED in ERA and financial decision-making as a key sustainability priority?

Finance regulators are increasingly motivated to assess the stability of the financial sector through an environmental lens, as there is a growing realization that there are risks to the financial sector arising from ESG issues that can and should be managed through different scenario-based tools that are being developed according to the context.

Primary targets of financial regulation are clearly the stability of the financial sector as well as market confidence. Aside from these primary targets, some regulators include additional targets. In the case of the Bank of Mexico, promoting the healthy development of the financial system is one of these additional targets.

Financial history is filled with bubbles and crashes that demonstrate that ‘fat-tail’ events occur more often than predicted. Financial markets have collectively mis-assessed this trend due to behavioural issues such as group thinking.<sup>33</sup> The 2008 global financial crisis, where financial markets collectively mis-assessed the potential impairment of subprime mortgages and other financial assets is an example. This mis-assessment can take place even up to the last minute. In fact, Lehman Brother’s credit rating was not changed to selective default by S&P until the company had already filed for bankruptcy. Lack of appropriate information to appropriately understand financial risks derived from climate-related events could also ‘make’ financial markets collectively mis-assess environmental risks.<sup>34</sup>

Banking regulators have been motivated to engage in this agenda by different concerns that have led in part to the establishment of the NGFS. In some cases, the key focus has been the environment, as in China. In others such as Peru, the key driver has been social risk arising from certain types of investment. In the UK, the Bank of England has explored the prudential implications of climate change, responding to the Climate Change Parliamentary Act. In Brazil, the central bank has become involved since the legal regime allows for an interpretation that the financial institution can be held liable for environmental harm caused by the borrower without limitation. In Argentina, the central bank began stress testing for drought after the country was hit by the most severe drought in the last 70 years,<sup>35</sup> with estimated losses of nearly US\$6 billion.<sup>36</sup> Others, like Bangladesh, have explicitly incorporated climate change as a risk that needs to be understood and mitigated, along with concerns such as occupational health and safety issues.

Insurance regulators have also been promoting a disclosure agenda through their work in the Sustainable Insurance Forum, “a voluntary leadership group for supervisors with a demonstrated interest in tackling sustainability issues impacting firms, markets, and consumers in their jurisdiction.”<sup>37</sup> The insurance industry has the deepest experience of innovation in analysing the physical sources of risk, having developed coherent metrics, methodologies and models to manage the financial impacts of natural catastrophes such as hurricanes, storms and floods.<sup>38</sup> Environmental data is essential for the insurance industry, both for the asset and liability sides of the balance sheet. There is increasing evidence that, left unchecked, climate change and other issues could affect the actuarial assumptions underpinning the insurance products,





potentially rendering significant proportions of the economy uninsurable. For example, the UK Prudential Regulation Authority found that physical risks “are particularly relevant to the liability side of general insurers’ balance sheets, and specifically to property-related classes of insurance business, which account for 38% of the £78 billion in gross written premiums underwritten by the UK general insurance market.”<sup>39</sup>





Financial regulatory involvement is key to understanding the interdependence between Mexico’s economy and the environment and for ensuring that financial markets are built on sustainable foundations to promote the transition to a green economy. Potential systemic risks associated with a transition to a low-carbon, environmentally friendly economy, require access to better data on the associated environmental risks at the asset, regional and national level. In other words, PAED availability data underpins the capacity for financial institutions and regulators to properly assess these risks.

In 2017, based on discussions with specialists in the financial sector, the GFSG identified five barriers to the use of PAED by financial institutions. These were:

PAED barrier	Description
 <p>Nascent state of environmental risk analysis and methodologies</p>	<p>Methods for ERA have recently been developed by a few banks, insurers, asset managers and academic institutions, and are not yet publicly available to most financial firms. This lack of such analytical tools and methodologies has resulted in limited demand for environmental data, since it is too costly or complex to analyse.</p>
 <p>Lack of commonly accepted future scenarios and clarity of future policy responses to environmental and climate challenges</p>	<p>Some key assumptions for ERA are made by individual financial firms on an ad hoc basis, leading to potential communication problems. Other financial market participants that are interested in but have not yet started with, such an analysis have wondered which assumptions should be used. Financial institutions that have already conducted environmental analysis of risks and opportunities also complain that many other macro-parameters – such as future demand for renewable energy and potential technology breakthroughs that may feature in scenario analysis (e.g. carbon capture and storage, cost reduction in solar power), as well as likely policy actions taken against polluting sectors and incentives for green investments – are very uncertain, resulting in a lack of confidence in the assumptions for analysis.</p>
 <p>PAED presented in unfamiliar ways to financial market users</p>	<p>Some metrological data and forecasts are written in units that are not commonly used or understood by financial analysts and their economic implications are not well explained in technical reports. Some public data are not standardized or not comparable. It is therefore difficult for financial users to compare the scenarios.</p>
 <p>Public data sources not widely known or easily accessible</p>	<p>The analysis of risks and opportunities by financial institutions requires several types of environmental data. However, these databases are typically located in various sources, with some only existing as text in certain publications. It is therefore time-consuming for most financial firms that are relatively new to environmental analysis, to search and obtain such data. Some public data, such as those at the facility level, are not yet mapped to financial assets and firms, and thus are difficult to use.</p>
 <p>Uncertainty over the business models for PAED provision</p>	<p>Based on the debate among specialists from NGOs, scientific institutes, government agencies and private data providers, there is not yet a clear model for who should be the main providers of public data relevant for financial analysis. There are cases for government agencies and international organizations to consolidate and provide PAED, but there are also potentially alternative business models for private data providers or NGOs to offer PAED at lower prices (e.g. public data without additional analytical services).</p>



Mexico has pledged to publish open data and adhere to the principles of the International Open Data Charter. These four principles (i.e. Open by Default, Accessible and Usable, Timely and Comprehensive, Comparable and Interoperable) can provide a lens through which financial regulatory authorities (data demand) and data regulating authorities (data supply) can understand and address the PAED barriers to increase its use by the financial sector in mainstream financial decision-making.

Open data principles	Possible actions by financial regulators	PAED barrier addressed
Open by Default	Facilitate the coordination with government and non-government entities to determine a clear data architecture and governance for PAED provision for the financial sector. Promote additional data availability for ERA (e.g. environmental fines).	
Accessible and Usable	Encourage the development and use of ERA analytical tools and methodologies. Promote 'one-stop-shop' platforms to reduce search costs and facilitate wider analysis across portfolio.	
Timely and Comprehensive	Provide clarity on the different official scenarios being used or considered in climate-related scenarios.	
Comparable and Interoperable	Encourage dialogue with data suppliers and policymakers to disclose economic implications of environmental risks and provide data in units used by financial analysts. Promote ESG reporting standardization to facilitate comparability within the same industry in portfolio companies.	





## 6 INTERNATIONAL OPEN DATA PRACTICES



International open data practices are reviewed based on the key principles of the International Open Data Charter and related to both dimensions (legal and technical) of the World Bank's definition of open data. The key principles include: 1) Open by Default, 2) Accessible and Usable, 3) Timely and Comprehensive, and 4) Comparable and Interoperable. In this review, good practice is defined as the existence of policy, laws or disclosure requirements within corporate or non-corporate entities that adhere to the principle in question.

### 6.1 OPEN BY DEFAULT

This principle recognizes that data is of significant value to societies and economies and that all data must be open by default. This means that data is open and available for the public to find, access, and use under an open and unrestrictive license, unless there is a specific, pressing reason why that data or information cannot be made open, and that reason is clearly communicated to the public. Where legislation prohibits publication, steps should be taken to overcome restrictions or justifications of data restriction should be disclosed.<sup>40</sup>

For financial institutions, a lack of 'open by default' environmental data can limit the implementation of ERA aimed at streamlining green investments. Allianz, for example, uses the *ClimateXcellence* tool to assess transition risks associated with climate change on investment margins. However, the method is data-intensive and is limited by the availability of PAED.<sup>41</sup>

International open data practices mostly adhere to the principle of making data created by public bodies open to all. For example, all data produced by public entities in Colombia are published in an open data portal ([www.datos.gov.co/en](http://www.datos.gov.co/en)), enabling users to download data freely and without use restrictions. For the six countries considered in this review, a variety of methods are used to overcome privacy restrictions to data publication. For example, France provides third party anonymization services for data publication, whereas the UK provides restricted environments for data use outside of normal restrictions, known as data safe havens.<sup>42</sup>

The degree of publication, however, differs between countries. In all cases, legislation determines the publishing of data online, but complex restriction criteria can sometimes result in the retention of data. For example, publication restrictions are put in place in China if the data in question threatens national, public, economic or social security.<sup>43</sup> In the UK, the reasons for data being restricted are openly published to ensure the public are aware of why certain data are not published. Table 1 provides examples of **good** practice in relation to the Open by Default principle and suggested improvements that could be made in each case to meet **best** practice.

