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CLIMATE-RELATED AND ENVIRONMENTAL RISKS AND
OPPORTUNITIES (CERO)

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This Technical Note was prepared in the context of a joint IMF-World Bank Financial Sector Assessment Program (FSAP) mission in Panama during June 2023 led by Richard Stobo, IMF and Emile van der Does de Willebois, World Bank, and overseen by the Monetary and Capital Markets Department. IMF, and the Finance, Competitiveness, and Innovation Global Practice, World Bank Group. The note contains the technical analysis and detailed information underpinning the FSAP assessment's findings and recommendations. Further information on the FSAP program can be found at www.worldbank.org/fsap.

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EXECUTIVE SUMMARY

This Technical Note provides an overview of possible financial sector vulnerabilities to climate and environmental risks, assesses the current supervisory response to those risks, explores green finance opportunities, and evaluates existing disaster risk financing mechanisms in Panama.

Financial authorities worldwide, including those in Panama, are increasingly acknowledging the significance of climate-related and environmental issues as crucial sources of risk and opportunity for the financial sector. To manage climate-related and environmental risks and support green development, financial authorities, governments, and international standard-setting bodies are taking steps to strengthen regulation, supervision, and capacity of financial sectors. The assessment in this technical note examines high-level risk exposure of the banking sector, while also considering the current supervisory response as well as the financial markets' potential to drive green finance. However, a comprehensive evaluation of the Panamanian entire financial sector's exposure to climate change risks and vulnerabilities falls beyond the purview of this FSAP note. For this note an on-site mission was carried out from January 24 to February 6, 2023, gathering information from a wide range of stakeholders.

Climate and environmental risk analysis

A high-level assessment indicates potential vulnerability to climate physical risks for Panama's financial sector. Climate physical risks can affect the financial sector, but the materialization of risk depends on asset location and vulnerability. More in-depth assessments by Superintendencia de Bancos (SBP), Superintendencia de Seguros y Reaseguros (SSRP) and the Superintendencia de Mercado de Valores (SMV) are needed, considering different scenarios, including compounding risks, broader macroeconomic impacts, such as on GDP, inflation, and exchange rates, and more detailed and spatially explicit exposure and vulnerability analysis to fully assess those physical risks. A more comprehensive assessment would also need to consider Panama's ongoing efforts to adapt and build resilience, which could reduce the economy's exposure and vulnerability to physical risks related to climate change. SBP could thereby focus on mortgages and real estate lending as those make up the largest share of lending of Panamanian banks and the lending is highly concentrated around Panama City, a region expected to be prone to recurring flooding with growing climate change.

Overall transition risk impact currently seems contained, given Panama's overall low greenhouse gas (GHG) emissions, and an expected focus of domestic climate policies in promoting green investment; nevertheless, individual FIs could be impacted in case of significant exposure to high-carbon sectors or climate spill-over risks from climate policies that are implemented in foreign jurisdictions. Panama has committed to maintain net-zero emissions by 2050 and is currently one of only three countries globally with net negative GHG emissions. However, Panama's GHG emissions have been growing substantially over the past decade, which could soon reverse its net negative emission status. Hence, Panama needs to reverse emission trends in the power and transportation sector, which would require more stringent climate policy introduction. Likewise, Panama's agricultural practices and forest loss contribute significantly to the country's greenhouse gas emissions with urban sprawl from Panama City and changing agricultural practices being major drivers. However, it seems currently more likely that climate policies will be phased-in overtime and will emphasize promoting and subsidizing green investments, rather than penalizing high-carbon ones. Financial institutions have an important role to play therein, which may also provide new business opportunities for banks. As such, overall transition risk impact currently seems contained but individual FIs could be affected in case of high exposure to high-

carbon sectors and by climate spillover risks resulting from the introduction of climate policies in foreign jurisdictions, warranting further assessment by the authorities.

Supervisory response to climate and environmental risks

Climate risk identification and assessment in Panama’s financial sector is in its early stages, with significant challenges, specifically on data gaps and lack of capacity, persisting. Currently, climate-related awareness and capacity in Panama are low due to limited understanding of the potential materiality of climate risks. Although the country has experienced some extreme weather events in recent decades, the impacts have been relatively minor compared to other regions, leading to a lack of appreciation for the magnitude of the risks that climate change poses to the economy and society. As a result, financial institutions (FIs) are just beginning to assess climate risks, as also confirmed by a recent survey conducted by the SBP among its supervised banks. SBP, SSRP and the SMV as well as government entities are acknowledging the financial stability risk that climate change could pose but are still in the early stages of understanding those risks and integrating them into their organizational and governance frameworks. The level of focus and maturity varies among superintendencies, where SBP has already issued high-level guidance on climate-related risk assessment. Authorities in Panama have recently started to prepare a guide for assessing climate risk in banking, insurance, and reinsurance portfolios.

Authorities should emphasize data collection, capacity building and appropriate resource mobilization and assign responsibilities across institutions for the system-wide assessment and monitoring of climate risks. SBP, SMV, and SSRP would need to collect more granular data both on asset location and the emission profile of assets, in collaboration with MiAmbiente. This would also include data sharing and collaboration among private and public stakeholders, along with collection of more granular physical impact data. Internal and external capacity building on climate-related risk is necessary, as capacity building and awareness-raising initiatives across authorities and the financial sector have so far focused on sustainable finance and ESG issues. In this regard, MiAmbiente is currently disseminating climate change scenario results, including temperature, precipitation, and sea level rise, to various financial institutions in Panama to raise awareness of the impact of climate variables on the country and its economic sectors. SBP, SMV, and SSRP could conduct a top-down exposure exercise to assess financial sector vulnerability to climate risks and gain insight into the potential impacts of climate risks. This could help to identify priority FIs, which require closer climate risk management supervision. The climate risk assessment and monitoring capacity should be supported by adequate internal strategies and resources in the regulatory and supervisory teams of SBP, SMV, and SSRP, while responsibilities across institutions need to be clearly defined.

Although SBP has provided high-level guidance on climate-related risk assessment, SBP, SMV, and SSRP need to provide more detailed supervisory guidance and expectations for the financial sector to effectively manage climate risks and foster coordination among private and public stakeholders. It is crucial for these authorities to develop and implement strategies with clear guidelines and timelines for integrating climate risk into supervisory and regulatory practices. The insights from the climate risk assessment can guide the need for supervisory actions and the tools. Such a risk-based approach could inform authorities for developing comprehensive supervisory guidance on governance, risk management, scenario analysis, vulnerability assessment, and disclosure of climate risks. Incorporating climate risks into supervisory reviews, scores, and on-site supervision can help assess the resilience of regulated institutions and identify areas requiring further action, such as setting disclosure requirements and providing supervisory guidance. Enhancing coordination among SBP, SMV, SSRP, government entities, and private

sector stakeholders is necessary, despite existing interagency platforms and working groups. To improve expertise in climate and environmental risk management, Panama's financial sector should engage external partners and international platforms, such as joining the NGFS (Network for Greening the Financial System) and invest in specialized training programs for staff members. A promising way forward could be the 2018 founded Sustainable Finance Work Group with public and private representatives from the entire financial sector, which aims to improve coordination processes and conducts online training for financial institutions and regulators to increase awareness and knowledge.

Developing and deepening green finance markets

The investment needs for mitigation and adaptation under Panama's National Determined Contributions (NDCs) exceed what can be financed through public resources alone, necessitating the mobilization of private finance. Panama faces significant climate mitigation investment needs to achieve its NDC targets, amounting to USD4.1bn, or about 6.4 percent of 2021 GDP, until 2025. The country's adaptation investment needs are even higher, particularly in the water, energy, and agriculture sectors, with estimates ranging from USD7.06 billion to USD9.4 billion by 2030. Panama has taken some steps towards developing green finance markets and initiatives, but to achieve its 2050 net-zero emissions target, a comprehensive strategy is required to scale up green lending and capital market development. MiAmbiente and the MEF, in coordination with other relevant agencies, should conduct a comprehensive gap analysis to determine the private and public finance needs and their availability for the national climate action plan and national energy transition strategy.

Panama's financial market has the potential to become a regional center for sustainable finance, but the growth of green finance markets is hindered by several challenges. To facilitate the financial sector's engagement in climate action, an enabling policy environment must be established by the authorities to address the barriers that impede the sector's involvement in green finance. Limited uptake of green lending instruments due to a lack of incentives and awareness, as well as the absence of reliable revenue streams, are among the main barriers. Other challenges include the absence of clear definitions and standards, limited climate-related disclosure practices, and low market awareness and knowledge. Panama's potential to become a green finance hub is currently underutilized, hindering its ability to tap into international markets for green finance opportunities. Five green corporate bonds have been issued so far, indicating that the green bond market is still in its early stages in Panama.

To scale up green finance in Panama, a comprehensive approach is necessary. This includes exploring and implementing various debt instruments and frameworks, establishing reliable revenue streams, and developing a robust regulatory framework for carbon markets. MEF is currently working on a sovereign sustainable bond framework and plans to issue its first sustainable bond in 2023. In addition to green bonds, the MEF could consider other debt instruments to attract more investors for both mitigation and adaptation finance. SMV should develop issuance frameworks and guidance to facilitate the issuance of innovative financial instruments like sustainability-linked bonds. It is crucial to establish measurable key performance indicators (KPIs) with the support of authorities to promote the development of these instruments. Furthermore, collaboration between SMV, MEF, and MiAmbiente is needed to incentivize the adoption of green and sustainable debt instruments, encourage investor participation, and create reliable revenue streams for green projects. The ongoing effort for developing a National Carbon Market is a useful step in this direction, while there is a need to ensure the interoperability of sustainable finance tools as well as measurable, reportable, and verifiable reductions in GHG emissions.

Improving data availability and market transparency in Panama's financial system is crucial for the development of comprehensive green finance. To enhance transparency, the development of a green taxonomy is underway, classifying economic activities as green or high carbon. This taxonomy is essential for the growth of the green finance market. Additionally, increasing the availability of climate-relevant data is necessary to make informed, greener investment decisions. The taxonomy is in the final stage of validation and public consultation is planned for late 2023. The publication is intended to be accompanied by a set of recommendations for policymakers and regulatory authorities, which are planned to be adopted under the legal framework of SBP, SMV, and SSRP. To promote transparency and accountability in the financial sector's environmental practices, the MEF, MiAmbiente, SBP, SMV, and SSRP should adopt a phased approach to enforce mandatory reporting of climate-related and environmental financial disclosures, taking into account varying firm capacities. To mitigate greenwashing risks and ensure consistency in disclosures, SBP, SMV, and SSRP should align their supervisory guidance with the green taxonomy. Furthermore, regulators play a vital role in overseeing external reviewers who assess firms' ESG performance, particularly in environmental aspects, to ensure their appropriate oversight and validation.

Disaster Risk Finance

Panama has made progress in disaster risk financing (DRF), but further strengthening of the DRF strategy is needed. The country has adopted a risk-layering approach, integrated disaster risk reduction into development policies, and aims to expand its disaster risk financing options, especially for agricultural insurance coverage. However, challenges remain, including limited data on physical climate risk, an insurance protection gap for vulnerable households and smallholder farmers, and unclear financing sources for expanding coverage through the Caribbean Catastrophe Risk Insurance Facility (CCRIF). To enhance Panama's DRF strategy, recommendations include exploring premium payment options for DRF instruments like CCRIF, incentivizing insurance companies to offer risk resilience products, and collaborating with stakeholders to address barriers, such as data gaps, to insurance coverage expansion.

Table 1. Key Recommendations

Recommendation		Responsibility	Timing¹
Supervisory response to climate-related and environmental risks			
1.	Improve coordination among superintendencies, government entities and private sector stakeholders on climate-related and environmental risks, engage with external partners and join international platforms.	MiAmbiente, MEF, SBP, SMV, SSRP	I
2.	Build up internal technical capacity, collect relevant data, mobilize dedicated resources within superintendencies, and assign responsibilities for the system-wide assessment and monitoring of climate risks.	SBP, SMV, SSRP, MiAmbiente	ST
3.	Conduct a top-down exposure exercise to assess the banking sector's vulnerability to climate risks and identify need for supervisory action.	SBP, SMV, SSRP	ST
4.	Provide more detailed supervisory guidance and expectations on the management and disclosure of climate and environmental risks following a risk-based approach.	SBP, SMV, SSRP	MT
5.	Develop supervisory strategies with clear guidelines and timelines for implementation.	SBP, SMV, SSRP	MT
Green finance			
6.	Outline private and public finance needs and availability for national climate action plan and national energy transition strategy ("gap analysis") to develop a green finance roadmap.	MiAmbiente, MEF, Secretaria de Energia	I
7.	Assess how private capital could be mobilized focusing on identified barriers and lacking incentives, while raising awareness and building capacity.	MiAmbiente, MEF, Secretaria de Energía, SBP, SMV	ST
8.	Evaluate debt instruments beyond green bonds that could mobilize green finance for mitigation and adaptation (e.g., blue bonds, sustainability-linked products, adaptation bonds) and develop respective frameworks.	MEF, MiAmbiente, SMV	MT
9.	Finalize the green taxonomy making sure it is environmentally sound, well communicated and covers entire financial sector.	MiAmbiente, MEF, SMV, SBP, SSRP	I
10.	Establishing the regulatory framework to ensure the interoperability of the National Carbon Market and other financial instruments, in order to generate financial income and establish Panama as a model to follow in the region by promoting environmental and market integrity.	MiAmbiente, MEF, SMV	ST
Disaster Risk Finance			
11.	Explore opportunities to increase private sector insurance coverage in the context of strengthening the disaster risk financing strategy.	MEF, SSRP, ISA	MT
12.	Consider relevance of expanding parametric and microinsurance products for quick and unbureaucratic payout options, including their technical requirements (e.g., weather stations).	MEF, MiAmbiente, SSRP	ST

¹ "I: Immediate" is within one year; "ST: short-term" is 1–3 years; "MT: medium-term" is 3–5 years.

* This could either be a separate mechanisms for green finance topics or combined with a coordination mechanism on climate-related and environmental risks (see recommendation 1).

I. INTRODUCTION

1. Financial authorities around the world increasingly view climate and environmental issues posing significant risks but also offering opportunities for the financial sector, and Panama is no exception. Central banks, supervisors, regulators, and government authorities are concerned about the potential impact of climate-related and environmental risks on the stability of their financial systems. Meanwhile, there is a growing consensus that the financial sector has a crucial role to play in facilitating a smooth transition to a low-carbon economy and in directing investment towards environmentally sustainable projects. This includes supporting climate mitigation and adaptation goals outlined in the Paris Agreement and the Sustainable Development Goals, as well as broader objectives related to nature and biodiversity.

2. Financial authorities, governments and international standard setting bodies are taking steps to strengthen the regulation, supervision, and capacity of their financial sectors to manage climate-related and environmental risks and support green development. The Central Banks and Supervisors Network for Greening the Financial System (NGFS) is a key international coordination mechanism, with 121 member organizations and 19 observers urging central banks, prudential supervisors, and policymakers to green the financial sector. Major standard-setting bodies such as the Basel Committee on Banking Supervision (BCBS), International Association of Insurance Supervisors (IAIS), and Financial Stability Board (FSB) are publishing analyses on climate-related financial risk. The G20 has elevated the Sustainable Finance Working Group and published a roadmap to prioritize the sustainable finance agenda, while over 80 finance ministers have committed to supportive actions through the Coalition of Finance Ministers for Climate Action. The International Sustainability Standards Board (ISSB) has been created to support ESG and climate-related reporting and disclosures.

3. This Technical Note provides an overview of possible financial sector vulnerabilities to climate change and environmental risks, assesses the current supervisory response to those risks, explores green finance opportunities, and evaluates current disaster risk financing mechanisms in Panama. The assessment in this technical note examines high-level risk exposure of the banking sector, while also considering the current supervisory response as well as the financial markets' potential to drive green finance. However, a comprehensive evaluation of the Panamanian entire financial sector's exposure to climate change risks and vulnerabilities falls beyond the purview of this FSAP note. To gather information from a wide range of stakeholders, an on-site mission was carried out from January 24 to February 6, 2023. The inclusion of climate risk and opportunities assessments in FSAP missions is a relatively recent development. Due to the continuously changing global policy landscape, a standardized framework for conducting such assessments does not yet exist. Nonetheless, drawing from extensive consultations with local stakeholders and emerging global best practices, this report presents practical recommendations to help authorities manage climate risks and promote the growth of green finance in the financial sector.

4. This Technical note is organized as follows. Section 2 provides background information on Panama's vulnerabilities to climate change and an overview of current climate policies. Section 3 assesses the high-level exposure of the Panamanian financial sector to climate physical and transition risks while Section 4 offers actionable guidance to financial regulators and supervisors on how to better understand and manage those risks. Section 5 provides an initial assessment of the current climate finance landscape in Panama and Section 6 presents a set of actions that Panamanian authorities could take to stimulate

green finance markets as well as private sector financing for climate adaptation and resilience. Section 7 gives recommendations how the current disaster risk financing mechanisms could be strengthened and enhanced.

II. CLIMATE CHANGE AND MACRO-FINANCIAL CONTEXT

5. To provide a foundation for the analysis, this section outlines the pertinent country context concerning climate change and the financial sector. It seeks to offer an outline of the most significant climate physical and transition risk sources in Panama, their potential impact on the economy, and actions taken by authorities in response. Additionally, it offers a general overview of noteworthy financial sector developments in Panama, which sets the context for the subsequent sections on supervising climate risks and expanding green finance markets.

Vulnerabilities to climate physical risks

6. Panama is exposed to growing impacts of climate change, which could also exacerbate other socioeconomic risks. The impacts of climate change are evident, and it is one of the great challenges facing humanity. Panama is particularly vulnerable to the effects of climate change, evidenced by disasters resulting from hydroclimatic threats such as floods, longer dry seasons, sea level rise, among others. Climate change is expected to increase the vulnerability of sectors such as agriculture, forestry, construction and housing, and health, as well as highly water dependent sectors (e.g., the Panama Canal²), which could have spill-over effects along value chains and cause economic disruptions that may impact the financial sector. The European Commission's INFORM Risk INDEX (Table 2) shows Panama's overall risk level versus the global average. High overall hazard exposure as well as the limited coping capacity, especially in some of its coastal regions, are exposing the country to the impacts of climate change.

Table 2. Selected Indicators from the INFORM Risk 2023 Index for Risk Management for Panama

Hazard and Exposure (0–10)	Vulnerability (0–10)	Lack of Coping Capacity (0–10)	Overall Risk Level (0–10)	INFORM Rank (1–191)
3.8 [2.7]	3.8 [3.8]	4.1 [4.4]	3.9 [3.5]	79

Source: European Commission, INFORM Risk Index 2023.

Note: For the subcategories of risk, higher scores represent greater risks. Conversely, the most at-risk country is ranked first. Global median risk scores are indicated in brackets.

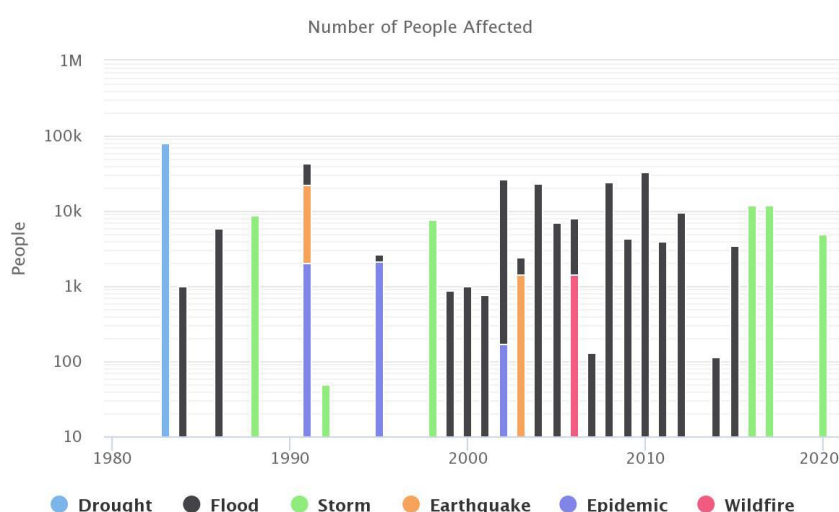
7. The greatest climate-related hazard risks in Panama stem from flooding, hurricanes, and droughts as well as sea level rise, where climate change is expected to increase frequency and intensity of those events (Figure 1). Panama has been mostly spared by extreme disasters in recent decades but is particularly vulnerable to extreme weather events such as hurricanes, floods, and droughts with growing climate change. The occurrence of climate-related disasters in Latin America has already increased by a factor of 2.4 since 1970.³ Those can cause extensive damage to infrastructure and disrupt economic activities. Sea level rise is also a significant threat to Panama, especially along its coastal regions

² The proceeds of the Panama Canal contribute to around 3 percent of Panama's annual GDP and about \$800 million goes to Panama's general treasury each year.

³ <https://climateknowledgeportal.worldbank.org/country/panama/vulnerability>

and islands (Figure 2), as it can cause flooding, erosion, and saltwater intrusion, affecting the tourism industry and coastal ecosystems. Additionally, water scarcity is becoming increasingly problematic in certain regions (resembling global developments⁴), particularly during the dry season, which can negatively impact agriculture and freshwater ecosystems. Finally, climate change is expected to exacerbate existing health issues, including the spread of vector-borne diseases and pathogens, as well as increase the risk of forest fires, soil erosion, and loss of biodiversity.⁵

Figure 1. Key Natural Hazard Statistics for 1980-2020



Source: EM-DAT, World Bank Climate Change Knowledge Portal

- Floods:** The country's vulnerability to floods is partly due to its location in a tropical region, with a high level of precipitation and a dense network of rivers and streams. Flash floods are a recurring phenomenon often associated with large storm events. Flood events have been particularly damaging in low-lying coastal areas, where urbanization and population growth have increased exposure to flood risk. The agricultural sector has also been impacted by floods, with crops and livestock being damaged by floodwaters. Floods are the primary concern in terms of Disaster risk management, accounting for 86.9 percent of all disaster-related economic losses between 1990 and 2014.⁶
- Hurricanes:** Panama has a history of being affected by tropical storms, particularly in the western part of the country, while few of them had hurricane status. The agriculture and tourism sectors are particularly vulnerable to the impacts of hurricanes, with crops and tourist facilities often suffering most of the damage. The provinces of Bocas del Toro, Chiriquí, and Veraguas have been the most affected by tropical storm and hurricanes in recent years. For example, in 2020, Hurricane Eta and Hurricane Iota caused severe flooding and landslides in the western region of the country, affecting multiple people, and causing damage to homes, roads, and bridges.
- Droughts:** Droughts have been a growing natural hazard in Panama, particularly affecting the Pacific and central regions of the country. The agricultural sector has been one of the most affected by

⁴ UN Water 2023: Partnerships and cooperation for water. <https://unesdoc.unesco.org/ark:/48223/pf0000384655>

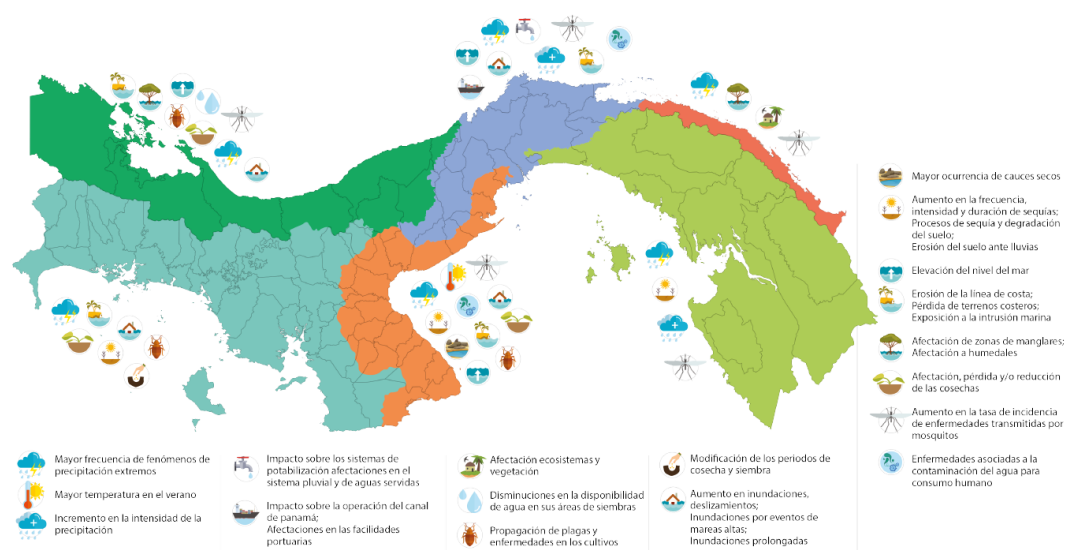
⁵ <https://www.ipcc.ch/sr15/chapter/spm/>

⁶ UN Office for Disaster Risk Reduction, <https://www.preventionweb.net/countries/pan/data/>

droughts, causing economic losses. More severe droughts in the future could pose a threat for food insecurity. The Panama Canal, a vital transportation route for global trade, has also been affected by droughts in the past. In 2019, a severe drought led to low water levels in the Canal, forcing authorities to impose shipping restrictions and reduce the draft of vessels that could transit through the waterway. The energy sector has also been impacted by droughts, as the country relies heavily on hydroelectric power generation. During the 2015-2016 El Niño event, which caused widespread drought in Central America, Panama had to resort to fossil fuel-based energy to compensate for the reduced hydropower output.

- Sea-level rise:** Sea level rise is a growing concern for Panama, particularly due to its impact on the country's infrastructure and coastal zones. Coastal areas such as Panama City, Colón, and Bocas del Toro have already experienced the effects of sea level rise, with increased flooding, erosion, and saltwater intrusion. The Panama Canal could also be affected by sea level rise. As the sea level continues to rise, the canal's locks may become less effective, which could lead to disruptions in global shipping routes and impact Panama's economy. In addition to these immediate impacts, sea level rise is expected to cause long-term effects on agriculture, water resources, and tourism. MiAmbiente commissioned a study to evaluate the potential impact of sea level rise on the Panamanian coasts by 2050.⁷ The study found that approximately 2.01% of the country's surface area may be affected by sea level rise, with crop areas accounting for 0.61%, populated areas for 0.02%, and aquaculture and salt production projects for 0.14%.

Figure 2. Environmental hazard maps by region in Panama⁸



Source: *Ministerio de Ambiente Panama*⁹

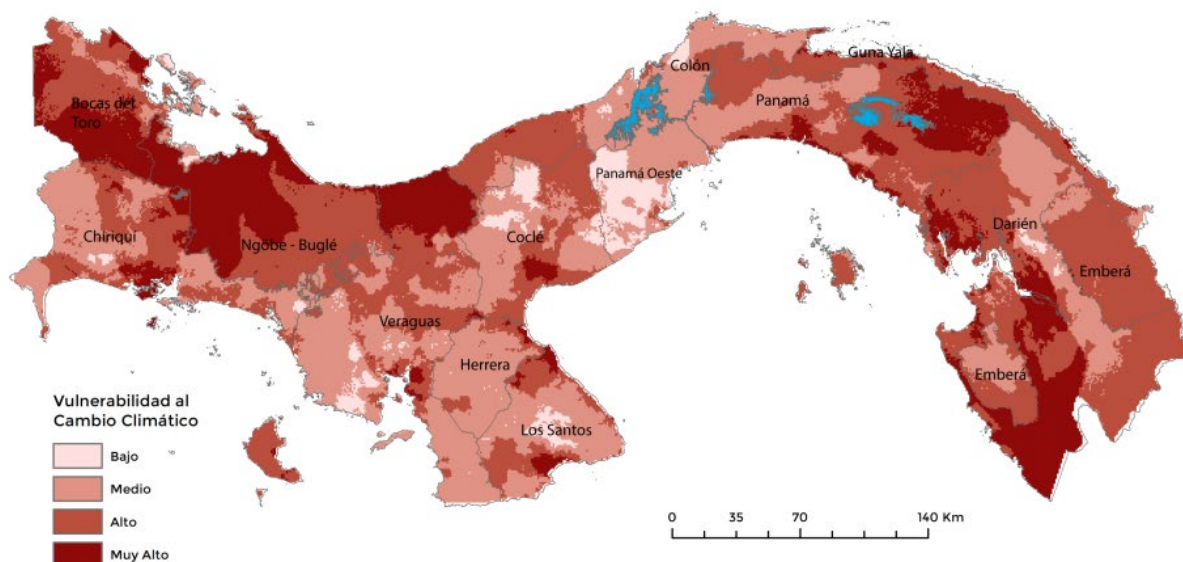
⁷ <https://dcc.miambiente.gob.pa/panama-presenta-resultados-de-estudio-sobre-proyeccion-de-ascenso-del-nivel-del-mar/>

⁸ The map shows the expected main impacts of climate change in the country by climatic regions.

⁹ <https://dcc.miambiente.gob.pa/impacto-del-cambio-climatico-en-panama/>

8. The socioeconomic impacts of climate-related disasters in Panama are likely to be amplified with growing climate change but differ across regions and sectors (Figure 3). The agriculture sector, dominated by smallholder farmers who rely on rainfed production, is at higher economic and financial risks from more intense droughts. Similarly, the tourism sector, concentrated on the coastline, is vulnerable to natural hazards like tropical cyclones and coastal flooding. Flood damages, especially very difficult to predict flash floods, can cause severe disruptions to businesses and public services, while destroying infrastructure like roads and railroads.

Figure 3. Climate change vulnerability by category¹⁰



Source: Ministerio de Ambiente Panama¹¹

Vulnerabilities to climate transition risks

9. Panama's GHG emissions are relatively low (118th largest emitter in the World)¹², yet selected sectors could be exposed to transition risk. Panama has committed to be net-zero in 2050

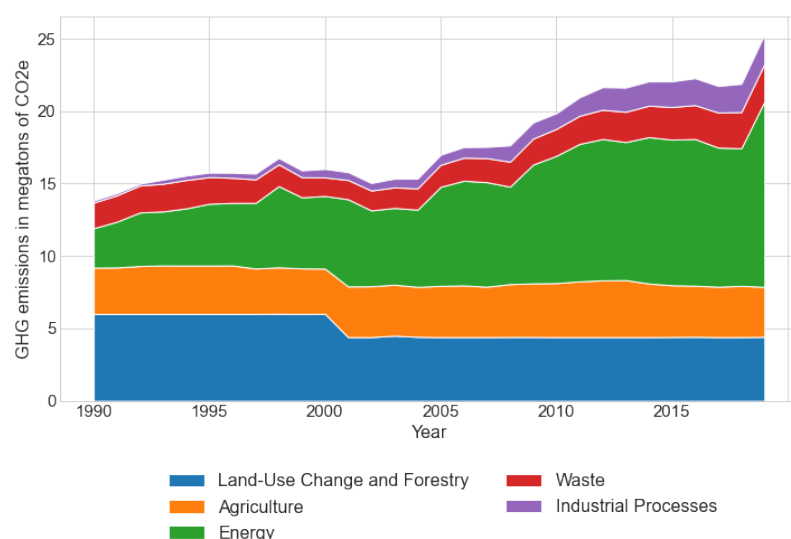
¹⁰ For vulnerability values, temperature anomalies were classified as follows: the higher the anomaly, the more vulnerable the area is. For precipitation anomalies, values were considered vulnerable if they were positive or negative in comparison to the historical period studied from 1980 to 2015. This means that the higher the anomaly, the greater the vulnerability. Even negative changes were considered highly vulnerable. This is because both positive and negative anomalies have the potential to cause impacts in different ways. For example, a region may be vulnerable to flooding due to an increase in precipitation or droughts in the case of a decrease in precipitation [18] [19]. This approach represents a high vulnerability for both cases of high change conditions, such as the increase and decrease in precipitation based on the studied period. To obtain each component of vulnerability, geo-processed and normalized indicators of exposure, sensitivity, and adaptive capacity were added with the same level of influence, meaning that each indicator has equal importance.

¹¹ <https://transparencia-climatica.miambiente.gob.pa/wp-content/uploads/2021/10/03-Indice-de-Vulnerabilidad-al-Cambio-Climatico.pdf>

¹² https://www.climatewatchdata.org/countries/PAN?end_year=2019&start_year=1990

and is currently considered one of only three countries globally with net negative emissions.¹³ However, GHG emissions in Panama have been growing substantially during the last decade (Figure 4), which could soon reverse Panama's state of net negative emissions if compliance with NDC2 is not ensured. The energy sector (which includes electricity, transportation, heating, and cooling) is the sector that contributes the most, with the rapid growth of road transport emissions being one of the main concerns in this regard.¹⁴ Likewise, land-use change, mainly driven by shifting agricultural practices, and agriculture are major GHG emission sources.¹⁵ Those are consequently priority sectors for decarbonization in Panama's submitted NDCs.¹⁶ Measures such as the Law on incentives for electric mobility and its regulation, as well as an Energy Transition Strategy are aiming to address this. However, it is necessary to ensure the successful implementation of these measures and strengthen if needed. Transition risks could emerge in case of the abrupt introduction of domestic or international climate policies that could pose significant adjustment costs for companies and households. Consumer and investor preference shifts could also be a source of transition risk for firms and financial institutions.

Figure 4. GHG emissions by sector up to 2019



Source: CAIT

10. Panama's energy sector is the largest contributor to GHG emissions, driven by oil-fueled transport sector emissions. 25 percent of total energy supply in 2020 stemmed from renewable sources as the electricity sector is predominantly fueled by hydro power; however, electricity generation from coal and natural gas has been growing recently (Figure 5). Hydro power is the main

¹³ It should be noted that the notion of net negative emission depends on the measurement and specifically on the assumed capability of mature forests to capture *additional flows* of carbon emissions, see for instance Pioniot et al. 2022 for details.

¹⁴ While not to be accounted towards Panama's emission in line with international standards, it should be noted that emissions from shipping and aviation are specifically high in Panama given the role of the Panama Canal, its role as the largest international shipping registry and its position as an international flight hub.

¹⁵ In 2019 energy emissions stemmed to 47.4 percent from transport, 19 percent industrial emissions, 17 percent commercial and public services, 16 percent residential and 0.5 percent from other energy-related activities.

¹⁶ https://unfccc.int/sites/default/files/NDC/2022-06/CDN1_percent20Actualizada_percent20Rep_percentC3_percentBAblica_percent20de_percent20Panam_percentC3_percentA1.pdf

electricity source in Panama (67 percent in 2020), while recent installments of natural gas as well as solar and wind power plants supplement the electricity mix. Despite having considerable potential, renewable sources such as solar, wind, geothermal, and biomass only account for a small portion of the electricity mix.¹⁷ Solar generation is expected to grow rapidly in homes and businesses following recent regulatory changes for distributed electricity generation. The transport sector, which consumes the most energy, contributes to about 50 percent of energy-related GHG emissions. Nearly 1 million motor vehicles (private cars, buses, trucks, etc.) account for around 65 percent of the consumption of petroleum-derived fuels (diesel and gasoline) in the country. Electrifying public and private transport is hence a core aspect of Panama's decarbonization strategy. In addition, the projected increase in temperatures by 2050 is expected to lead to a higher demand for cooling in residential and commercial buildings, which will further drive up energy consumption. The Secretaria de Energia expects electricity generation to almost double (from currently about 11000 Gigawatt hours to 19000 Gigawatt hours in a BAU scenario) to accommodate the growing energy needs that this would entail.¹⁸

11. Panama's agricultural practices and forest loss contribute significantly to the country's greenhouse gas emissions, with the agricultural sector alone accounting for a notable 14 percent of emissions in 2019. About 68 percent of the country's surface is covered with forests¹⁹ with a 3 percent increase in forest cover between 2019 and 2021. Despite large parts of the country being protected²⁰, urban sprawl from Panama City and changing agricultural practices remain major drivers of land-use change emissions. While agricultural and livestock practices outside protected areas have started to shift towards more sustainable practices, urgent action is needed to transform them into climate-smart agriculture and livestock, which can ensure food security and reduce losses and damages with high economic and financial costs. The terrestrial footprint, particularly around Panama City, has substantially increased between 2000 and 2013 (Figure 6), while the Biodiversity Intactness Index²¹ for the entire country has declined by 6 percentage points between 1970 and 2014 (Figure 7). Depending on the scenario assumed, further deterioration is expected (SSP2) while strong policy action could help to bend the curve (SSP1).

12. Conserving Panama's ecosystems is crucial for sustainable development, but multiple drivers currently contribute to continued degradation. Panama's ecosystems provide essential services such as regulating water supply, maintaining soil quality, supporting tourism and carbon sequestration. A recent report by MiAmbiente²² has identified 19 direct environmental problems and 12 external and underlying environmental drivers leading to degradation of those ecosystems. These include overexploitation, waste generation, poor management practices, and insensitive economic activities that lead to degradation of natural resources, environmental pollution, and other negative effects on the environment, climate, economy, and social well-being. The report provides an example of the potential

¹⁷ As of July 2020, solar electricity capacity was 37.1 MW, representing 2.3 percent of total electricity demand.

¹⁸ https://www.gacetaoficial.gob.pa/pdfTemp/29163_B/81944.pdf

¹⁹ <https://online.fliphtml5.com/eebm/vwqp/>

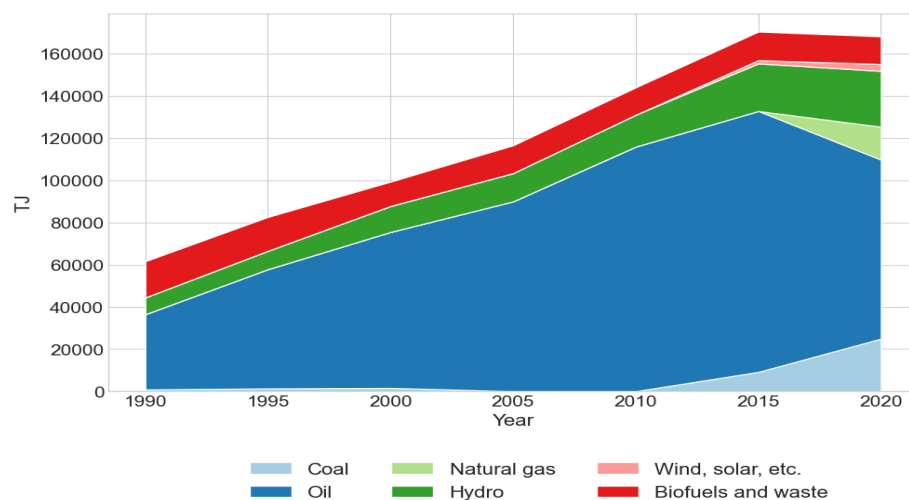
²⁰ 31 percent of terrestrial and 27 percent of the marine area are currently protected in Panama (WDPA 2021). 54 percent of key biodiversity areas (KBA) are currently protected, up from 13 percent in 1980.

²¹ If the BII is 90 percent or more, the area has enough biodiversity to be a resilient and functioning ecosystem. Under 90 percent, biodiversity loss means ecosystems may function less well and less reliably. If the BII is 30 percent or less, the area's biodiversity has been depleted and the ecosystem could be at risk of collapse.

²² <https://www.miambiente.gob.pa/wp-content/uploads/2022/10/PRINCIPALES-PROBLEMAS-AMBIENTALES-BAJA-F-1.pdf>

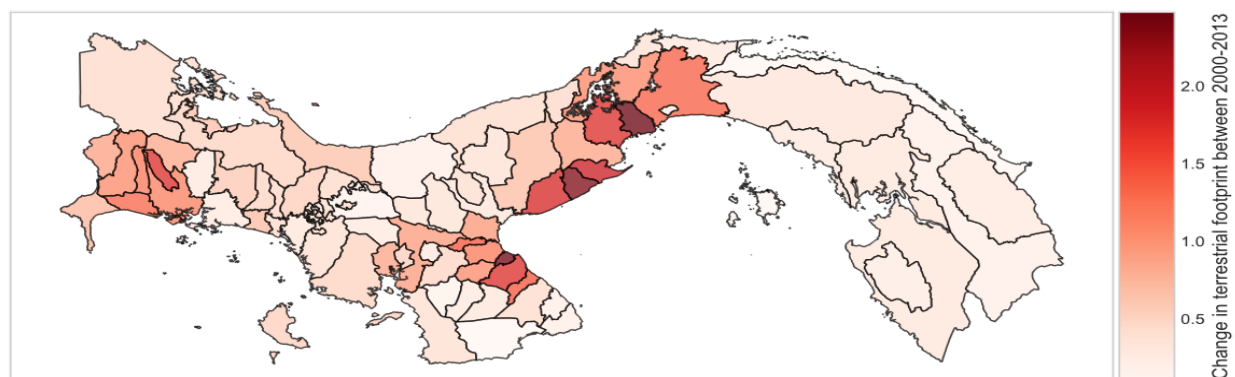
role of bank lending for this degradation, indicating that the promotion of livestock and agricultural activities through low-interest loans may have driven the expansion of the agricultural frontier and contributed to reduced forest cover.