**TABLE 1: EXAMPLES OF GOOD PRACTICE IN RELATION TO THE OPEN BY DEFAULT PRINCIPLE AND IMPROVEMENTS THAT COULD BE MADE TO MEET BEST PRACTICE**

Open by Default principle	Example of good practice	Improvements to meet best practice
<i>Open data is not limited to government organizations but includes external data of specific value to the public</i>	Enterprise Environmental Information Disclosure Measures <sup>44</sup> were established in <b>China</b> in 2016 to ensure publicly and privately owned enterprises disclose information on air pollution to the public.	Measures to be extended to include additional environmental information beyond air pollution.
<i>Data is free to access and use</i>	<b>Colombia, France, the UK and the US</b> all meet best practice for this aspect of the principle. Information was not available for Brazil and China.	
<i>Publication does not compromise privacy laws and adheres to international standards of protection</i>	<b>France, the UK and the US</b> all meet best practice for this aspect of the principle. Information was not available for Brazil, China and Colombia.	
<i>Provide clear justifications as to why certain data are not published</i>	<b>France and the UK</b> meet best practice for this aspect of the principle. Information was not available for Brazil, China, Colombia and the US.	
<i>Training programmes to raise awareness of open data benefits</i>	<b>Brazil</b> has committed to developing institutional channels for personal and virtual discussions surrounding open data. <sup>45</sup>	Inclusion of specific training courses on open data uses in ERA.
<i>Anonymize data in accordance with privacy legislation</i>	Article L.2121.26 of the General Local Authorities Code in <b>France</b> decrees the publication of building permit information in open data formats. Anonymization of the data must be carried out and validated by the Data Protection Authority before it is made public. <sup>46</sup>	Anonymization of data in accordance with privacy legislation to be rolled out across all sectors.

## 6.2 ACCESSIBLE AND USABLE

The International Open Data Charter principle on accessibility and usability states that the use of data should be free to access, in machine-readable formats and subject to open data licensing. Machine readability and usability are also noted within both the Timely and Comprehensive, and Comparable and Interoperable principles. This section will therefore focus on accessibility through open data licences and centralized data portals.

The use of Creative Commons licensing has been widely accepted globally as a mechanism ensuring data protection is tailored to the providers' needs. The Creative Commons CC-BY licence enables a user to download and alter or build upon data for distribution under attribution to the original data provider. CC-BY-SA<sup>47</sup> share-alike licences specify that any user modifying a data set must publish the modified data under the same licence to ensure transparency in the use of data. Use of Creative Commons licensing varies across the countries reviewed. For example, the US and Brazil directly quote CC-BY-SA licensing on federal or state data portals, and the UK and France have developed national licences directly compatible

with Creative Commons licensing standards. In comparison, government data portals in Colombia and China do not yet include information on Creative Commons licensing agreements.

Data portals across the countries reviewed in this report provide data that is online and searchable (e.g. France Connect); however, there is variation in the level of centralization. Searchability is a key function for centralized data portals and appropriate metadata (see Comparable and Interoperable principle below) ensures that the data is searchable according to format, scale and other attributes. This enables financial institutions, for example, to identify usable data to meet project-financing regulations such as those set out by the Equator Principles<sup>48</sup> or the International Finance Corporation.<sup>49</sup>

China’s Environmental Information Disclosure Measures ensure that provincial Environmental Protection Bureaus establish and curate online data repositories. However, there is no single centralized portal. Despite this, the Institute of Public and Environmental Affairs (a non-governmental organization) in China collects and publishes pollution data in a national portal<sup>50</sup> and highlights how non-governmental organizations can contribute to good open data practices. In comparison, the France Connect portal provides a single portal to access all published government data from multiple sources at a single access point.<sup>51</sup> Table 2 provides examples of **good** practice in relation to the Accessible and Usable principle and suggested improvements that could be made in each case to meet **best** practice.

**TABLE 2: EXAMPLES OF GOOD PRACTICE IN RELATION TO THE ACCESSIBLE AND USABLE PRINCIPLE AND IMPROVEMENTS THAT COULD BE MADE TO MEET BEST PRACTICE**

Accessible and Usable principle	Example of good practice	Improvements to meet best practice
<i>Data must be released under an open and unrestricted licence</i>	<b>Brazil, France, the UK and the US</b> all meet best practice for this aspect of the principle. Government data portals in <b>Colombia</b> and <b>China</b> do not yet describe licensing agreements aligned with Creative Commons.	
<i>Create comprehensive lists of data holdings in a central portal</i>	<b>China’s</b> Institute of Public and Environmental Affairs publishes integrated pollution data from federated sources in a central portal.	Legislation should be updated to ensure that provincial bureaus publish data in a centralized national portal.

### 6.3 TIMELY AND COMPREHENSIVE

The principle states that “data is only valuable if it is still relevant” and “that it is detailed, without significant data gaps or missing elements”.<sup>52</sup> Where possible, the principle suggests that governments publish data in “original, unmodified forms”. Environmental data is subject to continuous change, but by making it immediately available it can preserve the relevance.<sup>53</sup> Best practice would include mechanisms to ensure data is published without delay and in its entirety, with no data gaps or missing elements.

The publication of data in accordance with this principle varies across the countries reviewed in this report. The Department for Environment, Food and Rural Affairs in the UK, for example, applies a minimum viable format approach. This means that data is published in the format it was submitted, “as long as that is sensible or possible”.<sup>54</sup> This complies fully with the principle but can limit quality and comprehensiveness. The United States Geological Survey, on the other hand, publishes data subject to the readiness of the science for release.<sup>55</sup> In this case, publication is slower than observed in the UK but the data has often undergone a more extensive review. This can often result in the provision of more comprehensive data, but at the expense of time.



The type of data can also alter the speed of release. For example, the publication of foreign aid data in France is restricted by the various cross-governmental collaborations and the sensitive nature of aid data. In contrast, the publication of remotely sensed environmental data in France is rapid due to a commitment to publish data several times per day.<sup>56</sup> Table 3 provides examples of **good** practice in relation to the Timely and Comprehensive principle and suggested improvements that could be made in each case to meet **best** practice.

**TABLE 3: EXAMPLES OF GOOD PRACTICE IN RELATION TO THE TIMELY AND COMPREHENSIVE PRINCIPLE AND IMPROVEMENTS THAT COULD BE MADE TO MEET BEST PRACTICE**

Timely and Comprehensive principle	Example of good practice	Improvements to meet best practice
<i>Data is made available without delay</i>	The Department for Environment, Food and Rural Affairs in the <b>UK</b> publishes data using the minimum viable format approach, where data is published online in the format it was provided. <sup>57</sup>	Format requirements for data submissions should be put in place.
<i>Application of consistent life cycle information management</i>	In the <b>US</b> , an automated Data Assurance and Management Application tracker developed by the United States Geological Survey automatically cleans unnecessary files and carries out data housekeeping functions. <sup>58</sup>	Human validation is needed to ensure that automation is accurate.
<i>User feedback informs revisions</i>	The <b>US</b> Environmental Protection Agency's Developer Central Resource provides a mechanism for the public to provide feedback on priority data sets, informing revisions of the data to improve quality. <sup>59</sup>	Regulations should be put in place to ensure feedback is assessed at regular intervals.

## 6.4 COMPARABLE AND INTEROPERABLE

This principle states that “the more datasets you have access to the easier it is for them to talk to each other” providing higher “potential value” in the data. Data rarely has value in its raw form but, when modelled or aggregated, can be much more meaningful.<sup>60</sup> Commonly agreed standards should be applied to improve interoperability and enable spatial and temporal comparison and aggregation. Metadata publication in parallel to raw data is also an important criterion within this principle. Standardized metadata produced in machine-readable formats improves the understanding of the data and informs comparisons between data sets.

Colombia’s central data portal specifically sets criteria for data formats that it considers as open and downloadable under its terms of use.<sup>61</sup> For example, spatial data must be submitted in a shapefile format. Brazil also clearly defines file formats and standardizes spatial scale requirements (1:1,000,000 to 1:25,000). This significantly enhances comparability in spatial analyses.<sup>62</sup> France has taken this further by aligning with internationally accepted standards to enable interoperability at a global level (Table 4).

Standardization of metadata is observed across the countries reviewed in this report and is important to increase usability of the data. In the UK, metadata for spatial environmental data follows the Infrastructure for Spatial Data in Europe Directive. This was built on International Organization for Standardization ISO 19115 metadata standards. Brazil’s National Spatial Data Infrastructure also conforms to the ISO 19115 standard. Table 4 provides examples of **good** practice in relation to the Comparable and Interoperable principle and suggested improvements that could be made in each case to meet **best** practice.

**TABLE 4: EXAMPLES OF GOOD PRACTICE IN RELATION TO THE COMPARABLE AND INTEROPERABLE PRINCIPLE AND IMPROVEMENTS THAT COULD BE MADE TO MEET BEST PRACTICE**

Comparable and Interoperable principle	Example of good practice	Improvements to meet best practice
<i>Implement consistent core standards to open data sets based on internationally accepted standards</i>	The General Interoperability Repository of <b>France</b> provides data format standards that allow full interoperability and compatibility, validated by third-party experts and user feedback, and benchmarked against the European Interoperability Framework. <sup>63</sup>	Global interoperability standards should also be considered.
<i>Ensure that open data sets include consistent core metadata</i>	<b>Brazil's</b> National Spatial Data Infrastructure carried out a review of international metadata standards and has developed and applied a standard based on the ISO 19115. <sup>64, 65</sup>	Direct inclusion of the ISO 19115 standard into data infrastructure should be considered within the metadata.