Figure 5. Energy supply by sector up to 2020



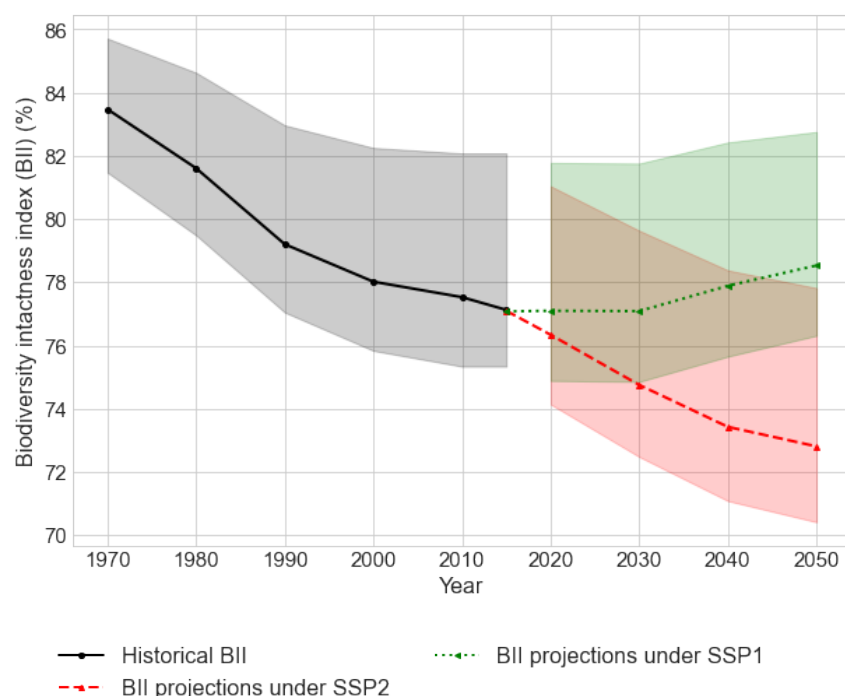
Source: IEA

Figure 6. Change in Panamanian terrestrial footprint between 2000 and 2013 by district



Source: Based on UN Biodiversity Lab, Venter et al. 2016, and Williams et al. 2020, Humanitarian Data Exchange 2021

Figure 7. Biodiversity intactness index in Panama under different shared socioeconomic pathways (SSPs)



Source: Helen Phillips; Adriana De Palma; Ricardo E Gonzalez; Sara Contu et al. (2021). *The Biodiversity Intactness Index - country, region and global-level summaries for the year 1970 to 2050 under various scenarios [Data set]*. Natural History Museum. <https://doi.org/10.5519/he1eqmg1>

Government Initiatives for Climate Mitigation, Adaptation and Nature Protection

13. Panama is committed to climate action and has implemented several policies and strategies aimed at reducing greenhouse gas emissions and promoting sustainable development. One of the most important policies in this regard is the National Climate Change Strategy 2015-2050, which however only included two sectors, Energy and Forests. Its objective is to reduce greenhouse gas emissions by 10 percent by 2030 and promote the use of renewable energy and energy efficiency. At this moment, the Inclusive Sustainable Development Strategy, Low in Emissions and Resilient to Climate Change by 2050 is being prepared in collaboration with the Ministry of Economy and Finance. It is expected to be finalized in January 2024 and should include 100 sectors of NDC2. It is also intended to cover the Corporate, Municipal, and Product Carbon Footprint and Water Footprint Reduction Program. In 2021, the Second Biennial Update Report was published, which shows that Panama is a net negative carbon country.²³ Panama also aims to maintain having net-zero emissions in 2050. Panama promotes the use of renewable energy through a net metering program and tax incentives for renewable energy projects. In April 2023, the economy and finance committee of Panama's national assembly has approved a bill to expand incentives for renewable energies, which would amend law 37 from 2013 that established the

²³ <https://transparencia-climatica.miambiente.gob.pa/biblioteca/#segundo-informe-bienal-de-actualizacion/1/>

incentives framework to promote the construction, operation and maintenance of solar plants or installations.²⁴ In addition, Panama has implemented other policies and initiatives such as the Strategic Guidelines for the Energy Transition Agenda 2020-2030 by the Secretaria de Energia, which outlines five pillars to decarbonize the energy sector.

14. MiAmbiente is currently developing an updated NDC, which is expected to include climate risk scenarios, updated GHG emissions inventories, more ambitious targets, and corresponding higher investment needs for adaptation and mitigation. The NDC2 is being developed through broad participatory consultation at the national level, and in addition to the 10 updated NDC1, it will incorporate the Corporate, Municipal, and Product Carbon and Water Footprint Reduction Program in a cross-cutting manner. The Secretaria de Energia in Panama is currently updating the national energy transition strategy in line with the updated NDCs and is developing a green hydrogen strategy. The creation of the National Program “Reduce Tu Huella” under Executive Decree No. 100 on October 20, 2020, regulates the preparation of national inventories of greenhouse gas emissions and establishes the National Platform for Climate Transparency as the official mechanism for monitoring and reporting national initiatives towards sustainable, inclusive, low-emission, and resilient development. The Panamanian Tourism Authority has also implemented an updated Sustainable Tourism Master Plan for 2020-2025 to support climate action.²⁵ The Alliance for One Million Hectares for 2015-2035, which aims to restore and conserve one million hectares of degraded land in Panama, is supported by the new Forest Incentives Law of October 30, 2017, which provides financial incentives for reforestation and sustainable forest management. The Estrategia Nacional Forestal 2018-2050²⁶ in Panama is a national strategy that aims to promote sustainable forest management, conservation, and restoration of forest ecosystems in the country, with the goal of achieving a net increase in forest cover and contributing to climate change mitigation and adaptation.

15. Climate adaptation also plays an important role in the government’s strategy to prepare Panama for growing climate impacts. Panama has developed a National Adaptation Plan and has established a Climate Change Adaptation Trust Fund to finance adaptation projects, particularly those with co-benefits for mitigation and adaptation. Panama recognizes the potential of nature-based solutions in mitigating climate change and enhancing climate resilience.²⁷ The country has identified several measures such as reforestation, forest conservation, sustainable land use practices, and restoration of degraded ecosystems, as key components of its climate strategy.

16. Panama has developed a disaster risk financing strategy to ensure the availability of financial resources after natural disasters. The strategy utilizes financial instruments such as insurance, contingent financing, and savings funds, and is guided by the Disaster Risk Financing Policy developed by the Ministry of Economy and Finance. A key component of the strategy is the creation of the Disaster Contingency and Risk Insurance Fund (DICRE), administered by the Ministry of Economy and Finance. DICRE provides reliable and timely funding to support the country's recovery efforts, without resorting to

²⁴ <https://www.bnamericas.com/en/news/solar-incentives-bill-advances-in-panama>

²⁵ https://www.atp.gob.pa/Plan_Maestro_de_Turismo_Sostenible_2020-2025.pdf

²⁶ https://www.gacetaoficial.gob.pa/pdfTemp/28745_A/GacetaNo_28745a_20190402.pdf

²⁷ https://unfccc.int/sites/default/files/NDC/2022-06/CDN1_percent20Actualizada_percent20Rep_percentC3_percentBAblica_percent20de_percent20Panam_percentC3_percentA1.pdf

additional borrowing or reducing other public expenditures.²⁸ The framework aims to strengthen Panama's resilience to natural disasters and ensure the country is better prepared to respond to future events. Panama has also received support from international financial institutions to strengthen its disaster risk financing strategy. The World Bank Catastrophe Deferred Drawdown Option (CatDDO) is one such example, which provides immediate funding to countries in the aftermath of a natural disaster. The Inter-American Development Bank (IDB) has also provided a disaster risk insurance policy to Panama, which covers earthquake and hurricane risks for the public sector.

III. CLIMATE-RELATED AND ENVIRONMENTAL RISKS AND THE FINANCIAL SECTOR

17. This section provides an overview of how climate-related risks can impact Panama's financial sector.²⁹ The section assesses the exposure of Panama's banking sector to both acute (such as flooding and hurricanes) and chronic (such as an increase in maximum daytime and minimum nighttime temperatures and sea level rise) climate change impacts (i.e., physical risk), as well as risks from sudden and unanticipated climate policy, technology, and consumer preference changes (i.e., transition risk). Panama could also face transition risk if other countries implement climate border adjustment or deforestation prevention measures³⁰, as currently planned by the EU for instance. Additionally, international investors could withdraw financing from Panama to align their portfolios with the Paris Agreement's goals.

18. Figure 8 summarizes the transmission channels of climate-related physical and transition risks to Panama's economy and financial sector. The financial sector may be affected by increased market risk from sudden financial asset price changes (such as stranded assets), credit risk from defaulting loans, and underwriting losses for the insurance sector as risks become harder to price. Operational risks may also arise, such as extreme events affecting servers, and foreign exchange risk could emerge as trade and cross-border finance flows may be altered. Reinforcing feedback effects from the financial sector to the real economy could potentially emerge, leading to cascading effects.

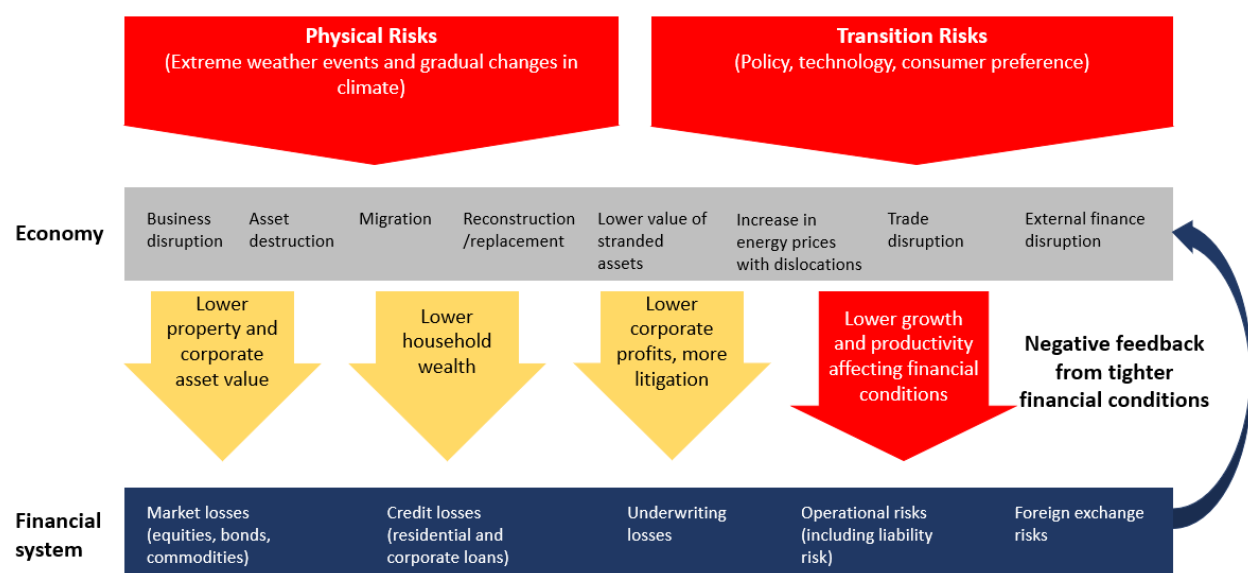
19. In response to these risks, more and more central banks and supervisors are beginning to incorporate climate risks into their supervisory framework to encourage financial institutions to better evaluate, reveal, and handle these risks. Standard-setting bodies are also introducing guidance and principles to promote a shared understanding of how climate-related financial risks can be efficiently managed. Recently, the Basel Committee on Banking Supervision (BCBS)³¹ has released essential principles for managing and supervising climate-related financial risks, which serves as a crucial foundation for banks and supervisors to adopt practices related to climate risks.

²⁸ DICRE is based on a risk pooling mechanism that combines government resources with contributions from private insurers and reinsurers, and has a targeted size of USD 200 million. DICRE also provides incentives to insurers to increase coverage and develop new products for disaster risk.

²⁹ For an overview of the financial sector in Panama please be referred to the Appendix section.

³⁰ https://ec.europa.eu/commission/presscorner/detail/en/ip_22_7444

³¹ <https://www.bis.org/bcbs/publ/d532.pdf>

Figure 8. Transmission channels for climate-related physical and transition risks

Source: Adapted from Grippa, Suntheim, and Schmittmann 2019.

Climate and Environmental Physical Risks

20. Given Panama's increasing exposure to acute climate-related physical risks such as hurricanes, floods and droughts, the financial sector could be affected. Yet, the location and vulnerability of assets are crucial factors that determine the actual materialization of risk, necessitating more specific information on asset location. The impact of these risks could be transmitted through supply chain disruptions and electricity shortages, which could also affect other sectors of the economy. The financial sector in Panama may face market and credit risks due to deteriorating firm fundamentals, leading to higher nonperforming loans and asset price losses. However, in Panama, climate-related physical risks such as droughts and floods are not evenly distributed across the country. Similarly, economic activity and lending varies by region (Figure 22 in Appendix), with Panama City being the main economic center, contributing to a significant portion of the country's GDP and lending share (Figure 23 in Appendix). To obtain more detailed estimates of the effects of climate-related physical risk on the financial sector, more specific information is needed on asset location, type, and ownership. A more comprehensive assessment would also need to consider Panama's ongoing efforts to adapt and build resilience, which could reduce the economy's exposure and vulnerability to physical risks related to climate change. A particular focus is recommended on mortgages and real estate lending as those make up the largest share of lending of Panamanian banks and the lending is highly concentrated around Panama City, a region expected to be prone to recurring flooding with growing climate change.

- **Floods: Flooding impacts could significantly affect the housing and energy sector in Panama, particularly in the metropolitan area around Panama City.** As illustrated by the Aqueduct Floods Hazard Maps for 2030 for an expected 100 year flood return period (Figure 9) under RCP 8.5 the area around Panama City is expected to be most exposed to flooding events in 2030 with growing climate change. At the same time, over 70 percent of bank lending in Panama goes to that area (Figure 22 in

Appendix), with the bulk of loans financing housing (34 percent) and auto loans (making up 14 percent of consumer good loans, which make up 20 of total loans in that area). Those are lending categories that might be specifically vulnerable to flooding events. At the same time, mortgage lending is one of the largest components in most Panamanian banks' balance sheet, where their impacts could have potentially strong implications. Likewise, power plants are usually located near rivers for hydroelectricity or cooling purposes in case of fossil fuels making them particularly susceptible to flooding. Power outages as well as decreased revenues and increased costs for electricity providers could be the consequence. At the same time, flash floods could occur almost everywhere, especially after a prolonged dry period if the surface water cannot run-off fast enough. Specifically vulnerable areas are thus difficult to predict based on historical data. Sea-level rise is also expected to become a significant issue in Panama by 2050, with particularly the Western and Eastern coastal regions strongly affected (Figure 10)³².

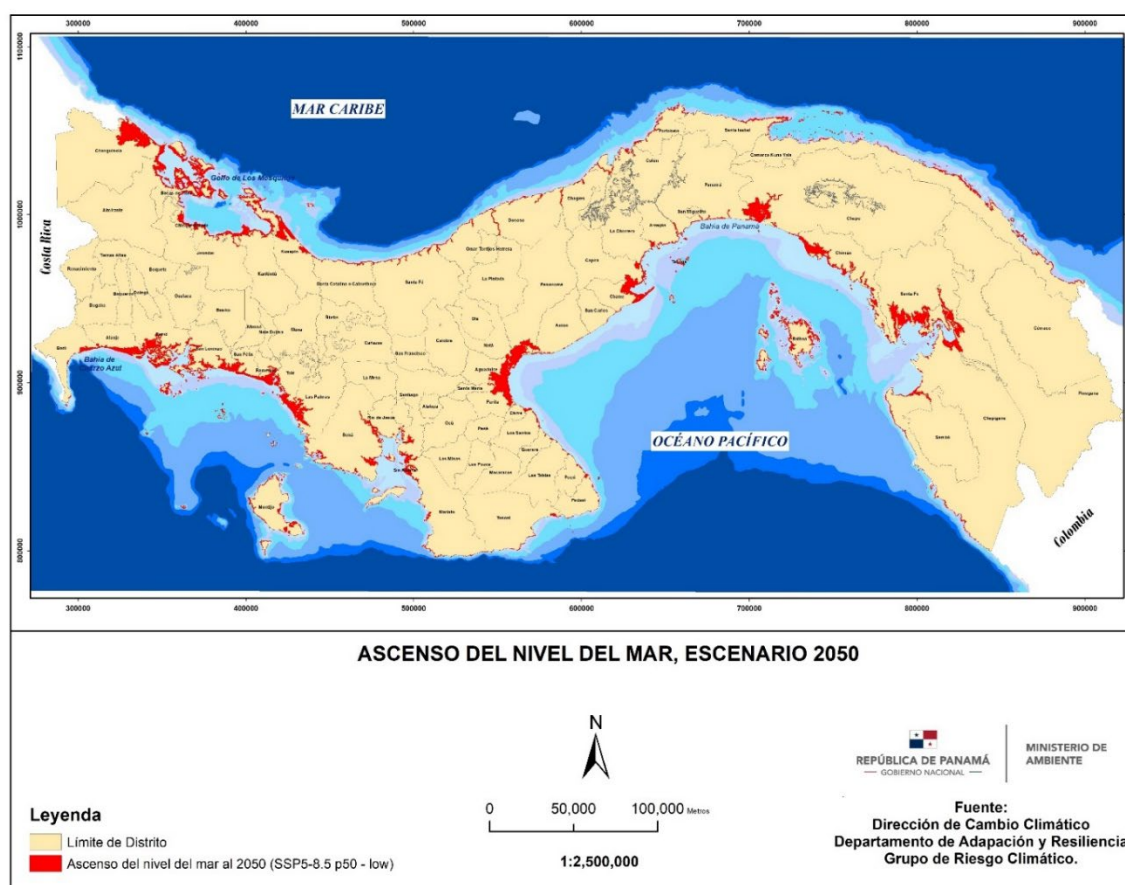
Figure 9. Projected change riverine and coastal flood risk with a 100-year return period in 2030 under the RCP4.5 scenario.



Source: WRI Aqueduct, Humanitarian Data Exchange

³² Those of updated climate change scenarios for precipitation, temperature, and sea level rise will be published within Panama's Fourth National Communication to the UNFCCC in August 2023

Figure 10. Expected increase in sea-level rise by 2050.



- Droughts: Panama's economy and financial sector could be impacted by droughts due to limited water availability and extreme temperatures.** Since a large share of Panama's agriculture relies on rainfed crops, droughts could reduce agricultural yields, which could lead to economic losses for crop producers. Livestock farmers could also be affected by heat and limited water, resulting in interrupted livestock sales and higher costs for feed imports. The country's electricity sector is also vulnerable to droughts. With hydropower accounting for approximately 67 percent of electricity generation, increased evaporation and droughts could significantly affect this sector. Likewise, the largest hydroelectric power plants in the country are situated in the western regions (Caribbean and Pacific) and the eastern region. However, climate change scenarios predict a gradual decrease in precipitation in the western Caribbean and Pacific regions in the next decades (Figure 12), which coincides with the location of these hydroelectric power plants. While water stress is expected to be contained by 2030 under the RCP4.5 scenario (Figure 11a), water demand is expected to strongly increase across the country (Figure 11b). In extreme drought years, water scarcity might occur, and this could result in power outages or require short-notice energy imports from neighboring countries. The Panama Canal, a major source of revenue for Panama, could also be impacted by droughts. Reduced water availability could limit the capacity of the canal, affecting shipping and ultimately impacting the country's economy. Indirect economic effects of droughts could also be felt given the relevance of the food processing sector in Panama, which depends on agricultural inputs and electricity shortages could negatively impact economic processes (e.g., banking operations). The

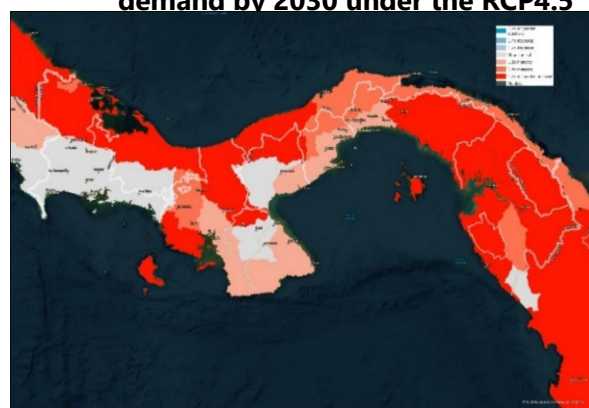
ENCORE methodology is applied for a high-level analysis of sectoral dependency on surface water provision and water flow maintenance as ecosystems services, proxying potential drought impacts.³³ The analysis indicates that almost 50 percent of Panamanian banks' lending (excluding consumer loans) is highly or very highly dependent on those two ecosystem services (Figure 13). Bank mortgages stand out, also reflecting the large share of real estate lending in Panamanian banks' portfolio, followed by lending for consumer services, materials, and utilities.

Figure 11. Potential water risk in Panama by 2030.

a. Projected water stress level by 2030 under the RCP4.5 scenario



b. Projected change in water demand by 2030 under the RCP4.5



Source: WRI Aqueduct, Humanitarian Data Exchange

³³ It's important to note that ENCORE, being a global tool, has some limitations. The assessment provided by ENCORE may require refinement with a geographical context, given that ecosystem service dependencies and the state of natural assets vary across countries. ENCORE focuses on direct nature-related impacts and dependencies for different economic sectors, providing a comprehensive view of first-order nature-related impacts and dependencies. However, when there are multiple sector or ecosystem service linkages, the equal weighting approach currently applied can influence the exposure results.

Figure 12. Expected temperature and precipitation changes by 2030 under SSP5-RCP8.5.

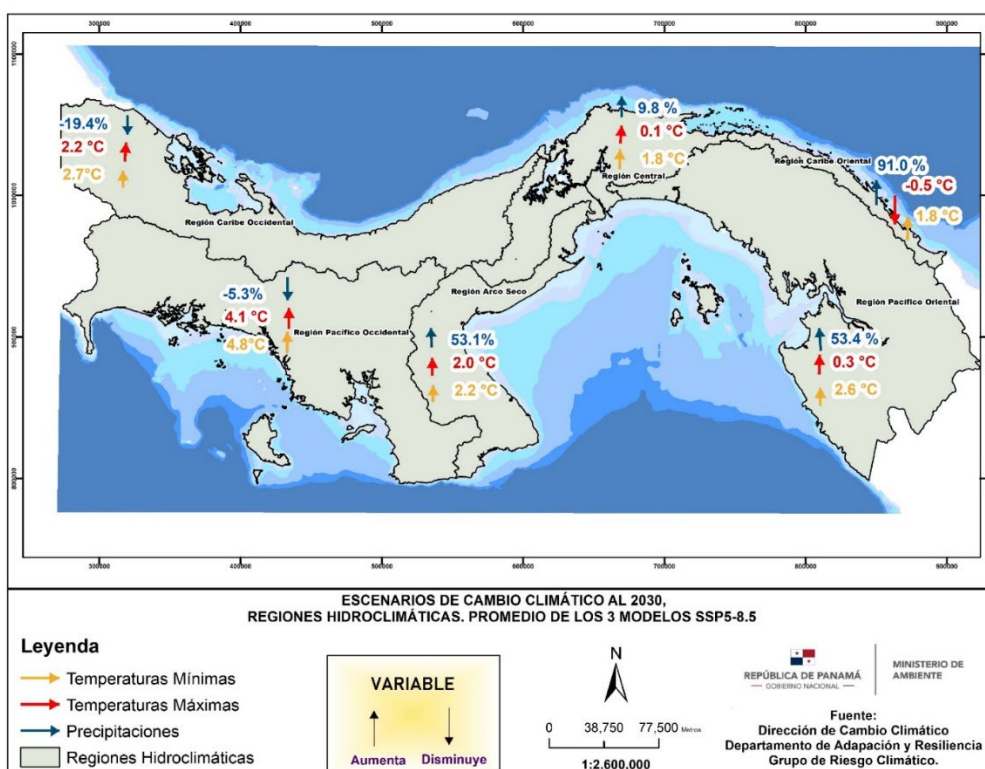
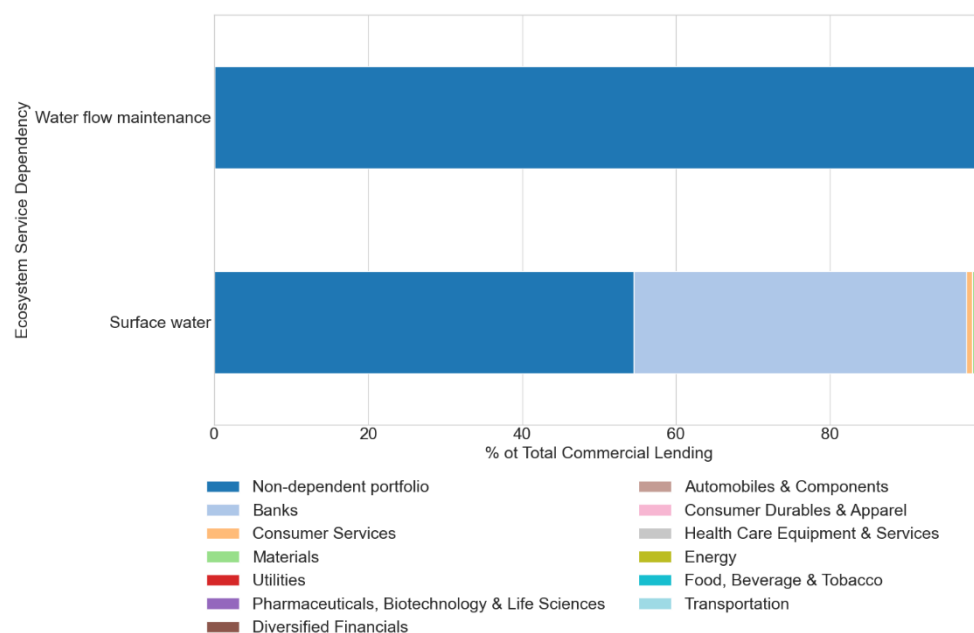


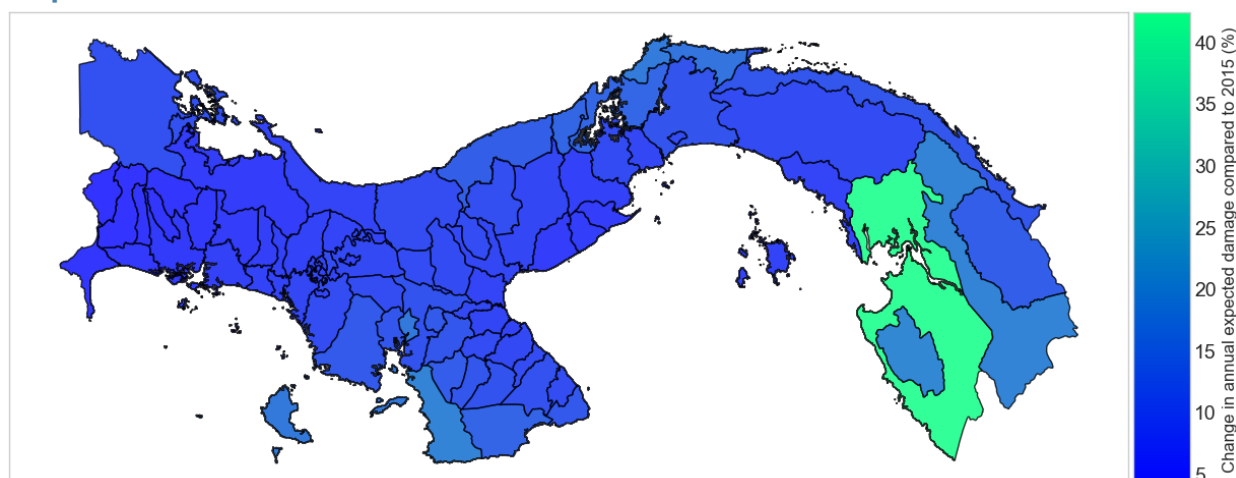
Figure 13. Panamanian banks' commercial sectoral loan dependency (high and very high dependency scores) on drought, flooding and hurricane related ecosystem services.



Source: ENCORE, SBP, World Bank staff calculations

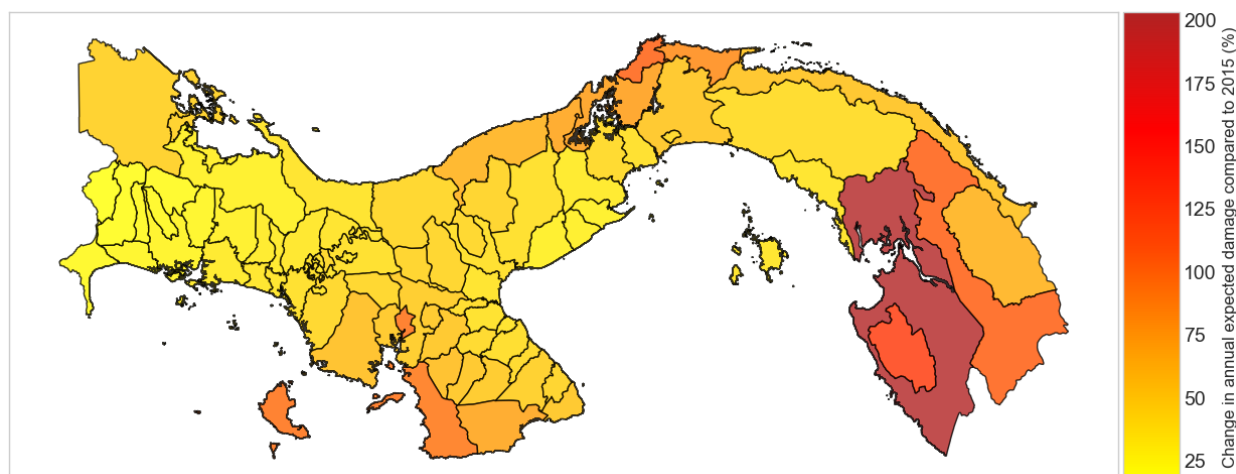
- Hurricanes: With growing climate change, frequency and intensity of hurricane risk is also expected to increase in Panama, with most severe impacts expected in regions with limited lending exposure, however.** Under a 1.5C scenario, it is estimated that direct damages from hurricanes will increase by approximately 5-10 percent compared to 2015 across the country, including historically most exposed regions Bocas del Toro, Chiriqui, and Veraguas (Figure 14). The exception is Darien, which could see damages increase by up to 40 percent. Under a 3C scenario, the damages could be much more severe, with increases of 25-50 percent in most regions, and up to 200 percent in some areas in Veraguas, Colon, and Darien (Figure 15). Hurricane impacts for the financial sector might materialize particularly on insurance companies, which could face losses from paying out claims related to hurricane damages. Furthermore, businesses and households could also be impacted, with increased costs for rebuilding and recovery. The government may also face challenges in providing financial assistance and implementing policies to support affected communities. The lending exposure to those expectedly most affected regions is, however, relatively limited (Figure 20). In contrast, Panama City, where lending exposure concentrates, seems to have contained hurricane exposure, suggesting limited financial risk from hurricane impacts. However, it should be acknowledged that those model estimates are characterized by large uncertainty and proper risk assessment would need to consider tail events, compounding, and indirect impacts.

Figure 14. Projected change in cyclone damage compared to 2015 under a 1.5C global average temperature increase.



Source: Climate Impact Explorer, Humanitarian Data Exchange

Figure 15. Projected change in cyclone damage compared to 2015 under a 3C global average temperature increase



Source: *Climate Impact Explorer, Humanitarian Data Exchange*

21. Housing insurance is particularly susceptible to physical risks such as floods and droughts.

The specific risks covered by insurance policies depend on the policy itself. Insurance for fire and other catastrophic events, including climate-related, accounted for about 11 percent of total insurance sector premiums in Panama in 2022. Most insurance activity (about 86 percent in 2022) is concentrated in Panama City, which could pose issues for the sector, in case of a larger extreme event occurring there. Agricultural insurance currently accounts a minuscule share of total commercial insurance sector premiums, where the public Instituto de Seguro Agropecuario (ISA) plays a more prominent role, despite generally low insurance coverage. Local insurers in Panama can mitigate financial losses by retroceding to reinsurers in overseas markets. The impact of natural disasters on insurers in Panama will vary significantly depending on their individual insurance and reinsurance arrangements.

22. Institutional investors in Panama with a high exposure to domestic sovereign bonds could face climate-related financial risks if recurring climate-related impacts affect fiscal sustainability.

A risk in this regard could be if the Panama Canal would be impacted, whose revenues are an important contribution to the Panamanian government's budget. In addition to direct damages to infrastructure, contingent liabilities, such as guarantees for state-owned enterprises or disaster relief expenditures, could be triggered for the government. These additional fiscal costs could lower the fiscal space of the government, potentially requiring budget cuts or resulting in higher public debt levels. Consequently, debt sustainability concerns could emerge, with potential implications for sovereign creditworthiness. This result could affect borrowing costs for the government, and trust in financial markets by international and domestic investors might deteriorate. Financial institutions and investors holding sovereign bonds might face haircuts, which could trigger a vicious cycle leading to decreases in both sovereign and financial institution creditworthiness.

Box 1. The role of intact forests for reducing floods and drought risk in Panama

The evidence from various studies in Panama underscores the vital role of intact forests in reducing floods and drought risks. Intact forests contribute to maintaining base flow during dry seasons, mitigating peak runoff rates and totals during storms, and enhancing water security. For instance, a study by Ogden et al. 2013³⁴ revealed that the forested catchment exhibited slower recession of dry season runoff compared to mosaic and pasture catchments. Additionally, the runoff rate from the forest catchment was higher than that from the similarly sized mosaic catchment at the end of the dry season, supporting the "sponge-effect hypothesis".³⁵ Furthermore, according to Hall et al. 2022³⁶, secondary forests have the potential to sequester significant amounts of carbon, aiding in climate change mitigation. Protecting these forests will not only support Panama's climate change mitigation goals but also enhance water security. Understanding the responses of forests to drought and climate variability is crucial for effective forest management, conservation, and climate change adaptation strategies. Preserving and protecting intact forests in Panama is paramount for minimizing the impacts of floods and droughts, ensuring water availability, and maintaining the ecological and socio-economic stability of the region.

Climate and Environmental Transition Risks

23. Achieving Panama's climate targets under the Paris agreement, necessitates emission trend reversal in the power and transportation sector that could require more stringent climate policy introduction. Panama aspires to remain net negative in GHG emissions by 2050. The Climate Change Policy approved by Executive Decree 3 of June 8, 2023 includes emissions reduction plans in the transportation sectors to address currently strongly growing emissions (Figure 4). While multiple climate policies can be applied and a mix of complementary climate policies is most likely, the effect of an illustrative carbon tax is demonstrated using the WB-IMF Climate Policy Assessment Tool (CPAT).³⁷ It is assumed that a carbon tax scheme with all revenues being transferred to households is introduced with a starting carbon tax at USD 0 in 2023. Two scenarios are considered, with the carbon tax increasing to USD 20 in 2030 (Scenario 1), where emission impacts would be relatively limited (Figure 14a) or USD 45 in 2030 (Scenario 2), less likely at this point but required to achieve Panama's NDC targets (Figure 14b). Figure 15 demonstrates how this policy under scenario 1 would translate into higher energy prices for fossil fuels, most strongly coal given its high emission intensity, whereas the electricity price would only rise moderately given the high share of renewables already in Panama's electricity sector. Figure 16a and

³⁴ <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2013WR013956>

³⁵ The "sponge effect," is a concept that suggests forests have the capacity to increase base flow during dry seasons despite experiencing reduced annual runoff due to evapotranspiration. The hypothesis proposes that intact forest ecosystems act as natural sponges, effectively storing water and slowly releasing it over time, thereby sustaining streamflow and water availability during periods of low rainfall.

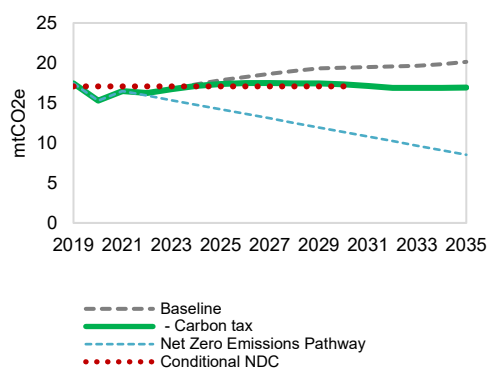
³⁶ <https://link.springer.com/article/10.1007/s10980-021-01379-4>

³⁷ CPAT is a tool developed by the World Bank in collaboration with the IMF and with contributions from other institutions (IDB, EU-JRC, IIASA, WHO, RFF, EIEE and others). The World Bank team includes the EFI Chief Economist Office, MTI, and the Climate Change Group

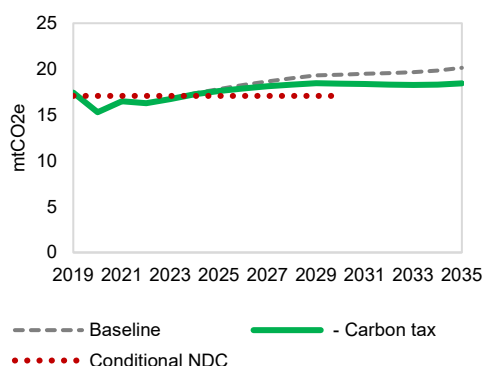
Figure 16b show the GHG abatement by sector under scenario 1 and 2 respectively. As indicated by policy design, power, transportation, and industry carry the bulk of emission reductions.

Figure 16. GHG emissions vs. Paris pledge in Panama (excluding LULUCF)

a. With a USD 20 carbon tax in place in 2030



b. With a USD 45 carbon tax in place in 2030



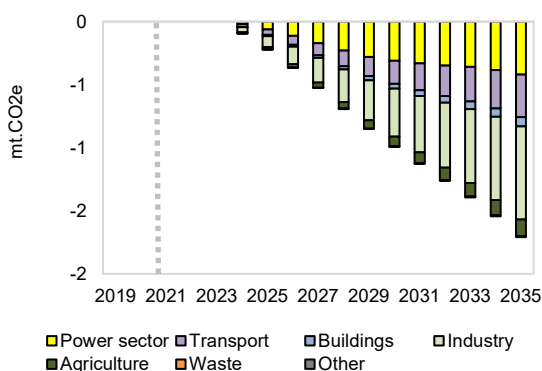
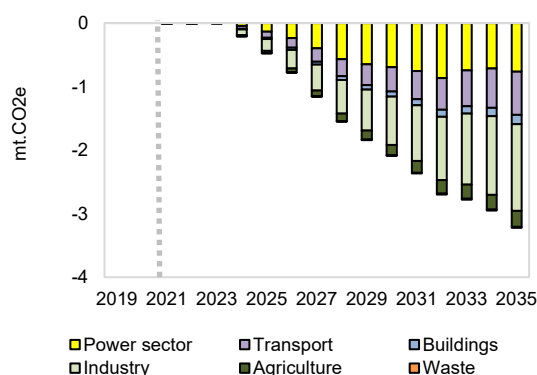
Source: WB Staff using the WB-IMF Climate Policy Assessment Tool

Figure 17. Energy price changes induced by policy by 2030

Fuel	Unit	Baseline	Baseline + USD 20 Carbon tax	% change with USD 20 carbon tax	Baseline + USD 45 Carbon tax	% change with USD 45 carbon tax
Gasoline	USD per liter	0.71	0.76	7%	0.82	16%
Diesel	USD per liter	0.66	0.71	9%	0.78	19%
LPG	USD per liter	0.18	0.22	21%	0.27	47%
Kerosene	USD per liter	0.63	0.69	9%	0.76	19%
Oil	USD per barrel	56.0	65.4	17%	77.2	38%
Coal	USD per gigajoule (GJ)	7.48	9.36	25%	11.72	57%
Natural gas	USD per gigajoule (GJ)	21.03	22.15	5%	23.55	12%
Electricity	USD per kwh	0.19	0.20	5%	0.21	8%

Source: WB Staff using the WB-IMF Climate Policy Assessment Tool

Notes: Prices are weighted by sectoral consumption

Figure 18. Abatement of GHGs by sector (excluding LULUCF)**a. With a USD 20 carbon tax in place in 2030****b. With a USD 45 carbon tax in place in 2030**

Source: WB Staff using the WB-IMF Climate Policy Assessment Tool

24. Overall transition risk impact currently seems contained, given Panama's overall low emissions and currently expected focus of climate policies in promoting green investment. Sectors that may be most affected by domestic climate policy changes include the power sector and industry (Figure 16), such as carbon-intensive utility lending. However, Panama is a service-driven economy (66 percent of 2021 GDP) and industry loans accounts for only about 6 percent of bank lending, with currently limited information on emission profiles. If climate policies also target the real estate sector, banking sector exposure to potential transition risk from house owners that need to implement costly energy efficiency measures could increase significantly due to the large share of real estate (34 percent) and construction (8 percent) lending. However, the majority of Panamanian bank lending is shorter than 5 years, reducing the likelihood of transition risk exposure. As such, transition risks might be a more limited concern for Panama's banks; while they have an important role to play in the country's low-carbon transition which may also provide new business opportunities for banks, such as offering loans for households to install private solar panels or purchase electric vehicles.