## 7 COMPARISON TO CURRENT OPEN DATA PRACTICE IN MEXICO



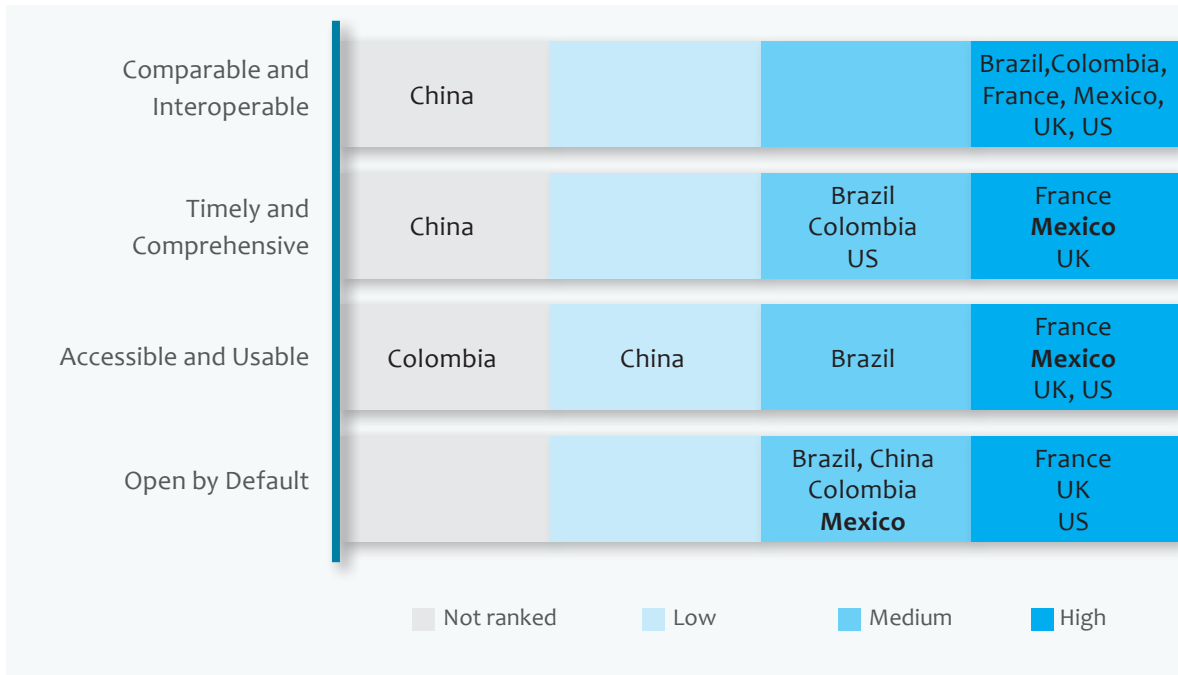
Mexico has become the regional leader for open data practices in Latin America by incorporating the International Open Data Charter principles into a National Decree for Open Data in 2015.<sup>66</sup> Internalization of these principles into national legislation reflects the Mexican government's willingness to improve the openness of data as a long-term strategy. However, there are still opportunities to further improve the quality and availability of environmental data for use by financial institutions. In a 2016 review of open government data in Mexico by the OECD, a number of recommendations were put forward to the government to improve Mexico's approach.<sup>67</sup> In the follow-up to this report, the OECD reviewed Mexico's progress in 2018.<sup>68</sup> Many of the recommendations have been implemented, initiated or are under discussion. The report suggests efforts should now be focused on improvements in the government and public sector as a whole, for example ensuring high-level political support for open data, structuring policy implementation, building awareness, and promoting the use of Mexico's open data portal ([www.datos.gob.mx](http://www.datos.gob.mx)).

By comparing and benchmarking Mexico's open data practices against other international open data practices based on the International Open Data Charter principles, this report identifies suggested areas of improvement for Mexico to meet international best practice. Each country is ranked as 'high', 'medium' or 'low' according to its adherence to each International Open Data Charter principle: 'high' indicates full alignment with best practice; 'medium' indicates partial but not full alignment with best practice; and 'low' indicates little alignment with best practice (Figure 8). Countries were not ranked if there was little available information related to the principle. As a baseline for comparison, in the 2017 OECD Open, Useful and Reusable Data Index, Mexico ranked 5<sup>th</sup>, compared to 10<sup>th</sup> in the 2014 version, below the UK (4<sup>th</sup>) and France (2<sup>nd</sup>) but above the US (12<sup>th</sup>).

Our findings reveal that Mexico mostly adheres to the principles of the International Open Data Charter and ranks highly in comparison to the other countries reviewed in this report. However, Mexico does not align fully with the Open by Default principle. Legislative bodies could consider enforcing the publication of reasons for restricting data and explore the provision of data safe havens.

Full details on Mexico's alignment with the International Open Data Charter principles are detailed below. A ranking of 'high' (which indicates full alignment with the International Open Data Charter principles) does not mean that there is no room for improvement. Even if the data is open, accessible, usable, timely, comprehensive, comparable and interoperable, the data needs to be relevant for ERA in order to be useful by financial institutions. Last but not least, a high ranking according to the Open Data Principles does not necessarily mean that the right information for financial decision-making is being disclosed nor that the information being disclosed is in a suitable format for financial institutions or easy to find.

**FIGURE 8: ADHERENCE TO THE INTERNATIONAL OPEN DATA CHARTER PRINCIPLES**



Note: Each country is ranked as high (full alignment), medium (partial alignment) or low (no alignment). Not ranked indicates that there was little available information related to the principle.

### 7.1 OPEN BY DEFAULT

The Open by Default principle has become a de facto policy across Mexico. The government interprets open data as “public digital data that is accessible online, and can be used, reused and redistributed, by any interested party.”<sup>69</sup> In accordance, all data created by any entity of the Federal Public Administration as well as by productive state enterprises must disclose all data in alignment with this definition.

Mexico’s National Decree for Open Data identifies that data must be accessible free of charge and free for use without access restrictions in compliance with the protection of personal data and confidential information legislation. The only requirement for users of data in public government portals is to cite the data source. With this decree, Mexico has closely followed world leaders in open data practice regarding data disclosure requirements. Mexican authorities could consider disclosing the reasons to withhold a certain data set, which are not required to be published by the decree. This will lead to increased trust with public and private institutions and greater uptake of open environmental data for use in financial decision-making. In addition, authorities may consider developing secure and confidential data use conditions, *i.e.* data safe havens, enabling the use of restricted data by confidentiality agreements and in a secure manner. In this case, Mexico could adopt a similar approach to the UK and explore an appropriate procedure by which to encourage further dialogue between information providers and financial institutions as users of the information.

## BOX 2. CASE STUDY – NATIONAL ATLAS ON CLIMATE CHANGE VULNERABILITY

Mexico has geographic characteristics that make it one of the most vulnerable countries to the effects of climate change. Its location between two oceans, its latitude and relief and its socio-economic characteristics make it particularly exposed to different hydrometeorological phenomena.

In order to develop, consolidate and modernize the instruments necessary to reduce vulnerability to climate change, the National Institute for Ecology and Climate Change (INECC), developed the National Climate Change Vulnerability Atlas (ANVCC).

The ANVCC is comprised of set of maps that show territorial vulnerability to climate change and can guide the realization of strategies and information for decision-making and advocacy in public policies focusing on adaptation actions.

The atlas helps understand the vulnerability of population of coastal communities, foggy forest, port infrastructure and agriculture, among others, to climate-related shocks (e.g. hurricanes, droughts, frost, heat waves, heavy rains). It provides a description of current vulnerability across different levels of aggregation (e.g. national, regional, state and municipal level) and three different time horizon scenarios (2039, 2069 and 2099).

Vulnerability is measured as a combination of: 1. Current and future exposure (i.e. magnitude and speed of change of climate change effects); 2. Sensitivity (i.e. degree to which the system can be affected by climate variability) and 3. Adaptive capacity (i.e. institutional capacities and resources that facilitate adaptation processes)

The ANVCC is an example of open by default platform that could be leveraged by the finance sector, if presented in ways familiar to financial market users, to further integrate the mainstreaming of climate change considerations in financial decision-making.

## 7.2 ACCESSIBLE AND USABLE

All data produced by the agencies and entities of the federal public administration of Mexico must be published online and be downloadable in open formats, if it does not compromise privacy laws.<sup>70</sup> In addition, the publication of data online must be available at [www.datos.gob.mx](http://www.datos.gob.mx). The use of a single centralized data portal ensures that data can easily be found, however, data standardization within centralized portals is key to ensuring usability by financial institutions (see Box 3). The use of a single web portal as a central repository ensures that all data published on the portal conforms to the same licensing agreement. Mexico clearly defines the licensing terms and conditions of the centralized portal as per the Open Definition requirements of Open Knowledge International, a global non-profit organization focused on enhancing open data practice internationally. The Open Definition clearly defines licensing requirements and acceptable conditions for the use of data. CC-BY-SA share-alike criteria, which require secondary data users to publish modified data in an open format, are not mandatory in this licensing. However, it is recommended that share-alike requirements are added to all licences in Mexico to ensure that future derivatives of the data are also publicly accessible.

### BOX 3. CASE STUDY – CITIBANAMEX TOOL FOR ENVIRONMENTAL DATA

The Mexican government has enhanced green growth commitments to address climate change and transition to a low-carbon economy in alignment with international agreements (for example the SDGs and the Paris Agreement). The banking sector has responded with a voluntary, market-led approach to enhance green investment and PAED is central to this approach.

Citibanamex started developing a tool for environmental data in 2017 to provide financial institutions with access to data required for ERAs. The Social and Environmental Risk Analysis Tool (HARAS in Spanish) aims to identify (through the use of postal codes) social and environmental risks in the granting and monitoring of credits approved by financial institutions for the mining, energy, real-estate and hydrocarbon industries. The first phase considers natural protected areas of Mexico and cultural heritage zones and was presented in August 2017 to the Sustainability Committee of the Mexican Banks Association (MBA). Although the tool was initially developed for internal use, Citibanamex has invited the Committee to participate in the ongoing development and the database has been shared with members so they can exploit its potential in environmental and social risk assessment. The second phase of the tool includes: human rights and territories of indigenous peoples, Ramsar sites and endangered species. Data for the tool is provided by government institutions such as CONABIO and the National Commission of Natural Protected Areas (CONANP).

A number of challenges were encountered in the development of the tool including the large quantity of public data sets, making it difficult to locate data at the correct scale and quality. The MBA is currently working to identify how to streamline data to identify the sources of highest quality. Data formats were also variable and required standardization before they could be incorporated within the tool. This was due to data being collected across multiple administrative levels, but is being resolved by working with several public entities to help match the different scales. In addition, data collected at administrative levels was often of low quality compared to that collected at the federal level, but federal data also tends to have a coarse geographic scale that would not be appropriate for financial decision-making.

Next steps for HARAS include adding climate change vulnerability data and georeferenced information to broaden the tool's scope. The purpose of the tool will only be for consultation and guidance in the process of detecting sensitive areas in the granting of credits, complying with the corporate policies of project financing and safeguarding the natural capital of the country.

## 7.3 TIMELY AND COMPREHENSIVE

Article 2 of Mexico's decree on open data states that all data are to be published in an open format, where technical specifications are publicly available and digital files do not cause access difficulties. Data must also be updated periodically, published as it is generated, exist in perpetuity, and be available in a machine legible and disaggregated format.<sup>71</sup>

To enhance the effectiveness of implementing these principles, Article 6 of the decree states that individual units of the Ministry of Public Administration will be responsible for the management, storage and maintenance of their own respective data and will provide access to the data through the centralized data portal. The decentralization of data management to individual federal administrations enables more frequent updates, validation and maintenance of data. With these Articles, Mexico ensures that all federal data disclosures adhere closely to the International Open Data Charter's Timely and Comprehensive principle.

## 7.4 COMPARABLE AND INTEROPERABLE

Mexico's national legislation clearly defines that the publication of open data must be in conjunction with the necessary metadata. Further, the decree for the technical standard for the access and publication of statistical and geographical open data (hereafter Technical Standard) states that all data related to geographical information must conform to the Data Catalogue Vocabulary as set out by the World Wide Consortium.<sup>72,73</sup> Through this decree, Mexico aligns with best practice exemplified by France's use of the European Interoperability Framework standards. Mexico's use of international standards also provides a proactive method of data verification and ensures that all data providers adhere to strict guidelines.

In addition, Section IV of the Technical Standard specifies that all metadata should conform to the 15 key categories of the Dublin Core Metadata Element Set as a guideline for the publication of online metadata. This differs from the standard used by the US, the UK and Brazil, who have aligned and adapted metadata around the International Organization for Standardization ISO 19115 certification. Although both of these standards are internationally recognized, Mexico could consider the use of ISO 19115 to improve interoperability at the international level and ensure interoperability of environmental data within financial institutions' digital platforms (see Box 4).

### **BOX 4. CASE STUDY – BANORTE'S INTEGRATED SOCIAL AND ENVIRONMENTAL RISK MANAGEMENT SYSTEM**

Social and environmental risk management is a crucial issue within financial institutions. The Equator Principles, the Principles of Responsible Investment (PRI) and the Principles of Responsible Banking (to be launched in September 2019) represent important global frameworks on the management of ESG issues in the credit and investment portfolios, and around banking activities. Banorte is an Equator Principles financial institution, PRI signatory and a founder of the Principles of Responsible Banking. In 2012 the Social and Environmental Risk Management System (SEMS) was created in close coordination with the Sustainability Department, the Credit Analysis area and the Risk Department. The SEMS follows an identification, categorization, evaluation and management process that is fully integrated within credit analysis procedures. The SEMS has positioned Banorte as a leader in ESG risk management in Mexico. Banorte was the first bank to establish a specialized risk management team that operates through an internally developed methodology, aligned to global frameworks. Banorte reviews more than 3,000 credits annually, while also training Credit and Risk executives on ESG best practices, national and international regulations and global trends.

However, current digital transformation in internal processes, financing portfolio growth, and the need for more efficiency and security, have led to Banorte starting to integrate its technological platforms and applications. The SEMS needs to align with these applications to improve the processing and availability of data, and to communicate more efficiently with the Credit and Risk teams. At the same time, the SEMS team is working on the reorganization and automation of internal databases, as well as on the development of tools to improve the georeferencing of environmental and social risks and systems to identify sustainable sectors and customers.

The financial sector needs to migrate credit analysis and risk management activities from traditional instruments to new technological platforms that integrate data and facilitate collaboration. The integration of ESG analysis in Banorte's operation processes, and the new digital transformation of banking activities, raise the bar for sustainable finance activities. The systematic analysis of ESG data allows the identification of potential risks, of opportunities for the development of new sustainable products and services, and the possibility to label 'sustainable' projects. The incorporation of technology into ESG risk management provides a more secure, integrated and solid tool to acquire and analyse data relevant for improved decision-making and for a more robust risk management procedure.

At the private sector level, the use of technologies, taxonomies and standards facilitate the comparability and interoperability of information provided by companies (see Box 5).

#### **BOX 5. CASE STUDY – DATA TECHNOLOGIES XBRL AND THE MEXICAN STOCK EXCHANGE (BMV)**

XBRL (eXtensible Business Reporting Language) is a free XML-based language for exchanging business information. It allows tagging business and financial reports to increase the transparency and accessibility of business information by using a uniform format.<sup>74</sup>

The use of XBRL has seen worldwide adoption.<sup>75</sup> It can promote data standardization and comparability and provides a more efficient way to share data, reducing search costs and improving data traceability.

The BMV published, in the first quarter of 2015, the version of Emisnet,<sup>76</sup> which supports the sending of XBRL files, so that public traded companies could generate their files based on the Mexican taxonomy. As of the first quarter of 2016, it became mandatory for all the issuers to present their financial information in the XBRL file with the new taxonomy prepared by the National Banking and Securities Commission (CNBV) and the BMV.<sup>77</sup> In 2017 the stock exchange and the securities regulator required the development of additional reporting taxonomies, including among them information relevant to material events and annual reports.

## **7.5 PRIVATE SECTOR ENVIRONMENTAL INFORMATION DISCLOSURE**

Increasing evidence of the link between mandated reporting and corporate sustainability performance suggests that current efforts to increase transparency on the societal impacts of corporations can improve both the quantity and quality of disclosures, as well as increase corporate value.<sup>78</sup>

Ioannou and Serafeim found that, following the adoption of mandatory disclosure regulations, firms not only increased the amount of information they disclosed, they were more likely to voluntarily adopt reporting guidelines and seek third-party assurance.

These results suggest that, even in the absence of regulatory mandates for assurance or specific guidelines, firms will seek the qualitative properties of comparability and credibility.

According to information from INEGI, Mexico has 5,078,737 economic units. Of this, only 0.2% (10,157) have more than 250 employees and 0.7% (35,551) have between 30 and 250 employees. The remaining 99.1% have less than 30 employees.

A recent KPMG<sup>79</sup> survey of 143 high-level executives from companies of varying size showed that 23% saw significant financial impacts from social or environmental reporting.<sup>80</sup>

ESG data can help investors and lenders understand how the company is evaluating environment- and social-related risks. More particularly, in relation to environmental risks and the application of the recommendations made by the TCFD, 38% of companies were unaware of the General Law on Climate Change and 34% only had partial knowledge. Portfolio companies could be exposed to transition risks associated with policy and regulatory changes or related market and technology shifts. Without the appropriate information, neither companies nor investors would be able to evaluate these risks.