25. Nevertheless, three channels may give rise to climate transition risk for banks in Panama, warranting further assessment and monitoring by authorities. Firstly, as Panamanian financial institutions have significant lending and investment activities abroad, they could be exposed to climate spillover risks resulting from the introduction of climate policies in other jurisdictions. Panamanian banks have about 40 percent of their lending and investment activities abroad, mostly in other Latin American countries (Colombia alone being 5 percent) and the United States (9 percent of which 61 percent is non-sovereign debt exposure). Transition risk could not only affect lending for sectors that could be under scrutiny of stringent climate policies abroad but could also emerge indirectly if foreign FIs that Panamanian FIs lend to, would be impacted. Panamanian banks, specifically smaller ones, are vulnerable to hypothetical defaults of foreign banks, as analysis conducted under this FSAP has demonstrated. Secondly, individual financial institutions may differ in their exposure to transition risk, as highlighted in recent analyses in Morocco and Colombia by the World Bank. This calls for a FI-level analysis to enable targeted supervisory guidance. Finally, long-term loans are often bundled and converted into bonds

which could then be transferred from banks to institutional investors' balance sheets. If they are composed of underlying transition sensitive sectors, this could pose a potential market risk.

26. Transition risks for Panamanian institutional investors appear to be limited at the moment, however, lack of granular data impedes a more detailed analysis of portfolio emission profiles. As with Panamanian insurers, most technical reserves in Panama are invested holding domestic bank deposits (38 percent), with smaller investments in local bank bonds (10 percent) and domestic government securities (7 percent) as of December 2022³⁸. As a result, Panamanian insurers' investment exposure to domestic transition risk is considered to be small. However, a more detailed analysis is necessary to understand their entire investment portfolio, as there is currently no data available on sectoral investments. This would especially be relevant for the insurance industry's foreign investments (21 percent of total assets), which could be exposed to foreign transition risk. Investment funds and private pension funds in Panama have relatively larger exposures to equities and corporate bonds, which could be vulnerable to transition risks. As there is currently no granular data available on those investment portfolios it is recommended for supervisors to take a closer look to assess potential transition risk exposure.

27. To better comprehend the transmission channels of climate physical and transition risks to the financial sector in Panama, a more detailed and comprehensive analysis is required. The analysis is presently hindered by limited data availability, which necessitates the use of spatially explicit financial data to assess the physical impacts of climate change accurately. Extreme weather events such as flooding and droughts typically have a regional or local origin, necessitating a local or regional approach to analyze their effects. The current analysis of climate-related physical and transition risks in Panama only provides a high-level overview of potential financial risks. It does not consider scenarios, impacts, detailed exposure, and vulnerability. Likewise, natural disasters may also have broader macroeconomic impacts, such as on GDP, inflation, and exchange rates, which could affect the stability indicators of banks and the financial sector as a whole. Furthermore, the financial sector in Panama may face physical biodiversity risks due to the loss of ecosystem services, such as the regulation of hazards, extreme events, or depletion of groundwater.³⁹ At the same time, biodiversity and climate risk are also interconnected, and with positive complementarities between them. Considering the interlinkages between physical and transition risks, including compounding risks, would require further work since different macroeconomic, financial, and climate risks are interconnected. Therefore, it is essential to perform a more in-depth analysis of the impacts of climate change on Panama's financial sector.

³⁸ <https://superseguros.gob.pa/wp-content/uploads/Inv-lv-2022.pdf>

³⁹ The Network for Greening the Financial System (NGFS) has identified nature-related financial risks as a potential source of financial instability. Although assessments of nature-related risks are still relatively new compared to climate-related risks, there have been few studies conducted for the financial systems of several countries, including the Netherlands, France, Brazil, Malaysia, and Mexico, which were often led by their respective central banks. Initial assessments of biodiversity- and nature-related risks of the financial sector can be found in studies by van Toor et al. (2020), Calice, Diaz Kalan, and Miguel (2021), Svartzman et al. (2021), and the World Bank and Bank Negara Malaysia (2022). To enhance risk assessment, the NGFS has recently formed a task force focused on developing better methodologies, data, and scenarios for nature-related risk assessments.

IV. ASSESSMENT OF THE SUPERVISORY RESPONSE TO ADDRESS CLIMATE-RELATED AND ENVIRONMENTAL RISKS

Governance and Strategy

28. Panamanian superintendencies, SBP, SMV, and SSRP are at early stages of engaging with the issue of climate-related and environmental risks, while the level of maturity and focus varies across institutions. The authorities are acknowledging the financial stability risk that climate change could pose. However, authorities are still in the early stages of understanding these risks and integrating them into their organizational and governance frameworks. SBP, SMV, and SSRP do not have formalized governance arrangements or committees to address these issues. Furthermore, they currently lack comprehensive internal strategies or roadmaps to address climate-related risks. Although SBP has demonstrated its commitment to addressing climate risks through issuing high-level supervisory guidance and activities, such efforts are not part of a formalized internal strategy with board-approved priorities, actions, and timelines. There seems to be limited resources currently dedicated on this topic; indeed, authorities have identified a lack of financial and human resources as a key obstacle to addressing this topic. Therefore, further integration of climate and environmental risks into regulatory and supervisory frameworks may require additional resources.

29. The Sustainable Finance Working Group has the potential to become a crucial actor in coordinating efforts and strengthening capacity across multiple stakeholders, but effective commitment is needed to ensure reaching its ambitions. In 2018, the Sustainable Finance Working Group of Panama (GFTS) was established with the participation of representatives from all segments of Panama's financial sector in collaboration with the Government of Panama. This group will be the main beneficiary of the Readiness Project "Aligning Panama's Private Financial Flows with the Climate Change Objectives of the Paris Agreement.", which started in January 2023. One component of this project is the Sustainable Taxonomy, which is expected to be publicly presented in November. The project also entails plans to develop a climate risk assessment guide as well as environmental and social safeguards, which are intended to be incorporated into the regulations of the superintendencies in 2024. This is expected to be accompanied with a comprehensive capacity-building program for their implementation. The project also includes an environmental and social risk analysis Committee to improve coordination processes between the superintendencies, as well as online training for financial institutions and financial regulators to increase general awareness and knowledge about taxonomy, climate-related financial risks, and the development of specific green financial products.

Raising awareness and capacity building

30. Climate-related awareness and capacity in Panama are currently insufficient due to a limited understanding of the potential materiality of climate risks. While the country has experienced some extreme weather events in recent decades, the impacts have been relatively minor compared to other regions. As a result, many individuals and organizations in Panama may not fully appreciate the magnitude of the risks that climate change poses to the country's economy and society. Addressing this limited understanding of climate risk materiality will be crucial to building the capacity needed to identify and manage climate risks effectively. There is a need to increase awareness among stakeholders in Panama about the potential risks associated with climate change, as well as the opportunities that arise from transitioning towards a low-carbon, climate-resilient economy. Various private and public capacity

building and awareness raising initiatives have been implemented but mostly focused on sustainable finance and Environmental, Social, and Governance (ESG) issues. Capacity building efforts were often supported by external partners or international networks. MiAmbiente has organized workshops and training sessions aimed at public and private institutions, the financial system, and academia to increase awareness and capacity on the effects of climate change through updated climate change and climate risk scenarios. Most of the initiatives so far focused on sustainable finance and ESG issues, however.

31. To enhance expertise in climate and environmental risk management, Panama's financial sector could engage external partners and international platforms and invest in specialized training programs for staff members. Increased collaboration and engagement across sectors and the provision of targeted capacity-building initiatives is needed, including training programs and workshops, to help build the necessary knowledge and skills to effectively manage climate risks. Most Panamanian financial authorities are members of various international networks, some focused-on climate and environmental risks, sustainability, and ESG. The MoF is already part of the Coalition of Finance Ministers for Climate Action. SBP could join the Network for Greening the Financial System (NGFS), which has a particular workstream on capacity building. SRRP could join the IAIS climate workstream and SMV could engage with IOCSO and ISSB on climate-related issues.

Risk identification, assessment and monitoring

32. SBP conducted a recent survey on climate-related risks among its supervised banks in Panama, indicating that the current stage of climate risk assessment among supervised banks is initial and that significant barriers persist.⁴⁰ The survey results show that some banks have started to consider climate change in their lending and risk management practices. Conversely, very few banks have integrated climate change considerations into their investment strategies. Nevertheless, the survey revealed that most banks believe that climate change could pose a financial stability risk for Panama but that most banks view climate change as a medium- to long-term issue, with a time horizon of more than 10 years. The survey also identified several barriers, such as missing data, methodologies, and taxonomy, as well as limited knowledge and capacity, which prevent other banks from taking action. Thus, the survey suggests that supervisors may need to provide support to banks in overcoming these barriers, especially those that have not yet implemented any risk management strategies and metrics. This resonates with findings from financial industry interviews during the FSAP mission. An important gap also persists in understanding the specific methodologies and criteria used by banks that have started to assess climate risks, as assessment results may vary widely depending on the applied methodology.

33. SBP also conducted a pilot study on the impacts of recent tropical storm and hurricane events, indicating contained impacts on the banking sector. A recent SBP study⁴¹ on the physical risks of climate change aimed to identify the credit portfolio with the highest risk of flooding and estimate the hurricanes ETA and IOTA impact. The methodology identified the sectors at the greatest flood risk in Panama and selected banks with the highest credit exposure in these areas. The most affected region was Chiriqui, accounting for 93 percent of impacts, followed by Bocas del Toro (5 percent). Agriculture and livestock farming were the most affected sectors. Five out of the nine surveyed banks reported damages,

⁴⁰ SPB 2021. Evaluación en el grado de avance para la gestión del riesgo climático en los bancos del Sistema Bancario Panameño.

⁴¹ SBP 2020. Impacto de ETA e IOTA: Vulnerabilidades de la República de Panamá frente a los riesgos físicos del cambio climático.

with 1,198 affected loans, representing a financial impact of USD 74 million, while USD 24 million was covered by provisions.

34. Overall, climate risk identification and assessment in Panama's financial sector appears to be in its early stages. While some larger banks have started to develop frameworks for assessing climate risk, such as conducting loan-level risk scoring and environmental impact assessments, such efforts are still relatively uncommon. At the same time, climate risks have not been incorporated even by the more advanced banks into banks' overall risk assessment and management frameworks. The lack of comprehensive climate risk assessment frameworks across the sector makes it challenging for financial institutions to accurately assess the risks they face from physical and transition risks associated with climate change. As a result, there is a growing need for increased collaboration and knowledge sharing among financial institutions, policymakers, and other stakeholders to advance climate risk identification and assessment efforts in Panama.

35. To improve risk monitoring and assessment in Panama, there is a need for increased collaboration on data collection, including the gathering of more detailed physical impact data, as well as making this data accessible for relevant stakeholders. There are notable initiatives, which aim to make data more accessible to stakeholders. For instance, starting in October 2023, the Climate Transparency Platform is planned to have an Adaptation Module that would include a data system for adaptation, climate change scenarios, vulnerability index, and climate risk maps of the NDC sectors, with transparent and free access for the general public. Furthermore, Executive Decree 1 of March 1, 2023 was approved, which incorporates climate change in the Environmental Impact Assessments (EIAs). All public and private environmental impact studies submitted for evaluation must identify the vulnerability and climate risk of the project site and present an Adaptation Plan for its management. Additionally, they are expected to present the project's carbon footprint calculation and a plan to mitigate its carbon footprint. The Climate Transparency Platform has a knowledge hub and there is a free online course on Climate Change in Environmental Impact Assessments. Additionally, with the support of the World Bank, the regulation of the Public-Private Partnership (PPP) Law was developed, which includes adaptation and GHG mitigation measures, allowing new PPP contracts to be considered as green projects. Yet, the effectiveness of those initiatives is yet to be seen and currently notable data gaps persist.

36. MiAmbiente is also making progress to develop physical risk maps and readiness indicators through partnerships with international organizations, such as the IDB and UNEP-FI, however, significant data and data availability gaps persist. Currently, there is a lack of awareness and access among supervisors and financial sector participants to granular physical impact data, such as detailed flooding maps. This limits the ability of financial institutions and other stakeholders to accurately assess the risks they face from physical climate risks, which can hinder effective decision-making. To address this, it is recommended that the quality and granularity of available regulatory, climate/environmental, and other relevant external data be assessed to identify any gaps, focusing on sectoral disaggregation of banks' exposures and data quality. Additionally, a data catalogue (e.g., as recently done in Malaysia⁴²) could be set up to gather and harmonize available data on climate and environmental risks to ensure that all relevant information is easily accessible for analysis and the development of effective risk management

⁴² <https://www.bnm.gov.my/documents/20124/3770663/JC3-Report-on-Climate-Data-2022.pdf>

strategies. The recent executive directive mandating environmental impact assessments for investment projects⁴³ might also strengthen data capacities.

37. To better understand and manage climate-related risks in the Panamanian financial sector, SBP, SMV, and SRRP could conduct a top-down exposure exercise to assess the banking sector's vulnerability to climate risks and identify need for supervisory action. A top-down exposure assessment exercise would provide insights into the potential impacts of climate risks on the sector and allow for the identification of priority FIs that require more closely climate risk management supervision. It will also help to identify relevant regulatory and climate/environmental data needs and consider the level of sectoral disaggregation of FIs exposures. A further deep-dive on particularly vulnerable sectors such as those related to mortgages, agriculture, and Panama Canal-dependent sectors would be recommended. In the mid-term, the initial stage climate risk exposure analysis could be enhanced by further developing macro-financial scenarios that are relevant to the Panamanian financial sector. These scenarios should take into account potential climate change impacts such as extreme weather events, sea-level rise, and changes in temperature and precipitation patterns. The scenarios should be country-wide and also consider potential exposure to transition risk, considering domestic and international transmission channels. This exercise will also include to develop models to assess climate change impacts on the economy, firms, and the financial sector. This would also be useful for FIs which indicated a current lack of methodologies.

Supervisory guidance

38. While SBP has provided high-level guidance on climate-related risk assessment, there remains a need for more detailed supervisory expectations and guidance within the banking sector to effectively manage and mitigate climate risks. Additionally, SRRP and SMV would need to step-up their guidance to address climate risk effectively. The recent amendment to supervisory expectations (Acuerdo No 11-2022, No 9-2017) by SBP has signaled a growing recognition of the importance of climate risks in the banking sector in Panama. However, there is still a need for more detailed and specific supervisory guidance to effectively manage and mitigate these risks. Several banks in Panama have indicated this need for more guidance during the course of the mission. Enhancing supervisory guidance and expectations around climate risks is critical for building the resilience of the financial sector in Panama. It can help ensure that financial institutions have the necessary tools and frameworks to assess and manage climate risks effectively.

39. To effectively integrate climate risk into supervisory and regulatory practice, SBP, SMV, and SRRP would need to develop strategies with clear guidelines and timelines for implementation. A cross-authority supervisory strategy should be designed to align with emerging international guidance and good practices, such as those developed by the NGFS, BCBS, IAIS, IOSCO, and IOPS. This strategy could be informed by a comprehensive exposure analysis and incorporate a risk-based approach (avoiding this to become a box-ticking exercise) to identify priority areas for supervisory action. To support the implementation of this strategy, the superintendencies would need to allocate dedicated resources to ensure sustained progress on climate risk assessment and management. This could involve creating dedicated teams or appointing individuals with specific responsibilities for climate risk within and across each superintendency. In this regard, the GCF funded Readiness project also includes a financial climate risk component, aiming to quantitatively analyze the level of exposure of banking and

⁴³ https://www.gacetaoficial.gob.pa/pdfTemp/29730_C/GacetaNo_29730c_20230301.pdf

insurance institutions to physical risks, prioritizing economic sectors and their impacts on the market and operations. As part of the project those insights should then be translated into regulation by the superintendencies for disclosing climate-related risks.

40. To ensure consistent and effective integration of climate risk considerations into the financial sector's overall risk management framework, SBP, SMV, and SSRP would need to develop and issue comprehensive supervisory guidance on governance, risk management, scenario analysis, vulnerability assessment, and disclosure of climate risks. Regulated institutions need to receive detailed guidance on the management and disclosure of climate and environmental risks, specifying expectations and requirements for consistent and effective implementation. This would be informed by the superintendencies' own analysis and experience of climate-risk assessment. Furthermore, a plan to provide necessary training and resources for supervisors to monitor and enforce compliance with the supervisory guidance on climate and environmental risks could be developed. This can include the development of supervisory tools, checklists, and conducting regular reviews of supervisory practices to ensure that regulated institutions are complying with the guidance provided. To support this effort, a framework should be developed and implemented to integrate climate and environmental risks into the supervisory review process, including offsite and onsite supervision, to ensure that these risks are adequately captured and addressed by supervisory actions.

Supervisory actions and tools

41. The incorporation of climate and environmental risks into prudential supervisory frameworks in Panama is still limited but supervisors could use insights from climate risk assessment to evaluate the need and appropriate use of supervisory actions and tools. SBP, SMV, and SSRP have yet to integrate climate and environmental risks into their risk-based supervisory frameworks, and it is not part of the supervisory review process or feeding into supervisory ratings. By conducting a climate risk assessment, supervisors can assess the resilience of regulated institutions to climate risks and identify areas where additional action is needed. This can include setting requirements for disclosures, developing supervisory guidance on the management of climate risks, and conducting regular reviews of supervisory practices. Supervisors could work collaboratively with private financial institutions to establish risk management mechanisms such as flood moratoriums, which would allow affected borrowers to temporarily suspend their loan payments during flood events. Additionally, the establishment of recovery lending windows could provide access to affordable credit for individuals and businesses to assist with the recovery and rebuilding process after a flood. Such pre-defined and structured measures would not only benefit the affected borrowers but would also contribute to overall financial stability in flood-prone areas. By taking a proactive approach to climate risk assessment, supervisors in Panama can ensure that the financial sector is effectively managing climate risks.

V. DEEPENING GREEN FINANCE MARKETS

Panama's climate and environmental objectives and its financing needs

42. To achieve its NDC targets, Panama faces significant climate mitigation investment needs, adding up to USD4.1bn (about 6.4 percent of 2021 GDP) until 2025.⁴⁴ Estimates by MiAmbiente for the energy sector and the forest sector⁴⁵ alone amount to over USD4 billion and USD86 million, respectively. These sectors are prioritized for having the greatest mitigation potential. According to the National Energy Transition Plan (ATE) 2020-2030, achieving the energy sector objectives will require annual climate investments averaging 1.5 percent of GDP by 2050 but with substantive savings potential via reduced subsidies. Co-benefits might be new job creation (approximately 35,000 new jobs in the energy sector by 2030) and reduced air pollution, resulting in fewer respiratory diseases and improved quality of life for Panamanians. At the same time, Panama is currently working on updated and potentially more ambitious NDC targets, which could further increase investment needs. Finally, there are indicative investment needs for the National Climate Action Plan (PNAC) for 2025. Those preliminary investment estimates add up to USD107mn and cover largely enabling conditions related to the development of plans, legislation, specific projects to achieve the targets outlined until 2025.

43. Initial estimates of Panama's adaptation investment needs are even higher than its mitigation investment needs and specifically pertain the water, energy, and agriculture sectors. According to MiAmbiente the adaptation costs by the year 2030, will be between USD7.06 billion (RCP4.5) and USD9.4 billion (RCP8.5), depending on the scenario.⁴⁶ The water sector hereby requires the bulk of the investment, as water retention basins need to be expanded, watersheds to be protected and irrigation and water run-off infrastructure needs to be built. These overall costs are expected to increase in the coming years, reaching even higher figures by 2050, 2070, and 2080. It is evident that substantial investments will be required to ensure that Panama can adapt to the expected climate change impacts and continue to thrive economically and socially.

44. Panama's climate investment needs to meet its nationally determined contributions and SDG commitments exceed what can be financed through public resources alone, requiring the mobilization of private finance. The COVID-19 pandemic has limited the fiscal space to invest in climate-related areas using public funds, making it essential for financial policymakers to utilize various public tools such as sovereign capital market instruments and green taxes to reduce emissions and directly mobilize revenues. However, the financial sector should also play a crucial role in mobilizing resources for climate mitigation and adaptation investments. There is a need to provide incentives for a

⁴⁴ Investment needs for climate change mitigation are difficult to estimate accurately, even with defined targets like those outlined in the NDCs. Climate policy options chosen to reach the target, such as targeting energy demand or supporting renewable energy investment, could impact the investment needs. In addition, there are other uncertain factors like economic and population growth projections, decoupling between GDP growth and energy demand, and low-carbon technology costs, as well as the economic and financial strategies of fossil fuel producers, and the extent to which climate policies are integrated into general economic policies ([Prasad et al. 2022](#), [Kreibiehl et al. 2022](#)). Hence, figures provided should be considered as broad estimates, where there might be needs for further refinement.

⁴⁵ The Plan Nacional de Reforestación Forestal 2021-2025 replaces what was originally included in the National Forest Strategy 2050.

⁴⁶ It is important to note that this was a first exercise carried out at the national level. Previously, there was no record of any approximation regarding adaptation costs. Therefore, it should be taken as an approximation that will allow for the creation of a clearer roadmap for the development of future studies related to this issue.

low-carbon transition; financial regulators could revert to disclosure and reporting requirements, while government entities could consider fiscal incentives such as carbon taxes or fossil fuel subsidy reversion. While some investments that have adaptation benefits also have private benefits and may be financed by the private sector, many adaptation measures provide public goods and are likely to rely more on public finance. In contrast, many mitigation measures can be implemented by the private sector (e.g. renewable energy, decarbonizing transport), and in such cases, the financing terms and relative prices of high-and low carbon could be improved to incentivize mandate uptake by the private sector.

Box 2. Carbon market development

Deep decarbonization requires structural economic changes. Carbon markets bring efficiencies that can help reduce the cost of climate action by prioritizing emission reductions where the cost of abatement is lowest. These reduced costs are expected to increase political appetite for more ambitious climate targets, allowing countries to initiate early action and begin planning for a transition to a low carbon economy. Therefore, carbon markets have the potential to accelerate the transitions needed for decarbonization.

Carbon markets can exist at the subnational, national, regional, and international levels and can be classified as regulated or voluntary carbon markets. Article 6 of the Paris Agreement relates to international compliance carbon markets. A compliance market is one in which governments establish rules for trade, and demand is driven by government requirements or objectives to achieve emissions reduction. Carbon markets under Article 6 are governed by the rules of the Paris Agreement, under which three voluntary cooperation mechanisms based on markets are established: (1) Article 6.2, which enables the international transfer of mitigation outcomes between Parties to achieve their Nationally Determined Contributions (NDCs); (2) Article 6.4, which seeks to give continuity to the Clean Development Mechanism established under the Kyoto Protocol; (3) Article 6.8, which includes other non-market-based approaches. In the case of outcomes obtained under the mechanism established in Article 6.2, they will require the "authorization" of the governments of the countries.

In addition, there are voluntary carbon markets, which are essentially led by the private sector and their voluntary commitments to reduce emissions. These voluntary markets do not have an entity that regulates or establishes general rules for their participants. This voluntary market is based on eligibility standards and requirements established by Independent Accreditation Mechanisms, such as Verra or Gold Standard, who have methodologies to quantify emissions reductions and issue carbon credits. There is no government oversight in voluntary markets.

It is critical to avoid double counting so that global emission reductions are not overestimated. The agreement on Article 6, therefore, puts in place an accounting mechanism, known as "corresponding adjustment," to ensure that double counting does not occur. The requirement for a corresponding adjustment may extend beyond compliance markets. For example, the market-based mechanism for airlines -- the International Civil Aviation Organization's Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) -- requires corresponding adjustment for traded credits. Some voluntary carbon market participants may also require corresponding adjustment. It is expected that the requirements of the voluntary and compliance markets will converge over time, possibly towards the end of the first NDC period.

While carbon markets have the potential to make a significant impact, realizing this potential requires enabling regulations, institutions, infrastructure, and capacity building, as well as improvements in

transparency, and quality standards. According to a recent survey by the World Economic Forum and Bain & Company, more than 90 percent of corporate respondents target net-zero emissions by 2050, but less than 25 percent of these respondents plan to compensate for any emissions before achieving net-zero.

At the national level, efforts are needed to identify the country's approach or strategy to utilizing compliance and voluntary carbon markets for the achievement of the country's NDC, establish necessary country processes and institutional arrangements to manage Article 6 transactions, and have access to a robust infrastructure (MRV and registry) to ensure the quality of carbon credits and accurate accounting as well as to meet the reporting requirements under Article 13 of the Paris Agreement.

Panama's current status of green finance markets and instruments

45. Panama's financial market is deemed relatively well-developed and with the potential to emerge as a regional center for sustainable finance; yet the green bond market in Panama is still in its early stages, with only five green corporate bond issuances so far. One potential barrier to attracting more investment in green projects is the lack of a dedicated green investment fund. Without such a fund, investors may be hesitant to invest in individual green bonds, which could limit the growth of the market. However, Panama's well-developed financial market provides a unique opportunity for the country to position itself as a regional hub for green finance, provided the necessary infrastructure and policies are put in place. A step in this direction was the launch of the Sustainable Market Segment in 2018 Panama Stock Exchange Latinex aiming to promote sustainable investments. Latinex has also issued sustainability guidelines, both for issuing ESG-related bonds⁴⁷ as well as for the voluntary reporting and disclosure of environmental, social, and corporate governance factors.⁴⁸ A coordinated effort from the government, financial institutions, and other stakeholders is required to develop and promote green financial products, build expertise in sustainable finance, and establish regulatory and disclosure frameworks (e.g. green taxonomy) to support the growth of the market. By doing so, Panama could not only contribute to global efforts to mitigate climate change but also benefit from the economic opportunities presented by the transition to a low-carbon economy.

Table 3. Green bond issuances to date in Panama.

No.	Nombre del Emisor	Título Valor	Monto de la Emisión	Second party opinion
1	Corporación Interamericana para el Financiamiento de Infraestructura	Programa Rotativo de Bonos Verdes Corporativos	200,000,000.00	Sustainalytics

⁴⁷

https://www.latinexbolsa.com/biblioteca/Sostenibilidad/Guias_Sostenibilidad/Guia_para_Emision_de_Valores_Negociables_SVS.pdf

⁴⁸

https://www.latinexbolsa.com/biblioteca/Sostenibilidad/Guias_Sostenibilidad/Guia_para_el_Reporte_y_Divulgacion_Voluntaria_de_Factores_ASG_v1.pdf

2	Panasolar Generation, S.A.	Bonos Verdes	15,500,000.00	Pacific Corporate Sustainability (Panama)
3	Banco Promérica de Costa Rica, S.A.	Programa Rotativo de Bonos Corporativos Sostenibles	50,000,000.00	Vigeo Eiris
4	Cochez y Cia SA	Programa Rotativo de Bonos Corporativos	90,000,000.00	-
5	Latin American Kraft Investments, Inc.	Programa Rotativo de Bonos Corporativos	60,000,000.00	-

46. Panama is developing a national Carbon Market to promote and finance a low-emission economy through the purchase and sale of greenhouse gas emissions reduction units. MiAmbiente was authorized to design and implement a National Carbon Market and its components by Executive Decree No. 100 of October 20, 2020, and Executive Decree No. 142 of December 9, 2021. These components include National Management Programs (GHG) under the National Program Reduce Your Footprint, the National Greenhouse Gas Emissions Compensation System, and the Panamanian Carbon Exchange, an online platform connecting the supply and demand of National Emission Reduction Units (NERUs), the carbon credits issued under the national market scheme. Panama has received support from international experts, including California's Cap and Trade Program technical team, to structure the National Carbon Market and ensure compliance with international standards. MiAmbiente has also worked with other relevant actors in the international voluntary market, such as Gold Standard, Plan Vivo, Climate Action Reserve, American Carbon Registry, and Verra. Latinex considers carbon markets a crucial area for growth and aims to become the central commercial platform of the country and the region. The company intends to link the carbon market with the sustainable taxonomy, which already includes biodiversity. The MRV Module of the Climate Transparency Platform is under development to ensure the environmental integrity of the carbon market and prevent double accounting.

Barriers to scaling up green finance in Panama

47. Panama faces a number of challenges both within and outside the financial system that hinder the growth of green finance markets. So far, the authorities have not conducted a comprehensive evaluation to pinpoint the obstacles that require attention to facilitate the expansion of green finance. As part of this FSAP, certain impediments have been identified and will be discussed in greater detail below. It is important to note that these are initial findings and do not represent a hierarchy in terms of the significance of these barriers.

48. One of the main barriers identified is the limited uptake of green lending instruments in Panama due to lack of incentives and limited awareness. The offering of green financial instruments is limited, with only a few banks currently providing such products, and these are predominantly focused on electric vehicles and solar energy. A lack of suitable green financial instruments for SMEs was indicated during the mission. At the same time, there is currently a lack of financial incentives for consumers and

firms to request such loans. Acuerdo 295, effective from January 2023 onwards, recently granted some preferential treatments and financial incentives such as an exemption from the payment of the selective consumption tax (previously set at 5 percent) for electric vehicles until 31 December 2030). In April 2023, Panama's national assembly's economy and finance committee approved a bill to enhance incentives for renewable energies. This bill seeks to amend Law 37 from 2013, which established the existing framework to promote the construction, operation, and maintenance of solar plants or installations. However, it is yet to be seen whether those incentives will be sufficient to stimulate demand for investments in that area, especially, as there seems to be limited awareness of green finance and financial education among the general public, which further hinders the demand for such instruments.

49. The lack of reliable and constant revenue streams for project finance, such as through power purchase agreements, poses a significant challenge for investors looking to take on the risk associated with green finance. Power purchase agreements guarantee investors a pre-determined price (and often also quantity) for electricity, which reduces project risk. Additionally, the lack of experience in this area can further deter potential investors, hindering the further scale-up of green finance. To address these barriers, efforts should be made to increase the reliability of revenue streams through improved market design and regulation, as well as increased collaboration between stakeholders to build knowledge and capacity in the field of green project finance.

50. The development of green capital markets in Panama is challenged by limited incentives for domestic and regional labeled bond issuances. Domestic investors are not willing to offer a reduced return in exchange for green purpose, and access to ESG-aware international investor bases is hampered due to obstacles such as perceived lack of transparency, limited awareness of Panama's green potential, and grey listing. Furthermore, additional reporting requirements are perceived as burdensome by issuers, and fee reductions offered by Latinex seem to be insufficient to cover costs. The limited amount of investable green instruments in Panama also limited diversification options of investors. This is particularly relevant for the insurance sector, which is legally obliged to invest at least 50 percent of its assets domestically. These challenges have limited the availability of green finance instruments, hindering the potential scale-up of green finance in Panama.

51. The absence of clear definitions and standards, combined with low market awareness and a lack of knowledge, data, and information, have shown to pose significant barriers inhibiting the further scale of green finance, and also do so in Panama. These factors not only prevent the identification and assessment of green finance opportunities but also have the potential to impact market integrity. Without universally recognized definitions and standards, it becomes difficult for investors and issuers to determine what constitutes green finance, and for regulators to ensure that green investments are meeting environmental objectives. This lack of clarity also hinders the development of a broader green finance market, as potential investors may be deterred by the lack of transparency and accountability in the sector.

52. The lack of climate-related disclosure practices is a significant challenge that inhibits the further scaling up of green finance. Currently, there are no disclosure expectations in place, and climate-related disclosure practices are still in their nascent stage. This limits the information available to investors and hinders market transparency, making it difficult to assess investment risks and opportunities accurately. The absence of a standardized approach to climate-related disclosures and reporting means

that investors may have limited access to critical information necessary to make informed investment decisions, particularly for investments in climate-related sectors

53. Panama's potential to leverage its image as a green leader and green finance hub is currently underutilized, which is hindering its ability to tap into international markets for green finance opportunities. Despite its strong reputation in the region as a finance hub, the country has yet to fully capitalize on its position to attract international investment in green projects. This lack of promotion and marketing may stem from a lack of coordination among different stakeholders or limited resources, but it represents a missed opportunity to expand Panama's green finance market and contribute to the country's sustainable development goals.

Box 3. Greening financial inclusion efforts

Despite having one of the largest financial sectors in Latin America, access to credit is limited and regionally concentrated, particularly for low-income households and MSMEs. According to the 2021 Findex survey, only 12 percent of adults in Panama reported borrowing from formal financial institutions, which is significantly lower than the average 24 percent of LAC upper middle-income countries. 26 percent of MSMEs are estimated to be fully credit constrained, with another 5 percent reporting at least partially constraints. This results in a substantial financing gap for MSMEs of approximately USD21.3 billion. In recent years, average loans size for MSMEs (inflation adjusted) increased notably, being yet another sign of financial exclusion, as larger average loan sizes indicate limited financial access for small companies. Furthermore, lending activity is concentrated in Panama City, with persisting lower access to credit in rural areas.

Limited access to finance could lower resilience of low-income and MSMEs ability to climate impacts, as it might restrict mitigation and adaptation efforts and quick post-disaster recovery. Access to a credit is important in times of disaster enabling MSMEs and households to cover immediate expenses and recover more quickly from the financial impacts of the disaster. Likewise, limited access to finance hinders much needed investment in disaster prevention, requiring investment in new technology, infrastructure (e.g., nature-based solutions), and training. At the same time, climate mitigation investments, such as solar panels for small-scale farms, require access to affordable finance to generate life-time gains. Main barriers are the limited availability of financing options, particularly for those MSMEs that are in the early stages of development or lack collateral. Addressing these barriers is crucial to promoting green financial inclusion in Panama and supporting sustainable economic growth.

VI. ASSESSMENT OF THE SUPERVISORY RESPONSE TO DEEPEN GREEN FINANCE MARKETS IN PANAMA

Assessment Approach

54. In order to encourage the financial sector's involvement in climate action, authorities need to create an enabling policy environment that addresses the barriers hindering the sector's participation in green finance. A range of policies, both within and outside the financial sector, will be necessary to overcome these obstacles and establish a suitable policy framework for green finance.

55. This section compares Panama's progress in developing policy measures to deepen green finance markets with global and regional counterparts. The benchmarking analysis draws on the World Bank's technical assistance programs, other climate diagnostics under the Financial Sector Assessment Program (FSAP), and the "Toolkits for Policymakers to Green the Financial System" report published by the World Bank in May 2021. In addition, guidance provided by standard setters and global experts is considered. While the benchmarking exercise uses global best practices and guidelines, the recommendations are tailored to address the unique challenges and requirements of green finance markets in the Panamanian context. Table 5 in the Appendix presents an overview of the policy areas assessed in the benchmarking analysis.

Strategy and coordination

56. Panama has made strides towards developing green finance markets and initiatives. However, a comprehensive strategy is required to scale green lending and capital market development, ensuring that the sectors identified under NDC2 receive adequate financing to achieve Panama's 2050 net-zero emissions target. MEF, MiAmbiente, and the Secretaria de Energia could conduct a comprehensive gap analysis to determine the private and public finance needs and availability for the national climate action plan and national energy transition strategy. This analysis would help identify any financing gaps that exist and provide insights into how private capital could be mobilized to fill these gaps. In addition, outlining the private and public finance needs would allow for a clear understanding of the funding required to achieve the national climate action plan and national energy transition strategy goals, and help to attract potential private investors. The results of this analysis could be used to inform the development of a green finance roadmap to mobilize private capital, including identifying potential funding sources and financial instruments, and developing effective communication strategies to engage with private investors.

57. In Panama, there is a willingness for cooperation among authorities and institutions, but coordination could be improved. Panama's inter-institutional coordination is most notably bundled in the 2018 founded Sustainable Finance Working Group, which is a collaborative effort between government institutions, private sector actors, and civil society organizations to promote sustainable finance practices in the country. The group's tasks include developing sustainable finance policies and guidelines, identifying sustainable finance opportunities, and fostering dialogue and collaboration between stakeholders to promote sustainable investments. From the government side, the Ministry of Economy and Finance, MiAmbiente, SBP, SMB, SRRP and Banco Nacional are part of the group. Yet, it seems that there is a need to make the working group more active to enhance collaboration and coordination among different stakeholders. The GCF funded Readiness program with the Sustainable Finance Working Group as the main beneficiary might be able to help in this regard. There are additional private sector led initiatives, such as SUMARSE, which promotes corporate social responsibility and sustainable development. Likewise, the banking sector has developed and promoted the sustainable finance protocol, with currently 16 signatories.

Raising demand for green finance: improve the business case of green projects

58. Next to assessing the current financing gap it is also important to better understand why green finance products are currently not sufficiently picked up to design corresponding policies. SBP, SMV, and MEF could conduct a comprehensive market assessment to obtain insights into the current lack of demand for green finance products offered by financial institutions and labeled

bond issuances. Barriers that were mentioned in the course of this mission were lacking definitions and standards, combined with low market awareness and a lack of knowledge, data, and information. Furthermore, lacking financial incentives, such as via tax breaks, climate subsidy reform, or carbon pricing were highlighted as a barrier. The proposed assessment should aim to fine-tune those barriers to the uptake of green finance products and labeled bond issuances, as well as to determine the level of awareness and understanding of green finance among different stakeholders. This market assessment could involve the use of surveys, focus groups, and interviews with relevant stakeholders, such as retail customers, financial institutions, and issuers.

59. MiAmbiente, MEF, Secretaria de Energia, SMV, and SBP could use the findings from the comprehensive market assessment to develop an action plan in collaboration with relevant stakeholders from the financial sector. The plan should focus on scaling up green finance demand and supply, with a particular emphasis on addressing the barriers inhibiting further scale of green finance at the retail, project, and market level. This should include designing targeted financial incentives for consumers and firms to strengthen the business case and hence increase demand for green finance products, as well as increasing the availability of green instruments through the expansion of product offerings from financial institutions. Additionally, it is crucial to improve financial education and awareness among domestic investors to increase their willingness to invest in green finance.

Building capabilities and capacity

60. To promote sustainable investments, Panama's authorities could collaborate more closely with industry associations to encourage financial institutions to align their business, portfolios, and strategies with net-zero pathways and climate objectives. Panama's authorities have already taken steps in this direction by creating the Sustainable Finance Working Group in 2018 and joining the Central American Alliance for Sustainable Banking. To further encourage financial institutions to adopt net-zero targets, the authorities could consider implementing the following key actions recommended by the Coalition of Finance Ministers: i) convening a financial sector platform to commit to Paris alignment, ii) encouraging financial institutions to sign up to global net-zero initiatives, iii) and educating the financial sector on the various tools and methodologies available at each step of the "alignment journey". The sub-module of the GCF funded Readiness project also aims to strengthen the capacities of financial institutions, policymakers, regulators, supervisors, and stakeholders who want to learn about green financing options in Panama. While there is no universally agreed methodology to measure Paris alignment, there are various tools that support financial institutions at different stages of the Paris agreement. Transparency and data availability

61. While there is recognition of the importance of building a comprehensive data environment, there is room for improvement in market transparency. Enhancing market transparency and understanding of climate-related risks and opportunities in the Panamanian financial system is a crucial element in the development of a comprehensive green finance approach. Providing investors and lenders with sufficient information on climate-related and environmental risks and opportunities is necessary to understand, price, and manage risk in their portfolios and operations. Therefore, climate-related reporting and disclosure will be essential for Panama to facilitate the efficient allocation of capital in the transition to a low-carbon economy.

Green taxonomy

62. To promote sustainable finance and support green investment in Panama, MiAmbiente, MEF, SMV, SBP, SSRP would need to finalize the green taxonomy, currently under development, that classifies economic activities as either green or high carbon. A green taxonomy can help financial sector entities to better identify activities and assets that would reduce greenhouse gas (GHG) emissions and minimize environmental impact. The taxonomy could also serve as a framework for labeling green finance products and building benchmarks that consider the country's specific context while aligning with international standards such as the EU taxonomy. Several countries, including the EU, China, Colombia, and Malaysia, have already introduced their own taxonomies to promote sustainable finance. The World Bank Group has recently issued a guidance document⁴⁹, suggesting six actions as laid out in Figure 19.