Intangibles have grown from 20% of corporate balance sheets to 80%.<sup>81</sup> Under these market circumstances, ESG data becomes more important for investor and lender decision-making. According to an EY survey, 60% of international global investors have recently decreased their holdings or begun monitoring their



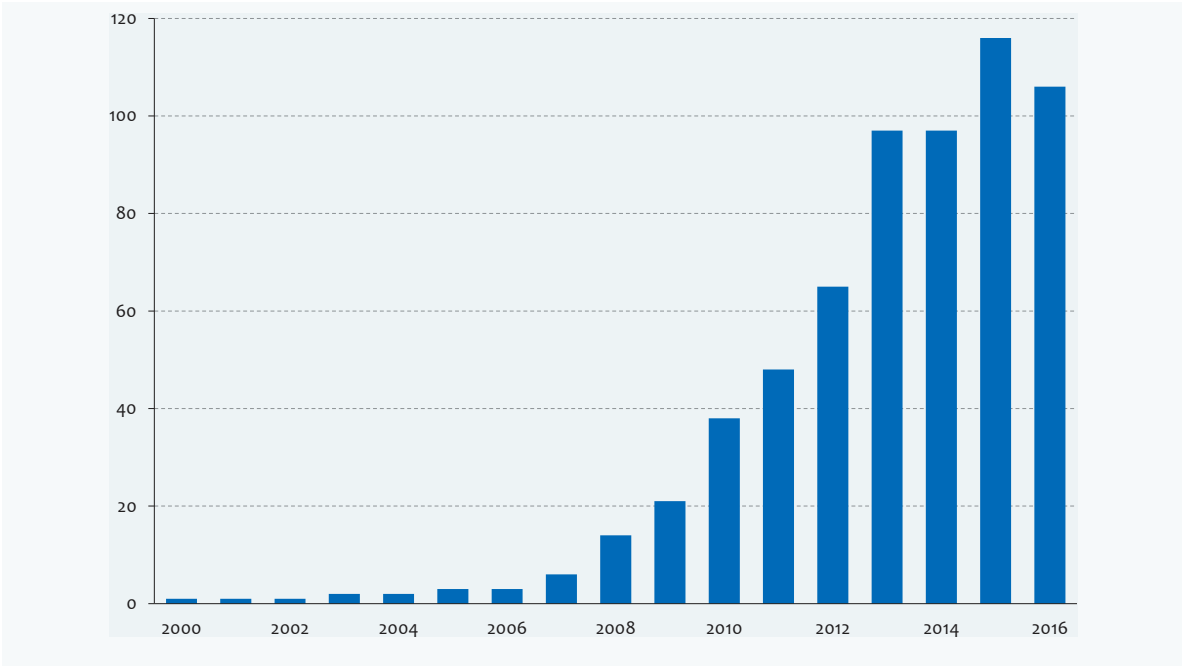
holdings more closely due to stranded asset risk.<sup>82</sup> In fact, there is mounting evidence that investors are increasingly considering ESG information in financial decision-making for both investment and credit portfolios. In addition, they have found that solid ESG practices lead to better operational performance and correlate positively with stock performance.<sup>83</sup> However, 60% of respondents to the same survey said ‘no’ when asked if companies adequately disclose their ESG risks – an increase of more than 20% over the previous year.

Sustainability (ESG) reporting by the private sector has evolved substantially since its early beginnings in the 1980s. Several standards and metrics have been developed for the private sector to disclose their impact in society. More recently (2015), the SDGs have emerged as an overarching framework for assessing impacts.<sup>84</sup>

There is little information and analysis on the current status of sustainability reporting by the private sector in Mexico. One of the most comprehensive studies was done by EY<sup>85</sup> in 2016, covering the 2012-13 reporting period. The report notes an increasing adoption of integrated reporting (15% by 2014) but little implementation of the International Integrated Reporting Council’s International Integrated Reporting Framework. It also mentions that 74% of the companies belonging to the IPC having sustainability reports.

According to data from the Global Reporting Initiative (GRI) Sustainability Disclosure database shown in Figure 9, sustainability reporting has grown to 106<sup>86</sup> reports in 2016; 21 of which were not done according to GRI standards.<sup>87</sup> Additionally, the Global Compact Participant Database identifies 681 Mexican companies reporting, with 528 active and 153 non-communicating.<sup>88</sup>

**FIGURE 9: NUMBERS OF SUSTAINABILITY REPORTS PER YEAR**



Source: based on information from GRI database

Efforts to access sustainability data from companies usually encounter the same barriers studied by the GFSG and stated earlier in this report. Several countries have taken different approaches to overcome these barriers by making data more accessible for financial decision-making and, in many cases, creating a ‘race to the top’. Box 6 showcases some policy and regulatory options. The examples presented below are illustrative and do not provide an exhaustive list of the sustainability disclosure regulations in place in the countries mentioned.

## BOX 6. SUSTAINABILITY DISCLOSURE POLICY AND REGULATORY OPTIONS

### BRAZIL

**Resolution 4.327:** Starting in 2008, Brazil's central bank has introduced new requirements limiting landowner access to subsidized rural credit to those who can demonstrate compliance with environmental legislation. In 2014, the National Monetary Council introduced requirements (Resolution 4.327) for socio-environmental factors to be mainstreamed into the governance of risk by banks and other financial institutions.

### CHINA

**Publicly listed companies ESG requirements:** The Securities Regulatory Commission (CSRC) in collaboration with the Ministry of Environment introduced new requirements mandating that by 2020 all listed companies and bond issuers disclose ESG risks associated with their operations.

**Enterprise Environmental Credit System (Guidelines):** Jointly issued by the Ministry of Environment and the National Development and Reform Commission in 2015, the guidelines put forward clear directions for the development of a corporate environmental credit system. For this, enterprises are required to report specific environmental information (e.g. environmental fines) that will be factored into their ability to access capital.

**Guidelines for Corporate Social Responsibility of Chinese Banking Institutions:** 25 articles establishing a set of minimum requirements in terms of economic, social and environmental responsibilities. For example:

- Set up specialized agencies or designate relevant departments to be responsible for environmental protection.
- Support customers to save resources and protect the environment through financial instruments.

**Environmental information from public and private institutions:** China's environmental pollution problems have led the country to adopt environmental disclosure measures. Some research details the evolution of environmental disclosure in China through a combination of annual reports and real-time disclosure. Regulation requires enterprises to disclose certain enterprise information (e.g. public complaints about operations, environmental fines, etc.) in the Enterprise Credit and Information Public Disclosure System, which is a publicly accessible online system available at <http://gsxt.saic.gov.cn/>.

The environmental credit rating will be based on a corporate environmental credit evaluation index and a grading methodology decided and is expected to help China achieve its emission reduction targets.

### FRANCE

**Grenelle II:** Data and information disclosure on the social and environmental consequences of the company's operations.

**Commercial Code (Article 225-100):** Include non-financial (social and environmental) KPIs alongside the company's business reports.



**Bilan Social:** Disclosure requirements of social metrics for companies with 300 or more employees.

**Financial Code (Article 533-16-1):** Disclosure of ESG criteria inclusion into investment and risk management policies.

**Energy Transition Law (Article 70 and 173):** Requires listed companies to disclose financial risks related to the effects of climate change and the measures taken to reduce them. It also requires institutional investors to disclose the ESG criteria considered in their portfolio strategy and how that strategy aligns with national strategies and international commitments.

## UK

The Financial Reporting Council regulates auditors, accountants and actuaries, and sets the UK's corporate governance and stewardship codes. It also promotes transparency and integrity in business.

**Stewardship Code:** Investors must prepare, maintain and publish a statement of investment principles that details the decisions governing their investment criteria. This statement should include the extent to which social, environmental and ethical considerations are taken into account for investment decision-making.

**Guidance on Strategic Reporting:** To the extent necessary to understand the entity's business, the strategic report should include information on the impact of the business on the environment and other ESG-related indicators.

## US

**Business Supply Chain Transparency on Trafficking and Slavery Act (2015):** An amendment to the Securities Exchange Act of 1934, it requires companies to disclose information regarding the measures the company is taking to tackle conditions of forced labour and human trafficking.

**Dodd-Frank – Conflict Mineral Rule:** Requires companies to disclose whether they use conflict minerals and whether the supply of those minerals come from countries where its sourcing is related to human right abuses.

**Securities Exchange Commission – Guidance on Disclosure Related to Climate Change:** The SEC's interpretative guidance highlights the following areas as examples of where climate change may trigger disclosure requirements:

- Impact of Legislation and Regulation
- Impact of International Accords
- Indirect Consequences of Regulation or Business Trends
- Physical Impacts of Climate Change.

Globally 65% of disclosure measures implemented are mandatory (Figure 6). According to data from the Reporting Exchange, Mexico currently has 20 provisions requiring information disclosure by the private sector. The reporting requirements are established by: the General Law of Ecological Balance and Environmental Protection (LGEEPA); the General Law for the Prevention and Comprehensive Management of Wastes (LGPGIR); the General Law on Wildlife (LGVS); and the General Law on Climate Change (LGCC) and their respective regulations.

However, despite the current measures in place and unlike other countries (e.g. Argentina, France, India) Mexico does not require the development of sustainability reports – neither for private nor for publicly listed companies.<sup>90</sup>

Enterprise level environment-related data has therefore proven harder to obtain. While most companies listed on the stock exchange develop their sustainability reports, the information is disaggregated into each company’s website, which increases the search costs.<sup>91</sup> Enterprise level data available for use in financial analyses was usually presented in ways unfamiliar to financial market users.

Further analysis is required to map the private data ecosystem and provide recommendations on how to develop the data ecosystem in ways that can provide financial decision makers with the right information and the appropriate tools to integrate environmental data into mainstream financial analysis.

## 8 CONCLUSIONS



This grounding paper looks to catalyse a dialogue between environmental data suppliers and environmental data users in the financial sector. Such a dialogue could help promote more sustainable and responsible financial markets through the use of PAED to:

- Reduce information asymmetries;
- Price risks of unsustainable projects more appropriately; and
- Reallocate capital to a climate-friendly, inclusive and environmentally friendly economy.