63. Developing a comprehensive green taxonomy that is environmentally sound and widely communicated is crucial to the development of the green finance market. This taxonomy should cover the entire financial sector, including banks and non-banking financial institutions (NBFIs) such as pension funds. The development of a taxonomy should involve engagement with relevant stakeholders, including industry experts, regulators, and academia, to ensure that it accurately captures the environmental impact of financial activities. Panama's authorities aim to publish the sustainable finance taxonomy in November 2023. Once published, taxonomy is intended to be used to issue a first set of recommendations for policymakers and regulatory authorities under the project for Aligning Panama's Financial Flows with the Climate Change Objectives of the Paris Agreement. These recommendations are intended to focus on defining the governance mechanism to implement and regularly improve the sustainable finance taxonomy. Once developed, the taxonomy should be clearly communicated to market participants to promote its understanding and consistent application. It is crucial for MiAmbiente and the superintendencies to maintain their engagement to ensure that disclosure mandates for financial and non-financial entities align with the definitions laid out by the national green taxonomy. This will enhance the credibility of green finance products, reduce the potential for greenwashing, and increase investor confidence.

64. The steps taken to develop a public climate budget tagging system and the green taxonomy for the private financial sector could allow to better identify and track green investment and financing efforts in Panama. The Ministry of Economy and Finance (MEF) is currently working on climate public budget tagging, which involves labeling public expenditures related to climate change mitigation and adaptation. In this regard, MiAmbiente has been working with the Ministry of Economy and Finance (MEF) since 2021 to align public financing with the Paris Agreement. To achieve this, Resolution N DM-0110-2022 was approved on April 20, 2022, adopting the Climate Change Labeling Implementation Manual for public investment projects, which includes a climate vulnerability and risk labeler. Additionally, Resolution N was adopted, which adopts the Technical Guide on Climate Change for Planning, Pre-Feasibility, and Feasibility of Public Investment Projects. In 2022, 50 percent of the planning offices of public institutions were trained, allowing for the identification of 20 percent of climate financing in the public budget for 2023 for the first time. The rest of the public institutions are being trained in 2023 to gradually increase climate financing in the budget for 2024 and the following years. Mainstreaming

⁴⁹ <https://documents1.worldbank.org/curated/en/953011593410423487/pdf/Developing-a-National-Green-Taxonomy-A-World-Bank-Guide.pdf>

climate considerations into public financial management (PFM) is crucial, and there is room for improvement in the Panamanian PFM system. Fiscal transfers to other government entities and public institutions need to become more climate-sensitive, and green public procurement (GPP) should be used to direct public investments towards environmental goals.

Figure 19. Six suggested actions to define a green taxonomy



Source: World Bank Group 2020⁵⁰

Disclosure, reporting, and monitoring

65. Improving the availability of climate-relevant data is crucial for enabling informed, greener investment decisions. The recent establishment of the International Sustainability Standards Board (ISSB) in November 2021 was a positive development, as it aims to develop global, high-quality sustainability disclosure standards to meet investor needs. The standards are currently under development and expected to be finalized within 2023. Panama could benefit from these global standards by using them to inform the development of local sustainability disclosure regulations and guidelines.

66. Authorities could enhance the availability of climate-relevant data and promote transparency and accountability in the financial sector's environmental and climate-related practices by introducing mandatory reporting of climate-related and environmental financial disclosures following a transition period. To address the risks of greenwashing and ensure consistency in climate-related and environmental disclosures, SBP, SMV, and SSRP, in coordination with MiAmbiente, could issue supervisory guidance aligned with the green taxonomy. This guidance should be provided to financial institutions, emphasizing the importance of transparency, accuracy, and completeness in disclosures. Aligning the disclosures with international standards and frameworks such as the Task Force on Climate-related Financial Disclosures (TCFD) and the Greenhouse Gas Protocol is crucial. Mandating

⁵⁰ <https://documents1.worldbank.org/curated/en/953011593410423487/pdf/Developing-a-National-Green-Taxonomy-A-World-Bank-Guide.pdf>

these disclosures enables investors, policymakers, and regulators to assess the climate-related and environmental risks and opportunities of financial institutions accurately, fostering a sustainable financial system. During the transition period, institutions can prepare and adjust their reporting practices with clear guidelines from supervisory authorities. International institutions like the World Bank Group or IADB could collaborate with local stock exchanges to develop training modules on climate-related financial disclosures and public disclosure processes, strengthening capacity among local stakeholders and improving sustainability information quality in Panama's financial markets.

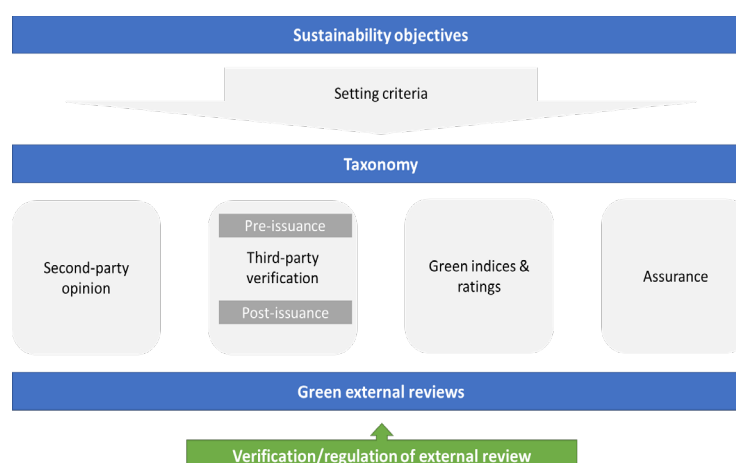
Development of well-defined metrics, certification labels, and methodological standards

67. Market participants in Panama also use external reviewers to validate the greenness of assets or activities with green frameworks and standards (Figure 20). As Panama seeks to promote green finance, external reviewers should play a critical role in ensuring the legitimacy of green bonds. Third-party verification can be used pre- and post-issuance of green and thematic bonds to ensure that bond proceeds have been managed appropriately, in accordance with the issuer's framework. For asset managers and asset owners, external verification provides an additional step of due diligence to ensure private capital is flowing in accordance with the issuer's guidelines. Establishing a strong and reliable system for external verification can enhance market confidence and promote green finance in Panama.

68. Regulators have an important role to play in ensuring appropriate oversight of external reviewers and verifiers who assess firms' ESG performance, especially with respect to environmental performance. As the use of ESG ratings and data products has grown, the need for securities regulators to understand their role and influence has become more important. The International Organization of Securities Commissions (IOSCO) has recently issued guidance to regulators on the issue of ESG data ratings and data product providers. Of specific importance is a better understanding of the methodologies underpinning the assessment of environmental performance among entities that receive ESG ratings, as well as the importance of avoiding conflicts of interest among ESG ratings and data providers.

69. ESG data providers and rating agencies use a diversity of methodologies to evaluate firms' ESG performance, and lower incentives for firms to invest in green projects, higher market uncertainty on the exact actions that would improve ESG ratings, and lower credibility of ESG ratings are the result. Therefore, it is important for Panama to understand the ESG data providers that exist in the domestic and regional marketplace and provide appropriate oversight where necessary. Additionally, the Organization for Economic Co-operation and Development (OECD) has called for ESG ratings providers to emphasize the role of emissions reductions as part of ratings, rather than solely focusing on disclosure. Panama should take note of this and work towards ensuring that ESG ratings providers prioritize emissions reductions as a key factor in their ratings.

70. Explicit labeling could be an effective tool to guide investment decisions towards green assets. For example, introducing energy-efficiency labeling standards for buildings could provide clarity on what qualifies as a "green" building. Labels for other green assets such as EVs could help financial institutions better identify and develop products related to green investments. This information could then also feed into the green taxonomy. Additionally, such labeling systems may provide valuable indicators of asset quality, including their vulnerability to tightened energy-efficiency standards and potentially increasing utility prices.

Figure 20. Schematic overview of the climate information architecture

Stimulating green financial tools and instruments

71. The MEF is currently in the process of developing a sovereign sustainable bond framework, with the aim of issuing its first sustainable bond in 2023. The framework will provide guidelines for the use of proceeds, including eligible projects and activities, reporting and disclosure requirements, and environmental and social safeguards. This effort reflects Panama's commitment to aligning its financial activities with sustainable development goals and promoting the growth of its green finance markets. The issuance of a sovereign sustainable bond can also serve as a signal to the private sector, demonstrating Panama's dedication to sustainable finance and encouraging the development of green financial products and services. The framework should consider the specific market demand for green bonds, identify eligible green projects, and ensure transparent and reliable reporting of green bond proceeds. Additionally, the MEF could consider using the proceeds from the green bond to finance or co-finance green projects that are part of the national climate action plan and energy transition strategy, or to establish a dedicated green fund.

72. To tap additional pools of investors for both mitigation and adaptation finance, MEF, MiAmbiente, SMV could start assessing the issuance of debt instruments beyond green bonds. This includes exploring the potential of blue bonds, sustainability-linked products, and adaptation bonds. The government should consider developing respective frameworks for each instrument to ensure they align with Panama's climate goals and contribute to the transition towards a low-carbon economy. Blue bonds, for example, can be used to finance marine conservation and sustainable fisheries, while adaptation bonds can be used to finance climate resilience projects. Sustainability-linked products are a flexible instrument that can incentivize companies to improve their sustainability performance by linking their financing costs to specific sustainability targets. By exploring these different debt instruments, Panama can diversify its financing options and attract a broader pool of investors while demonstrating its commitment to climate action.

73. It is important to develop measurable key performance indicators (KPIs) to enable the use of novel financial instruments such as sustainability-linked instruments. Sustainability-linked financial instruments create financial incentives for the borrower via ambitious, predetermined sustainability performance objectives. For example, Uruguay and Chile recently issued their first sovereign

sustainable bond linked to targets for renewable energy generation and energy efficiency improvements. To develop such financial instruments, it is crucial to establish a data infrastructure that can support the development of sufficiently robust and credible KPIs that are aligned with the country's context.⁵¹ Unlike green and other sustainability-labeled bonds, sustainability-linked bonds are not ring-fenced for particular projects or spending, but their payout to bond investors depends on the previously agreed performance indicators.

74. MEF, MiAmbiente, and SMV could collaborate to ensure the interoperability of the National Carbon Market with other green financial instruments, reducing investor risk and making climate projects more attractive. The National Carbon Market generates carbon credits from offset projects that achieve emissions reductions or increased absorptions. These credits are traded through the Panamanian Carbon Exchange, with companies registered under MiAmbiente's GHG management programs becoming the main demand for the National Carbon Market. The Market aims to generate NERUs for international sale, as long as it does not affect international climate commitments established in the NDC and its updates.

75. Establishing a legal and regulatory framework for carbon markets is crucial to create an integer and transparent marketplace. Executive Decree No. 100 of October 20, 2020, and Executive Decree No. 142 of December 9, 2021, currently authorize the National Carbon Market, with work underway on a Climate Change Framework Law to establish necessary guidelines for its proper functioning. It is recommended to review the existing legal framework and instruments under development to identify possible gaps that may hinder the implementation of the National Carbon Market and its interaction with other national and international instruments. The infrastructure includes a national registry of offset projects to collect relevant information on all mitigation initiatives developed at the national level, a Panamanian Carbon Exchange under development by Latinex, and the Corporate Carbon Footprint Reduction Program with a standardized process for reporting corporate emissions. NERUs generated under the National Carbon Market would need to have high quality and transparency, with MiAmbiente working with international experts and Accreditation Mechanisms to ensure this. The National Market is expected to rely on existing methodologies for the generation of high-quality credits that include co-benefits, such as those with a focus on biodiversity/environment, which may attract additional investments and position Panama as a model for other countries in the region.

VII. DISASTER RISK FINANCE IN PANAMA

Current approach to Disaster Risk Financing and Insurance

76. Panama has made significant strides in disaster risk financing, utilizing a risk-layering approach with various risk transfer and risk retention instruments in place. Panama was the first country to approve and adopt a DRF strategy (2014) and a five-year implementation plan (2016–2020). In addition to providing contingency financing, it focused on increasing the country's technical and institutional DRM capacity by implementing DRM priority actions by relevant line ministries and government agencies and adopting a framework for the financial management of disaster risk. The Ministry of Economy and Finance's National Directorate of Risk Analysis and Evaluation (DICRE) is

⁵¹ <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/935681641463424672/striking-the-right-note-key-performance-indicators-for-sovereign-sustainability-linked-bonds>

responsible for coordinating the country's disaster risk financing strategy. In addition to its role in coordinating disaster risk financing, DICRE has also implemented a multi-sectoral approach to disaster risk financing management, involving various government agencies, private sector entities, and civil society organizations.

77. Climate change and associated public health hazards have the potential to amplify explicit and implicit contingent liabilities arising from natural disasters.⁵² More frequent and intense climate physical risks could trigger implicit and explicit contingent liabilities. Natural disaster impacts may necessitate timely relief expenditures, such as emergency payments or shelter provisions. However, the unpredictability of costs associated with a changing climate adds complexity to estimating such expenses. As such, a changing climate can also generate contingent liabilities with unforeseen fiscal costs, surpassing allocated funds and abruptly leading to deteriorated public finance conditions.⁵³

78. MEF's Strategic Framework⁵⁴ **for managing fiscal risk due to natural disasters consists of five strategic pillars aimed at reducing fiscal risk when natural disasters occur.**⁵⁵ These pillars recognize the financial management of disaster risk as a component of both fiscal management policy and policies on integrated disaster risk management. They include identifying, quantifying, and understanding fiscal risk due to disasters, incorporating disaster risk analysis in public investment planning, formulating risk retention and transfer instruments, developing the domestic insurance market, and strengthening DICRE's role in designing and implementing financial protection strategies. The development of activities along these pillars is expected to enhance the government's capacity to respond to disasters and mitigate their long-term fiscal and social impacts.

79. Panama has shifted its disaster risk management strategy to a more comprehensive approach that incorporates disaster risk reduction into its development policies. With the help of a USD66 million Catastrophe Deferred Drawdown Option (Cat DDO) from the World Bank in 2012, Panama improved its technical and institutional capacity to manage disaster risk⁵⁶. During a flooding event in 2016 (25mn) and the pandemic (41mn) this CAT DDO was disbursed. In 2022, a second USD100 million Cat DDO was approved to further enhance Panama's ability to manage natural and health-related hazards. Likewise, Panama has a USD400 million natural disaster and public health emergency contingent loan

⁵² Contingent liabilities are obligations that become relevant only when a specific future event occurs. These risks can be categorized into explicit contingent liabilities, which are obligations established by law or contract, and implicit contingent liabilities, which involve moral or public responsibilities not determined by legal agreements.

⁵³ https://www.financeministersforclimate.org/sites/cape/files/inline-files/Climate-Related%20Risks%20for%20Ministries%20of%20Finance%20-%20An%20Overview%20%28CFMCA%29_1.pdf

⁵⁴ https://www.gacetaoficial.gob.pa/pdfTemp/27662_A/48878.pdf

⁵⁵ For details please be referred to: [https://www.gfdrr.org/sites/default/files/publication/Panama- percent20Strategic percent20Framework percent20for percent20the percent20Financial percent20Management percent20of percent20Disaster percent20Risk.pdf](https://www.gfdrr.org/sites/default/files/publication/Panama-percent20Strategic-percent20Framework-percent20for-percent20the-percent20Financial-percent20Management-percent20of-percent20Disaster-percent20Risk.pdf)

⁵⁶ <https://www.preventionweb.net/news/results-resilience-enhancing-institutional-capacities-more-comprehensive-and-inclusive-drm>

with IADB in place.⁵⁷ These efforts build on the institutional and policy reforms that the government has undertaken since 2010.

80. Panama has been active in seeking to expand its disaster risk financing options, particularly with regards to agricultural insurance coverage but key barriers persist. The country is also exploring options for expanding and incentivizing insurance coverage of climate risks and the development of risk resilience products. However, there are still key barriers and challenges that need to be addressed, including the lack of granular data on physical climate risk, particularly in rural and remote areas, which hinders the underwriting and pricing of insurance products. Despite these challenges, Panama is showing a commitment to disaster risk financing and is likely to continue exploring new options and expanding its existing instruments to better manage its disaster risk.

81. One of the key challenges for disaster risk finance in Panama is the unclear financing source for premiums related to the expansion of coverage by the Caribbean Catastrophe Risk Insurance Facility (CCRIF). Panama is a member of CCRIF SPC and has an in-force excess of rain coverage. It is currently considering acquiring more policies to expand its portfolio for different types of tropical cyclone events and considering the inclusion of earthquake parametric insurance and other risk transfer instruments to further diversify their portfolio. While there are ongoing efforts to expand CCRIF coverage for Panama, the financing source for the respective premiums remains uncertain. The Fondo de Ahorro de Panama (Panama Savings Fund) has been mentioned as a potential source of financing, but it could be challenging due to its limited capital endowment and limited additional cash flows, next to financial returns. This uncertainty makes it difficult to plan for and expand coverage, which could leave the country vulnerable to losses resulting from natural disasters.

82. To strengthen Panama's disaster risk financing strategy and capacity, MEF could explore options for paying premiums for Disaster Risk Financing (DRF) instruments CCRIF. This would ensure timely access to funds in the event of a disaster. It is also important to consider mechanisms for post-disaster funding, including contingency funds and access to concessional loans, to support the recovery and rebuilding process.

Insurance penetration and the insurance market

83. The insurance protection gap is a significant concern in Panama, particularly for low-income households, small and medium-sized enterprises (SMEs) and smallholder farmers who are highly vulnerable to natural disasters. Non-life insurance penetration in Panama is relatively low (2.2 percent in 2021)⁵⁸, slightly higher than most Latin American Peers (e.g. Argentina 1.9, Brazil 1.0, Colombia 1.5, Chile 1.5, Mexico 1.4 percent in 2021) but lower than the OECD country average (4.9 percent in 2021). Commercial insurance providers often consider low-income households, small and medium-sized enterprises (SMEs) and smallholder farmers as too risky and not attractive for business. The high likelihood of disasters and limited risk modeling data further complicates the situation, making it challenging to

⁵⁷ file:///C:/Users/wb574010/Downloads/Panama. percent20PN-O008. percent20Proposal percent20for percent20a percent20Contingent percent20Loan percent20for percent20Natural percent20Disaster percent20and percent20Public percent20Health percent20Emergencies percent20 percent20(1).pdf

⁵⁸ <https://stats.oecd.org/Index.aspx?DatasetCode=INSIND>

develop affordable insurance products that adequately cover the needs of vulnerable populations and small firms. Additionally, a lack of awareness and understanding of insurance among low-income households and smallholder farmers is another significant barrier that needs to be addressed through targeted education and awareness-raising initiatives. These challenges highlight the need for innovative approaches to disaster risk finance that can expand insurance coverage and better serve the needs of vulnerable populations in Panama.

84. Growing climate impacts could pose a risk for the insurability of houses, requiring proactive measures by the authorities to ensure long-term sustainability of insurance coverage. Dedicated disaster and climate-related insurance products are currently largely absent, but many standard fire insurance policies for houses in Panama also include climate-related damages, such as floods and wind damages. However, during the mission the perception arose that insurance companies may not be sufficiently prepared to handle unforeseen and significant risk increases. This raises the question of whether insurance companies are adequately addressing the potential impacts of climate change on their business. One reason for this neglect might be that insurance companies could simply withdraw coverage, specifically as most insurance contracts are renewed after 1 year. The recent evidence from the United States, where insurance companies are becoming increasingly reluctant to provide coverage to homeowners in states like California and Florida, reflects a growing concern over the insurability of climate-related risks.⁵⁹ This situation highlights the need for further evaluation and proactive measures by SSRP to ensure the long-term sustainability of insurance coverage in the face of climate-related challenges.

85. Expanding agricultural insurance coverage in Panama faces challenges such as low awareness and high premiums, requiring policy support. The Instituto de Seguro Agropecuario (ISA)⁶⁰ is the main provider of agricultural insurance in the country, but its coverage remains low as it was indicated that only about 5 percent of farmers have insurance in Panama. There is general low awareness among farmers about insurance benefits, while the high cost of insurance premiums and limited access to credit can make it difficult for farmers to afford coverage. To address these obstacles, targeted education campaigns and outreach efforts are needed to raise awareness and promote the benefits of insurance. Likewise, SSRP and the MEF should consider providing subsidies or incentives to make insurance more affordable and accessible for farmers. Subsidies could allow to scale the efforts of ISA, while appropriate incentives could strengthen private insurer participation and market competition to enhance resilience in Panama's agriculture sector in the face of climate risks.