Conclusions on two different fronts can be drawn from this initial ground work to understand the environmental data ecosystem:

- Open Data Practices in Mexico: Understanding Mexico's current environmental open data practices and how they compare to other countries leading the sustainable finance agenda.
- PAED Catalogue: Building up a knowledge base for financial institutions to understand the potential exposure to natural capital and climate change risks.

### 8.1 OPEN DATA PRACTICES IN MEXICO

Open data practices, related to the use of PAED, are wide-ranging, but are often implemented through internationally accepted standards. Mexico closely adheres to the International Open Data Charter principles and largely aligns with examples of best practice from other countries, for example France and the UK. However, several recommendations were identified that could enhance Mexico's open data practices and in turn the use of PAED in financial decision-making:

- 1 Consider disclosing the reasons for data restrictions to ensure openness and increased trust with public and private institutions, and therefore greater uptake of PAED in financial decision-making.
- 2 Explore the use of data safe havens in order to build trust in the publishing bodies. This will provide financial institutions with confidence that available data is secure and trustworthy.
- 3 Creative Commons share-alike licensing agreements could be considered for the Mexican government's central portal to ensure that third-party modifications to data are published in open formats. This will ensure that financial institutions have access to up-to-date, accurate and relevant data in order to inform decisions.
- 4 Consider adopting the use of the ISO 19115 standard to enhance interoperability of open data within international systems. This would enable financial institutions to consistently assess transboundary environmental impacts, enabling more informed, landscape-level decision-making.

Although a comparison of open data practices is valuable to identify recommendations for the Mexican government, it will also be important for future studies to compare regulation disclosure requirements

and measure the amount of information being disclosed and its usefulness for financial institutions. For example, information provided by the government might need to be in an open source format based on the pledge to the International Open Data Charter, but the availability of data from the private sector might be conditioned by good practices (such as voluntary guidelines from stock exchanges or regulation). Nevertheless, the adoption of the recommendations above, based on a review of international open practices, would lead to improved trust, accessibility and quality of Mexico's data, fostering increased use of PAED in financial decision-making. This will ultimately result in improved environmental safeguards and will ensure that Mexico's financial markets align more closely to sustainable development.

This is an initial assessment. Going forward, it is important to identify not only technical data gaps but also potential gaps in institutional capacity, governance, principles and standards, and technology aspects (e.g. user interfaces) necessary for advancing a robust digital data infrastructure for the use of PAED in financial decision-making.

## 8.2 PUBLICLY AVAILABLE ENVIRONMENTAL DATA CATALOGUE

The PAED background paper notes a number of potential barriers to the use and uptake of PAED for the finance sector.<sup>92</sup> In addition, we note the following gaps and challenges specific to the creation of a functional PAED catalogue:

- **Priority uses of data by financial decision makers have yet to be defined.** The broad range of decision-making contexts within the finance sector means that different data sets will be relevant for different users. Clearly defining the information needs of different financial decision makers from government and standard setters to investors, retail banks and insurers will be important to develop a more tailored and comprehensive catalogue.
- **Data sets reported by national and regional sources (e.g. data focused on particular assets) will be required by some users, but may be more time-consuming to access than data sets with global coverage reported by international organizations.** Securing information on such data sets will be important for some elements of decision-making but will be located in a wide range of portals or formats and additional time will be required access them and assess their value for inclusion within the catalogue. The government could help reduce the time required to access information relevant to financial decision-making by consolidating frequently used data, such as economic data.
- **Data sets may require further analysis or interpretation of data to render them meaningful to assess risk.** Users may find raw data difficult to use and interpret, depending on their technical expertise and capacity.
- **Data credibility and the extent to which it is fit for purpose for decision-making will vary according to its source:** Most PAED are typically managed or compiled by internationally recognized organizations with a strong reputation and expertise, and well-established data verification and validation processes. However, if this is not the case, caution will need to be applied to ensure decisions are made based on accurate, complete and valid data sets.

In relation to the use and uptake of PAED by the financial sector, the following table summarizes the current status of the PAED ecosystem as it pertains to the different barriers identified by the GFSG in 2017.

PAED barrier	Description
 <p data-bbox="255 336 454 481">Nascent state of environmental risk analysis and methodologies</p>	<p data-bbox="510 224 1356 302">Methods for ERA have just been developed by a few financial institutions (see Box 3 and Box 4).</p> <p data-bbox="510 336 1356 448">The lack of such analytical tools and wider deployment of established methodologies results in limited demand for environmental data, since it is too costly or complex to analyse.</p>
 <p data-bbox="215 660 486 884">Lack of commonly accepted future scenarios and clarity of future policy responses to environmental and climate challenges</p>	<p data-bbox="510 515 1356 616">Most of the data identified in the PAED catalogue was historical, with only a few web portals (2%) providing data sets with forecasts or future predictions on, for example, weather conditions.</p> <p data-bbox="510 627 1356 694">Categories of potentially relevant forward-looking information include, but are not limited to:</p> <ul data-bbox="550 705 1356 996" style="list-style-type: none"> <li>• Scenarios of global warming economic impacts and projections of natural disaster probabilities (e.g. Intergovernmental Panel on Climate Change).</li> <li>• Forecasts of energy statistics including demand, supply, and cost projections (e.g. International Energy Agency).</li> <li>• Natural resource management, such as future water demand or stress (e.g. UN Environment, OECD or World Resources Institute).</li> <li>• Costs of damages from air, water, and land pollution (e.g. OECD, Institute for Advanced Sustainability Studies).</li> </ul>
 <p data-bbox="239 1176 470 1276">PAED presented in unfamiliar ways to financial market users</p>	<p data-bbox="510 1019 1356 1276">About 63% of the data sets identified in the PAED catalogue are drivers of change (e.g. pollution), the rest are data sets describing natural capital assets. This provides a strong foundation from which to further adapt information and integrate it into traditional risk analysis processes. Unfortunately, the majority of data sets were available as an online or downloadable map at the federal or national level, a format the currently prevents the scaling-up of environmental risk analysis beyond traditional project finance.</p>
 <p data-bbox="231 1500 478 1601">Public data sources not widely known or easily accessible</p>	<p data-bbox="510 1310 1356 1646">The analysis of risks and opportunities by financial institutions requires several types of environmental data. The majority of data sets had no restrictions on the access or use and those that do have restrictions for commercial use have been specified. However, these databases are typically located in various sources. It is therefore time-consuming for most financial firms that are relatively new to environmental analysis to search and obtain such data or expand the scope of their ERA beyond project finance and below certain amounts. Some public data, such as those at the facility level, are not yet mapped to financial assets and firms, and thus are difficult to use.</p> <p data-bbox="510 1680 1356 1747">Data from the private sector and non-governmental sources was not easily found.<sup>93</sup></p>
 <p data-bbox="215 1892 486 1993">Uncertainty over the business models for PAED provision</p>	<p data-bbox="510 1780 1356 1926">Mexico closely adheres to the principles of the International Open Data Charter and largely aligns with the examples of best practices from other countries. Further improvement on this front could be made by establishing a specific governance mechanism to advance PAED provision for the financial sector.</p>

## 8.3 NEXT STEPS

Today, most assessments of environmental risk undertaken by financial institutions focus on the impact that financing – mainly project finance – has on the environment. They do not, however, sufficiently consider how the environment could impact the portfolio.

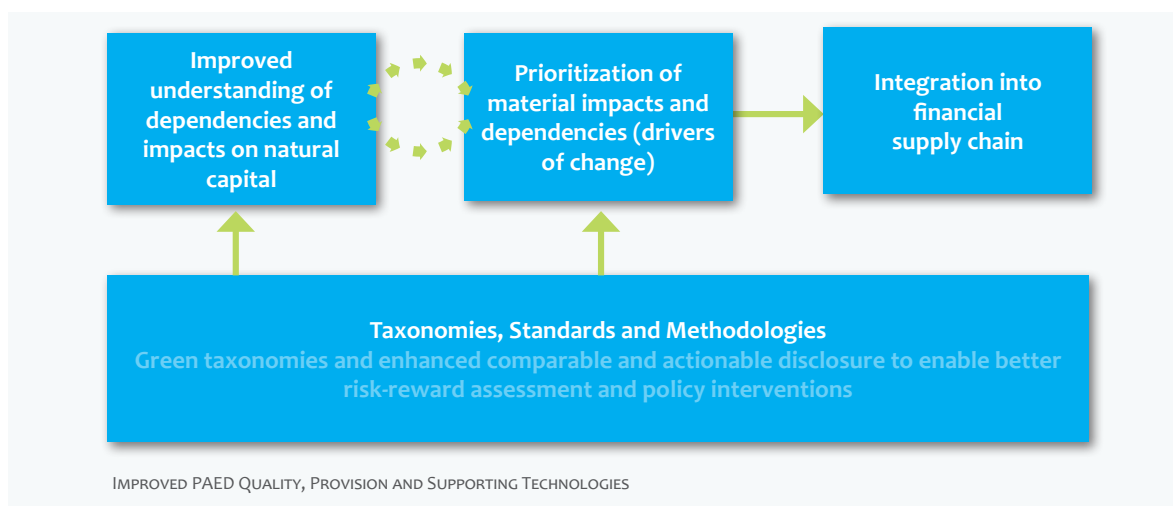
This type of environment-related risks (e.g. climate change, natural capital) is often hidden to financial institutions. The development of a PAED catalogue as well as an initial understanding of Mexico’s current standing on environmental open data practices serves as a key first step to identify the broad array of information available to facilitate financial institutions’ identification, assessment, exposure and mitigation of associated project level and portfolio-based risks.

By presenting the benchmark of open data policies together with the PAED catalogue and case studies by government and the private sector, this paper sets out the basis to encourage a dialogue between environmental data suppliers and environmental data users in the financial sector. The aim is to promote more sustainable and responsible financial markets through the use of PAED and the development of appropriate tools to integrate ERA in mainstream financial decision-making.

Building up from previous work done by financial institutions in Mexico on deforestation risk, drought stress testing and water risk modelling, this dialogue will facilitate an in-depth analysis of the barriers and drivers to integrate the use of PAED at each stage of the financial supply chain.

In advancing this dialogue to generate a more efficient and effective environmental data ecosystem for financial decision-making, the Bank of Mexico and Secretaría de Hacienda y Crédito Público could take into consideration the framework presented in Figure 9 and presented below with some exploratory options.

**FIGURE 10: FRAMEWORK FOR UNDERSTANDING, PRIORITIZING AND INTEGRATING NATURAL CAPITAL IMPACTS AND DEPENDENCIES**



Source: Authors

### 8.3.1 IMPROVED PAED QUALITY, PROVISION AND SUPPORTING TECHNOLOGIES

Mexico closely adheres to the principles of the International Open Data Charter and largely aligns with the examples of best practices from other countries. The analysis of risks and opportunities by financial institutions requires several types of environmental data. Databases are typically located in various sources. It is therefore time-consuming for most financial firms that are relatively new to environmental analysis, to search and obtain such data or expand the scope of their ERA beyond project finance and below certain amounts.

Further improvement on this front could be made by encouraging a dialogue or the development of a national PAED task force to:

- Establish a specific governance mechanism to advance PAED provision for the financial sector.
- Examine laws, regulations and market standards that price or help improve the pricing of externalities by providing market signals.
- Analyse current data provision and data gaps at different levels of aggregation (e.g. asset, firm, value chain, sectoral, regional, national) from both the public and the private sector.

The technology underlying big data can increase the use of PAED by pulling vast data sets of non-standardized data from multiple sources, and allow these to be standardized and presented in ways that make sense for financial users.<sup>94</sup> Work done by the Sustainable Digital Finance Alliance (SDFA) for the G20 SFSG showcases different examples of how technology, through the use of artificial intelligence is being used to pull, standardize and validate information, providing insights on risks and rewards.

In 2016 the Global Report Initiative (GRI) launched the Digital Reporting Alliance with the objective to address the lack of structured data, develop and promote the use XBRL sustainability taxonomy.

**The use of an XBRL sustainability taxonomy could certainly promote data standardization and comparability among other benefits and could therefore be furthered considered by the task force alongside other technological developments to improve data disclosure and use by financial decision makers.**

Technology can also help translating a wide range of financial transaction data into environmental data.<sup>95</sup> This could empower increasing environment-conscious customers with information about the environmental and social impact of either their real economy retail decisions (e.g. *Ant Forest and the greening of fintech*) or financial product selection (e.g. *EU Eco-labelling on financial products*) to opt out of certain purchases. **The PAED task force could further explore the possibilities for advancing data solutions that empower citizens to drive more sustainable capital allocation in retail purchases.**

### 8.3.2 TAXONOMIES AND STANDARDS

Data taxonomies and standards underpin the data ecosystem and structure the ways different actors in the data ecosystem interact with one another. In order to develop an appropriate PAED infrastructure for financial institutions to better integrate PAED into mainstream decision-making, it is important to establish the underlying architecture of taxonomies and disclosure standards among others.

Both G20 SFSG<sup>96</sup> as well as the EU high-level expert group on sustainable finance<sup>97</sup> and the FSB TCFD,<sup>98</sup> have identified a series of barriers to drive a more sustainable capital allocation process that derive from a lack of taxonomies or competing classifications. A lack of clarity in definitions can contribute to a market information asymmetry. The absence of commonly agreed classifications and taxonomies in sustainable finance can also give space for some level of ‘greenwashing’, a topic that is further considered by the NGFS.

Additionally, the emergence of competing disclosure standards has also been cited as a barrier given the inconsistencies in disclosure practices, the lack of information on the financial implications of climate-related aspects, and the use of boilerplate language among others. A lack of uniform and authoritative environmental quantification standard makes environmental externalities (positive and negative) generated by sustainable investments harder to quantify, monetize, and integrate into mainstream decision-making.

In short, taxonomies and standards are part of the structural enabling environment for a functioning market and ecosystem for sustainable development data as they enable market growth by redirecting



capital flows towards more sustainable assets. They enable smoother interaction and more useful insights by providing a basis for improved interoperability, and build trust across sectors and data communities. Potential implications for the PAED task force work are to:

- Develop a sustainability taxonomy to help identify the underlying environment-related risk of brown vs green assets to enable market growth and reallocation of capital flows towards sustainable assets.
- Implement the recommended disclosures of the TCFD, as they provide a standardized common framework for disclosures in climate-related risks
- Consider the interconnectivity of TCFD implementation with existing financial statement and disclosure requirements as well as open data policies and standards.

### **8.3.3 IMPROVE UNDERSTANDING OF DEPENDENCIES AND IMPACTS ON NATURAL CAPITAL BY THE BUSINESS SECTOR<sup>99</sup>**

An increasing amount of evidence highlights the dependence of business on natural capital. Several frameworks have been developed to help identify, assess, mitigate and report on the associated risks derived from this dependence (e.g. CDP, Climate Disclosure Standards Board, Natural Capital Coalition, Sustainability Accounting Standards Board). In order to improve the understanding of dependencies and impacts on natural capital by businesses, it would be important for the PAED task force to:

- Develop an analysis of environmental impacts and dependencies per sector prioritizing industries based on Mexico's current production matrix, taking into consideration the potential implications of future technology shifts.

In parallel with the above:

- Produce factsheets that can inform both business and the financial sector to help understand the dependencies and guide further integration into mainstream financial decision-making.
- Identify the extent and quality of current data holdings and perform a gaps assessment to promote further interactions with data suppliers. Consider both data that can inform the identification, assessment, exposure and mitigation of current risks as data that can serve to inform about future risk exposure.

### **8.3.4 PRIORITIZE IMPACTS AND DEPENDENCIES TO NATURAL CAPITAL ASSETS AND DRIVERS OF CHANGE WITHIN THOSE ASSETS<sup>100</sup>**

Based on the impacts and dependencies identified previously, the task force could undertake further research to prioritize impacts per industry based on financial materiality<sup>101</sup> and environmental data availability in order to develop an environmental risk and information materiality assessment matrix.

Considering the breakdown of the number of data categories per data source shown in Figure 12, further analysis on the availability of environmental data and its format for integration into mainstream financial decision-making should be conducted with those organizations making data available for the most data categories.

### **8.3.5 INTEGRATE INTO FINANCIAL SUPPLY CHAIN**

The nascent state of environmental risk analysis and methodologies, and the lack of commonly accepted future scenarios and clarity of future policy responses to environmental and climate challenges, have been identified as key barriers that hinder further consideration and integration of PAED into mainstream



financial decision-making. In order to further environmental data and considerations into mainstream financial decision-making, the task force could further:

- ④ Identify key financially material sectors in banks portfolios.
- ④ Understand current ERA practices and how PAED is integrated in mainstream risk management processes in financial institutions.
- ④ Translate PAED materiality assessment matrix data sets into quantitative and standardized metrics of financial risk that are applicable in different investment contexts and to different sectors, companies and assets.
- ④ Map out different tools available (e.g. Carbon Risk Valuation Tool) and build capacity within the financial sector to understand key environmental sensitivities (e.g. potential disruptions) of businesses production processes.
- ④ Promote quantitative, portfolio-wide assessments of risk exposure based on sector, geographies and activities of the institutions



# APPENDIX A: MEXICO PAED CATALOGUE – MAPPING DATA ECOSYSTEM

This catalogue brings together a wide range of PAED and indicates their sources with hyperlinks to the data sets. The catalogue represents an initial mapping exercise. It focuses exclusively on historical PAED and on national-level data. This could provide a useful starting point for more comprehensive efforts that would in turn further benefit financial decision-making. The complexity in the number of sources and diversity in number of indicators simply confirm the need for the financial sector to engage in a more substantive dialogue with data suppliers.

A total of 186 different data sets were identified, which cover 32 out of the 35 data categories (natural capital assets and drivers of change) according to the framework developed as part of the Natural Capital Finance Alliance’s Advancing Environmental Risk Management project. The only three categories that were not covered were: ocean acidification, overharvesting and human modification of genetic material. Figure 11 provides the proportion of data sets per data category. The majority (94%) of the PAED entered into this catalogue comes from governmental sources, collected at the national, federal or state level. Often, the same data set was available from multiple websites and web portals for different purposes.

## SCOPE OF THE CATALOGUE

This catalogue focuses on national and sub-national sources of PAED from government organizations and other sources, such as NGOs and private sector. It should be noted that there are additional and significant volumes of PAED reported at the international level that could also be of value to decision makers. These were not included in this catalogue under the assumption that the data sources from international organizations are the same sources of PAED captured in the catalogue.