86. The lack of granular data on physical climate risk in Panama poses another significant barrier to effective disaster risk finance, hindering commercial insurance providers from underwriting and pricing risk accurately and impeding the development of novel insurance products like parametric insurance. The lack of reliable and up-to-date data on current and future

⁵⁹ <https://www.nytimes.com/2023/05/31/climate/climate-change-insurance-wildfires-california.html>

⁶⁰ The Instituto de Seguro Agropecuario (ISA) is a government agency in Panama that provides insurance coverage to farmers and ranchers. Its mission is to offer insurance to providing security to agricultural, livestock, and forestry producers, creating trust among financial institutions to encourage investment in the activities developed by the agricultural sector.

climate patterns presents a challenge for accurately pricing insurance policies. MiAmbiente and a few private insurance companies have made progress on developing physical risk maps and readiness indicators, that could help to overcome this challenge. Yet, more efforts are needed to improve data quality, frequency, and accessibility, requiring investment in infrastructure, such as weather stations, and stronger collaboration across stakeholders. Better data would allow insurance companies to better underwrite and price risks, and also potentially allow developing parametric⁶¹ and microinsurance products that offer quick payouts.

⁶¹ It should be noted that parametric insurance has its limitations in situations where the disaster impact is very heterogenous (e.g., such as in the case of floods, with impacts often varying by street level), increasing the likelihood of 'false positive' payouts. Hence, careful consideration needs to be given to the use case of parametric insurance, such as traditionally in the agricultural sector.

VIII. APPENDIX

Financial Sector Context

87. Panama's financial sector is large and dominated by banks, with financial sector assets representing 212 percent of the country's GDP (USD 151bn) (Table 4). Panama's monetary policy is closely tied to the US Federal Reserve's policies as the country fully uses the US dollar as its means of payment, and it lacks a central bank. The financial sector is bank-centric with 56 banks, making up 90 percent of financial sector assets. These banks operate under various licensing regimes, with 43 operating under a general license that allows them to do banking business both domestically and internationally. Foreign banks, mainly subsidiaries of Latin American banks, comprise 27 of the 43 banks operating under a general license, accounting for 40 percent of the financial system's assets. While banks are mostly funded by domestic and foreign deposits, banks are nevertheless the largest issuer of external debt (about 42 percent) in Panama, exceeding external general government debt (27.5 percent). As an important aspect of Panama's economy, the country's very large financial sector plays a crucial role in facilitating trade and investment, but it also poses risks to financial stability.

88. Despite the macroeconomic challenges posed by the COVID-19 pandemic, Panama's banking sector has remained resilient and financially sound (Table 5). Capital adequacy ratios have been adequate, with a system-wide ratio of 15.8 percent in Fall 2022. Asset quality has also held up well during the pandemic, as evidenced by the moderate deterioration of the non-performing loan (NPL) ratio, which stood at 2.5 percent as of November 2022. The NPL ratio varies across banks, with state-owned and Panamanian general license banks having higher ratios than international general license banks. Provisions for NPLs exceed 100 percent for all types of banks except for state-owned banks, where coverage is at around 70 percent.

Table 4. Financial sector composition overview

Panama: Structure of Financial System December 2022				
	Number of Institutions	Total Assets (USD billion)	Share of the total assets, %	Share of GDP, %
Banks¹	56	135.7	90.1	192
General license banks	42	119.4	79.3	169
<i>o/w State-owned</i>	2	21	14	30
<i>o/w Domestically-owned</i>	13	39	25.8	55
<i>o/w Foreign-owned</i>	27	59.4	39.5	84
International license banks	14	16.3	10.8	23
Non-bank Financial Intermediaries	1351	14.8	9.9	20
Insurance and resinsurance ²	54	3.6	2.4	5
Securities companies and pension funds	179	5.0	3.3	7
Cooperatives	536	2.4	1.6	3
Other financial entities	582	3.8	2.5	5
Total	1417	150.5	100.0	212
Source: Superintendency of Banks				
1/ Data to June 2022				

2/ Data to March 2022				
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Notes: * data as of December 2022. Source: SBP

Table 5. Financial soundness indicators

	RoA	RoE	NPLs ⁶²	Morosos ⁶³	Loan provisioning
Sistema Bancario	1.22 percent	11.77 percent	2.53 percent	1.80 percent	3.13 percent
Banca Oficial	1.0 percent	14.06 percent	3.22 percent	2.05 percent	2.55 percent
Banca Extranjera Privada	1.18 percent	9.35 percent	2.05 percent	1.10 percent	3.09 percent
Banca Panamena Privada	1.42 percent	16.23 percent	3.06 percent	2.88 percent	3.44 percent

As of November 2022

Source: SBP

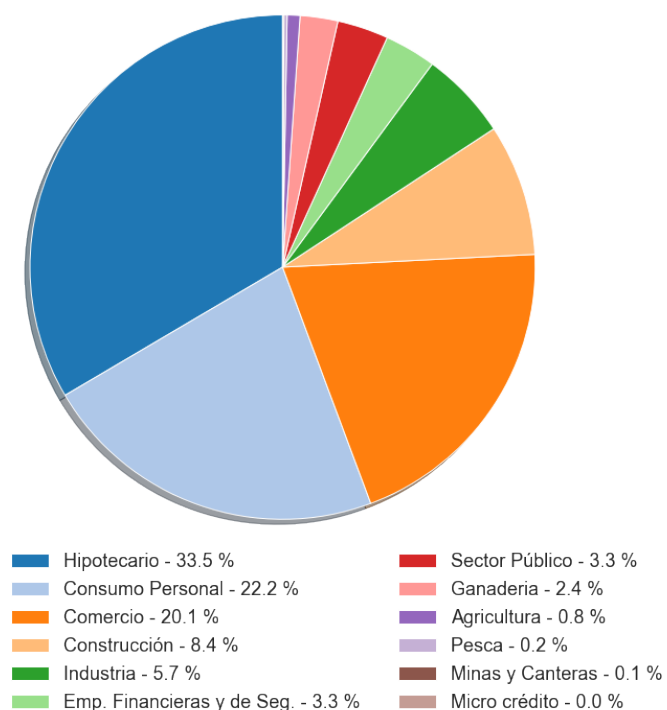
89. Bank lending in Panama is concentrated in the real estate sector and consumer loans.

Panama has benefited from a construction boom that has left the economy with the highest share of construction to GDP compared to other countries with similar income levels. Real estate lending accounts for 34 percent of all lending, followed by consumer loans at 22 percent, commerce at 20 percent, and construction at 8 percent (Figure 21). At the same time, bank lending is highly concentrated on consumers and big enterprises, with SMEs making up about 15 percent of total bank lending. The strong concentration on housing, personal consumption and construction lending makes banks vulnerable to a slowdown in real estate and construction and reduced credit growth. Lending is geographically highly concentrated in Panama, with the state of Panama (including Panama City) accounting for about 70 percent of all bank lending (Figure 22). While Real estate and consumer loans are the most prominent sectors of lending in most states, there are notable exceptions such as commerce in Colon, cattle raising in Darien, and construction in Ngobe Bugle (Figure 23). Overall, the lending patterns in Panama reflect the country's economic structure and the various sectors that drive growth and development.

⁶² Credits that have been overdue for 90 days or more are considered delinquent and continue to be regulated by Agreement 4-2013, as well as those covered under the framework of Agreement 2-2020 and Law 156-2020.

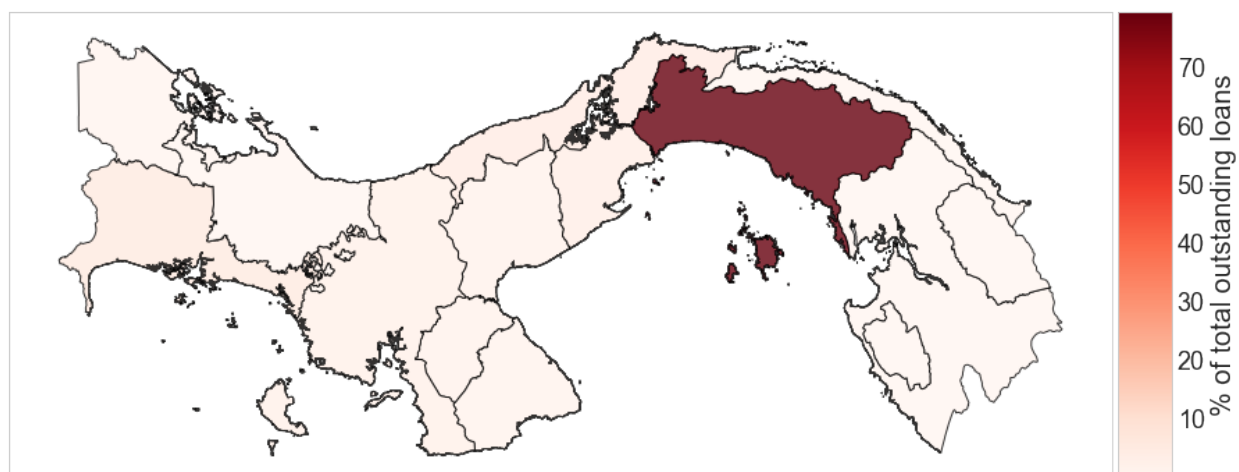
⁶³ Credits with delays of more than 30 days up to 89 days are considered overdue and are still regulated by Agreement 4-2013, as well as those protected by the framework of Agreement 2-2020 and Law 156-2020.

Figure 21. Overall bank lending by sector

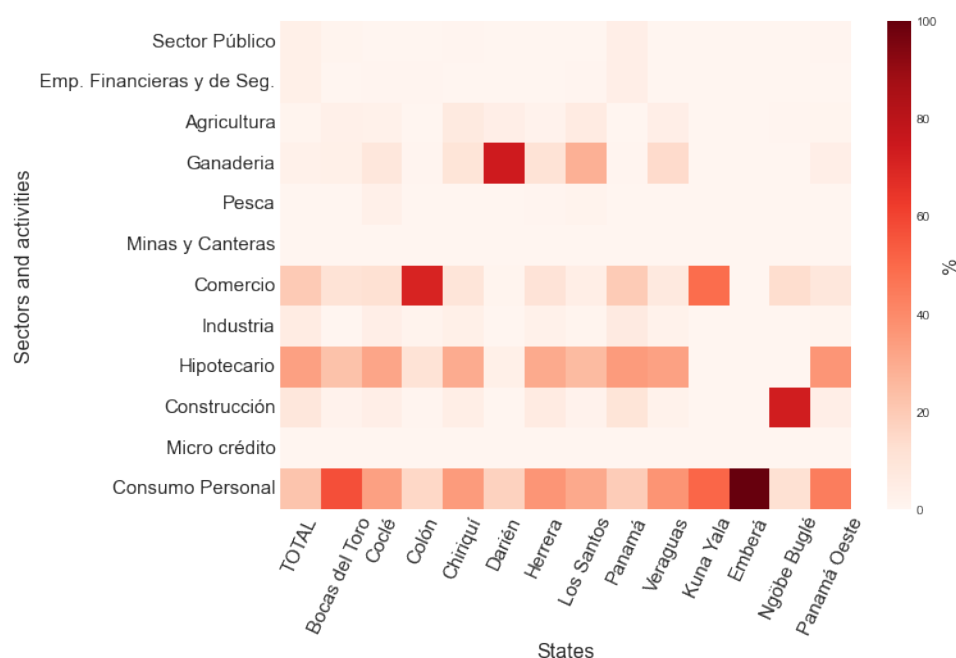


Source: SBP as of November 2022

Figure 22. Bank lending by state in percent of total



Source: SBP as of November 2022

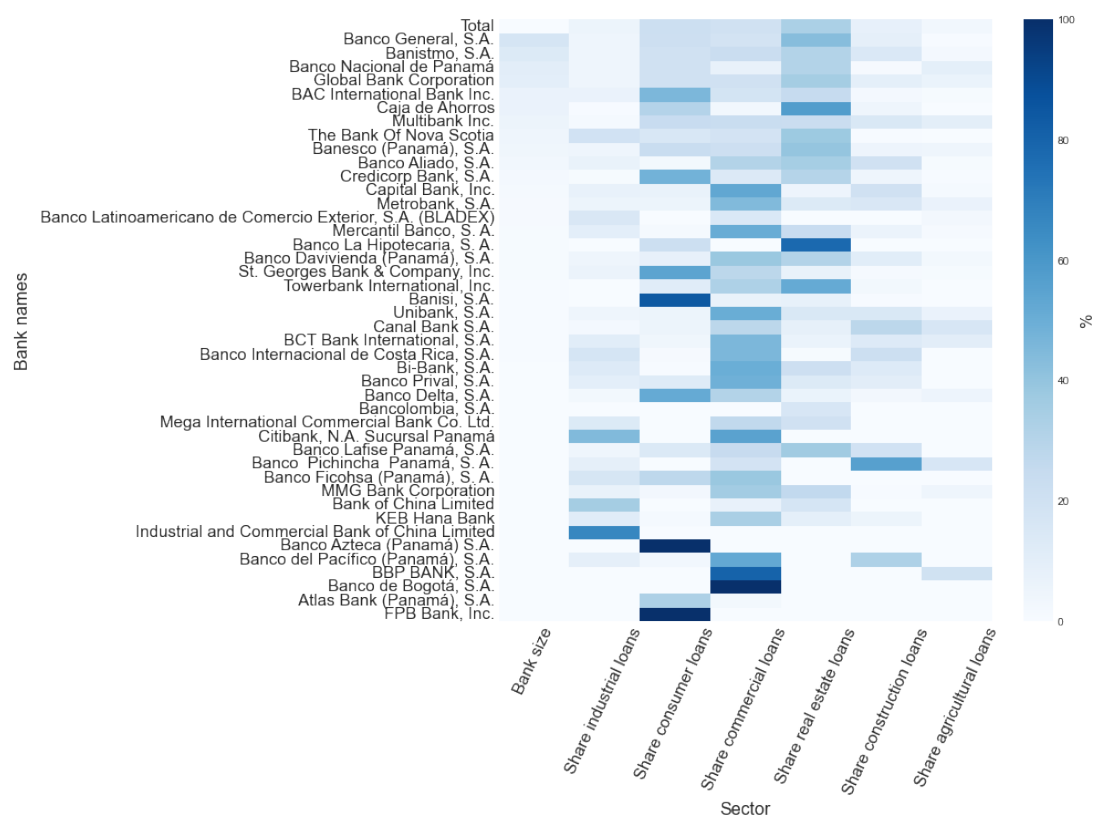
Figure 23. Bank lending by sector and state (relative for each state)

Source: SBP as of November 2022

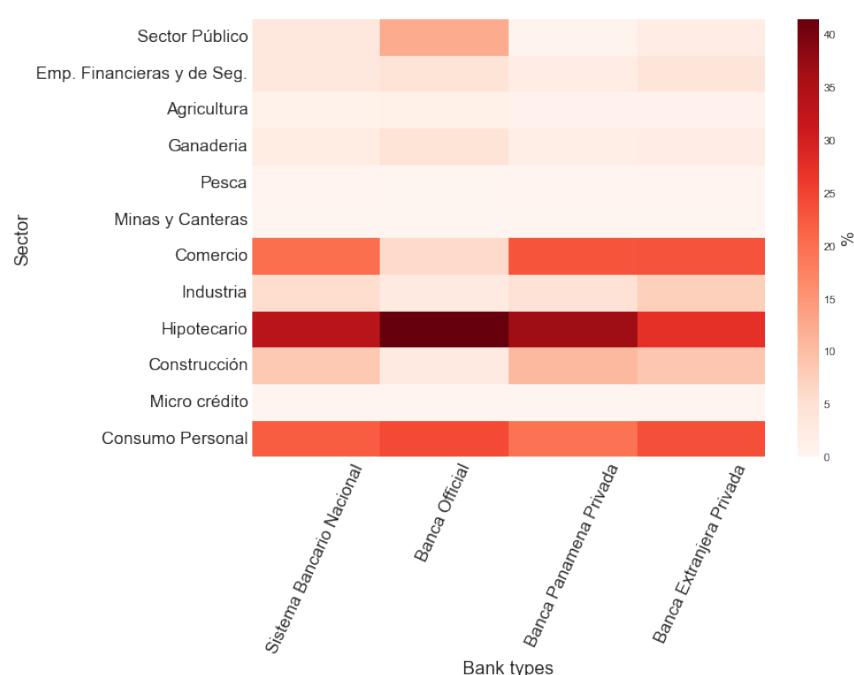
90. Panama's capital markets are diverse, with over 260 registered issuers and a market value of close to USD 39 bn (71 percent of GDP) at the end of 2020. The equity market is dominated by banks (70 percent) and other financial sector issuers (26 percent), while non-financial entities have limited equity. The domestic debt capital market has a more diverse participation, with the government being the largest issuer (32 percent of outstanding debt securities) followed by energy companies (12 percent) and banks (12 percent). Investment fund managers, advisors, and brokers support capital market activity. The investor base is split between retail and institutional investors, with strong participation from international investors. The domestic pension sector is small, with only 67k members and assets under management of around USD 700 mn, and does not play a significant role as an institutional investor.

91. The insurance sector in Panama is moderately sized, with premiums and assets totaling 2.5 percent and 5.7 percent of GDP, respectively, in 2021. The non-life segment dominates the sector, accounting for over 75 percent of gross written premiums, with health, automotive, and fire insurance being the largest components. There are 23 insurance companies in the market, including both national and multinational companies, with the top-5 companies holding 70 percent of total assets. The sector's investments are concentrated in bank deposits (38 percent), securities issued by local banks (10 percent), and foreign assets (21 percent), with relatively low exposure to the domestic sovereign (7 percent).

Figure 24. Individual bank lending by sector (relative for each bank and ordered by bank size)



Source: SBP, as of November 2022

Figure 25. Bank type lending by sector (relative for each bank type)


Source: SBP, as of November 2022

Framework to assess the Supervisory Response to Deepen Green Finance Markets in Panama

Table 6. Overview of policy areas covered in the benchmarking assessment

Category	Policy area	Objective	Expected outcomes
Strategy and coordination	National climate finance strategy	Define how short and long-term financing will be mobilized to implement the country's climate goals (including NDCs)	Align financial policies and incentives with climate goals
	Green Finance Roadmap	Align financial sector policies, regulations, and incentives with national climate goals	
Enabling environment	Alignment of fiscal, economic and climate policies	Creating the enabling environment for climate action and	Long term investment certainty and improved business case for climate projects

		participation of the financial sector	
Building capabilities and capacity	National coordination	Establish a multi-stakeholder platform to advance policy developments on green finance	Enhance awareness of climate impacts
	Paris alignment by financial institutions	Encourage financial institutions to align their businesses, portfolios and strategies with net-zero pathways and climate objective	
Transparency and data availability	Green taxonomy	Offer a uniform and integer framework to determine activities that can be considered green	Improve transparency and avoid greenwashing
	Disclosure, reporting and monitoring	Enhance market transparency and understanding of climate risks and opportunities in line with most important international standards and requirements to guarantee comparability and consistency of information	
	Development of well-defined metrics, certification labels, and methodological standards		
Green finance instruments	Sovereign labelled bonds	Bonds issued by the central government where the proceeds are used to finance or re-finance specific climate/ESG projects	Improve risk-adjusted returns of green investments by catalyzing new markets for green growth

	Corporate labelled bonds	Bond instruments where the proceeds will be exclusively applied to finance / re-finance verified climate /ESG projects	
	Green/labelled loans	Loans made available exclusively to finance or re-finance eligible green projects	
	Carbon markets	Strengthening the interoperability of the National Market with other instruments, and reviewing the legal framework to develop complementary tools if necessary.	

The IMF-World Bank Climate Policy Assessment Tool (CPAT)

The Climate Policy Assessment Tool (CPAT) is a global tool that helps countries evaluate the potential impacts of climate policy reforms quickly. It covers more than 180 countries and can be used as a one-stop-shop for anyone interested in a quick diagnostic of the potential benefits of a carbon price reform across multiple key dimensions. These dimensions include emissions reduction potential, macroeconomic aggregates, air pollution and health, road fatalities and congestion, and distributional impacts. CPAT allows for the rapid quantification of impacts of climate mitigation policies on various metrics such as energy demand, prices, emissions, revenues, welfare, GDP, households, industries, local air pollution, and health. A detailed description of the CPAT model, its data sources, key assumptions, and caveats can be found in its documentation⁶⁴.

CPAT enables rapid estimation of the effects of these reforms across several economic and non-economic dimensions, including key macroeconomic variables, energy consumption, local and global pollutants, development co-benefits, distribution/equity, and poverty. The objectives of CPAT are twofold: to help decision-makers and analysts quickly assess the potential benefits of explicit

⁶⁴ https://cpmodel.github.io/cpat_public/

carbon pricing and fossil fuel subsidy reforms to inform Sustainable Development Goals (SDGs) and other country strategies, and to provide initial estimates of benefits across different dimensions (from tax revenues to health) to initiate engagement with country counterparts and identify areas where more in-depth analyses are needed or promising.