Most of the PAED presented in the catalogue is macro-level, national-level data. No asset-level data is included in the catalogue but, given the large number of sources for this data, time constraints prevented a comprehensive search for such data. As noted in the PAED background paper, raw data at the physical asset level is typically reported by owners or operators of facilities to regulators based on legal or administrative requirements. Firm-level data can be provided by environmental agencies (e.g. as part of their environmental monitoring activities), national statistics offices (e.g. as part of regular business surveys), and NGOs (some examples of which are included in the catalogue) as well as by third-party data providers (e.g. industry associations) and corporate disclosures (which are not included in PAED).

## STRUCTURE OF THE CATALOGUE

The catalogue has been constructed based on the framework presented in Figure 11. It is recognized that various other frameworks and groupings could be used for structuring a PAED catalogue.

This framework consists of two data categories:

- **Natural Capital Assets:** Data that characterize the availability, accessibility and quality of the natural assets (natural capital) that form the basis of economic activity. A declining asset base may constitute a risk to future growth.
- **Drivers of Change:** Data that characterize the environmental risks to which people and economic activity are exposed, and the related economic losses. Degraded environmental conditions can have substantial economic and social consequences, from health costs to reduced agricultural output, impaired ecosystem functions and lower labour productivity.

**FIGURE 11: TYPOLOGY OF ENVIRONMENTAL ISSUES FEATURED IN THE CATALOGUE (NCFA FRAMEWORK)**



Source: NCFA

Data sets within the catalogue are described via a set of qualifiers that were used to screen a broad range of data sets. These qualifiers are:

**Data Type:** (e.g. primary spatial, secondary spatial, primary non-spatial, secondary non-spatial)

**Type of Data Provider:** (e.g. non-governmental organization, intergovernmental organization, governmental organization, academia)

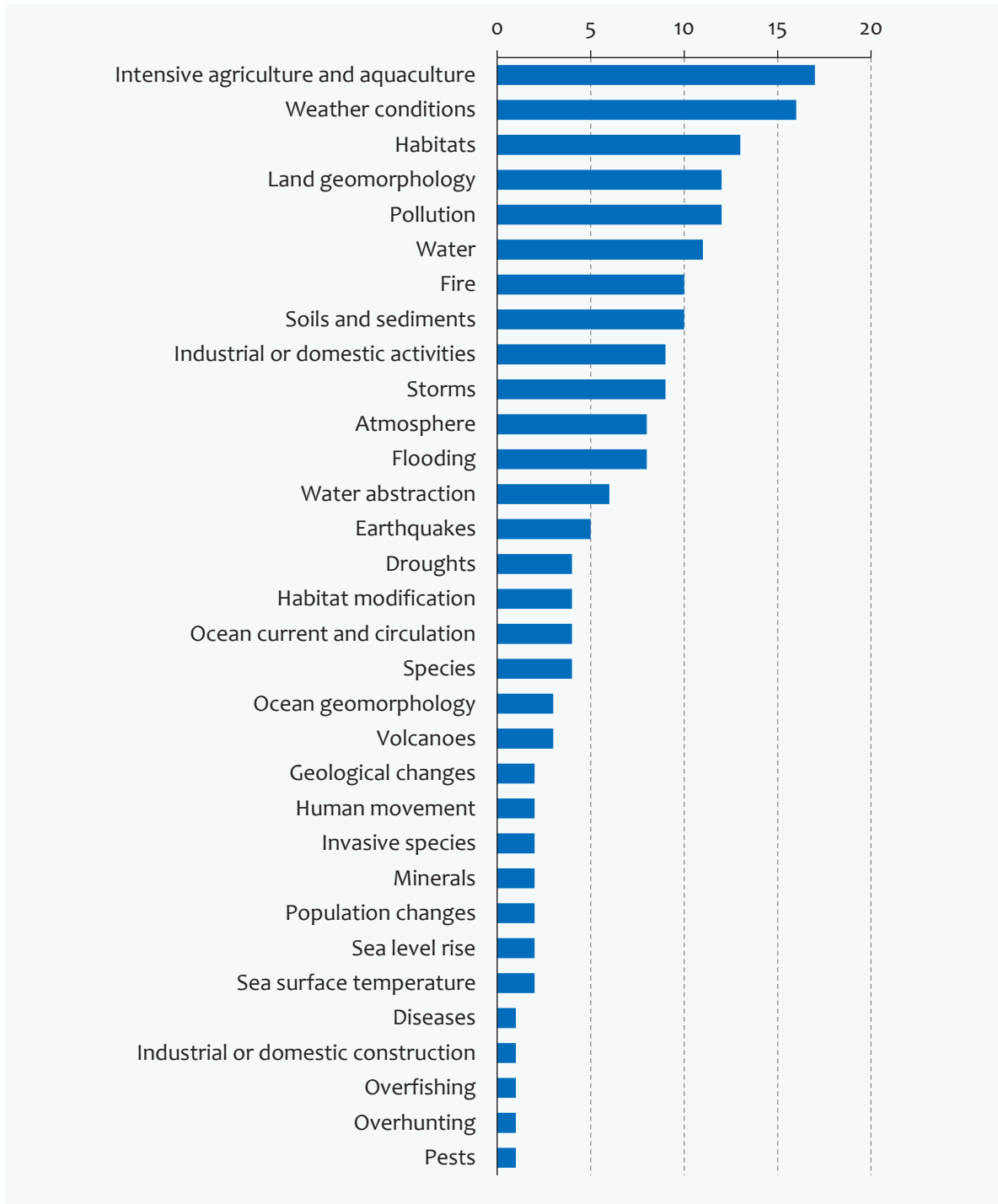
**Data Source:** Organization through which the data was sourced. Figure 13 provides a breakdown of the number of data categories per data source.

**Temporal Scenario:** Does data have ability to demonstrate trends over time and within a timeframe suitable for finance sector decision-making? (e.g. historical, forward-looking, present, unknown)

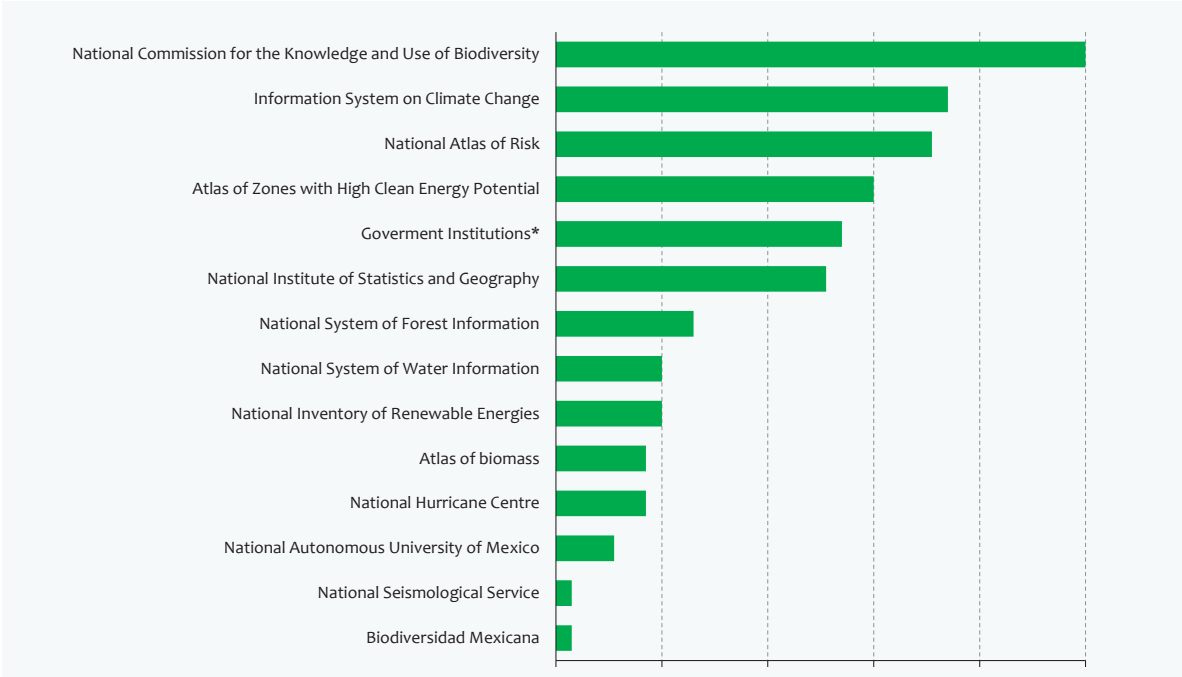
**Update Frequency:** How often is data updated? (e.g. annual, bi-annual, monthly, weekly)

**Geographical Extent:** Is data coverage available and robust? (e.g. national, state)

**FIGURE 12: PROPORTION OF DATA SETS PER DATA CATEGORY**



**FIGURE 13: DATA CATEGORIES PER DATA SOURCE**



\*These datasets were taken from the main government data portal (<https://datos.gob.mx/>).

# ENDNOTES

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- 100 This step is in line with the NCFA's Advancing Environmental Risk Management project, which is doing this at the global level and for Colombia, Indonesia, Peru and South Africa. More information can be found at <http://www.naturalcapitalfinancealliance.org/aerm-project>
- 101 An advisory panel of leading academics could be established to guide the quantification of economic consequences of environmental impacts.



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