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COUNTRY CLIMATE AND DEVELOPMENT REPORT

HONDURAS

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Abbreviations

AHIBA	*Asociación Hondureña de Instituciones Bancarias* (Honduran Association of Banking Associations)
ASP	Adaptive social protection
BAU	Business-as-usual
BRT	Bus Rapid Transit (system)
CCDR	Country Climate and Development Report
CCRIF SPC	Caribbean Catastrophe Risk Insurance Facility Segregated Portfolio Company
CCT	Conditional cash transfer
CLEAR	Climate and Economic Analyses for Resilience
CNBS	*Comisión Nacional de Bancos y Seguros* (National Banking and Insurance Commission)
CODELs	*Comités de Emergencia Local* (Local Emergency Committees)
CPAT	Climate Policy Assessment Tool
CPF	Country Partnership Facility
CRED	Centre for Research on the Epidemiology of Disasters
CSA	Climate-smart agriculture
CSF	Climate Support Facility
DNCC	*Dirección Nacional de Cambio Climático* (National Directorate of Climate Change)
DRF	Disaster risk finance
DRM	Disaster risk management
E&S	Environmental and Social
EFTs	Ecological fiscal transfers
ENEE	*Empresa Nacional de Energía Eléctrica* (National Company of Electrical Energy)
ESG	Environmental, Social and Governance
EVs	Electric vehicles
FAO	Food and Agriculture Organization
GDP	Gross domestic product
GHGs	Greenhouse gases
ICF	*Instituto de Conservación Forestal* (Forest Conservation Institute)

IDPs	Internally displaced persons
IFC	International Finance Corporation
IMF	International Monetary Fund
IPADs	Indigenous peoples and Afro-descendants
IPCC	Intergovernmental Panel on Climate Change
IPF	Investment project financing
IWRM	Integrated Water Resources Management
LAC	Latin America and the Caribbean (region)
LULUCF	Land Use, Land Use Change and Forestry (sector)
MFI	Microfinance institution
MFMod-C	Macroeconomic and Fiscal Model
MiAmbiente	*Ministerio de Ambiente Honduras* (Ministry of Environment, Honduras)
MIGA	Multilateral Investment Guarantee Agency
MRV	Measurement, reporting and verification
MSMEs	Micro, small and medium enterprises
NAPA	National Program for Adaptation
NDC	Nationally Determined Contribution
NPL	Nonperforming loan
PNA	*Plan Nacional de Adaptación al Cambio Climático* (National Plan of Adaptation)
PPA	Power purchase agreement
PRDS	*Plan de Reconstrucción y Desarrollo Sostenible* (Plan for Reconstruction and Sustainable Development)
R&D	Research and development
RCP	Representative Concentration Pathway
SDGs	(United Nations) Sustainable Development Goals
SEFIN	*Secretaria de Finanzas Honduras* (Ministry of Finance, Honduras)
SEN	*Secretaria de Energía Honduras* (Ministry of Energy, Honduras)
SMEs	Small and medium enterprises
SSP	Shared Socioeconomic Pathway

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Executive Summary

Although Honduras has been growing at the average rate of the Latin America and Caribbean Region, it remains one of the poorest and most unequal countries in the Western Hemisphere. Honduras's real gross domestic product (GDP) growth averaged 3.8 percent a year over the three decades leading up to 2019.[1] In spite of this, nearly one in six Hondurans lives on less than US$1.90 a day, and per capita income growth has averaged only 1.2 percent a year since the 1960s. The economy, largely agricultural and predominantly informal, is small and open, creating high structural exposure to external shocks. This is accompanied by high exposure to natural hazards, high levels of crime, political instability, and a weak institutional and business environment. Taken together, these factors undermine the country's competitiveness and economic diversification, incentivize out-migration, and hamper progress toward raising incomes, reducing poverty, and tackling exclusion.

In 2020, the impacts of the COVID-19 pandemic and two category-4 hurricanes, Eta and Iota, exacerbated existing economic and social challenges, with significant impacts in areas with high concentrations of indigenous peoples and Afro-descendants (IPADs). Real GDP declined by a record 9 percent in 2020, with output contracting across all sectors, and it is estimated that poverty (US$5.50 line)[2] increased by 6.4 percentage points in 2020 to 55.4 percent.

Honduras is highly exposed and vulnerable to extreme climate-induced natural hazards, and climate change is expected to intensify these events and exacerbate their impacts. Historically, gains achieved during periods of relatively robust and broad-based growth have often been wiped out by devastating shocks, and then followed by only modest and uneven recoveries. In 2019, the Global Climate Risk Index ranked Honduras as the second country in the world most severely affected by extreme weather events in the 1998–2017 period, highlighting its acute vulnerability to climate change events and low level of preparedness to respond to them. Indeed, climate-induced natural hazards have generated significant delays in the country's economic and social development. Between 1998 and 2017, on average, annual losses were equivalent to 1.8 percent of GDP, with floods being the most destructive events, and droughts severely affecting the agriculture sector. The future outlook is somber: Climate change is expected to increase global mean temperatures, intensify weather events such as floods, heatwaves, and droughts,[3] and raise sea levels. Since Honduras's natural hazard losses have been triggered mainly by excess rain (floods), tropical cyclones (windstorms), and droughts, these disasters will likely increase both in frequency and in severity as a result of climate change.

In the absence of resilience building and advances in adaptation, impacts from climate change will have significant consequences for the whole of Honduran society, affecting key economic sectors and threatening food and water security, human health, and well-being.

» **Agriculture:** The agriculture sector, which accounts for 73 percent of the country's total exports and 30 percent of employed Hondurans, is the sector most affected by climate change. The majority of the employed are small-scale, rural-based, subsistence farmers, and most are poor (80 percent of poor households rely on income from agriculture). The sector is characterized by low productivity and high risks of impacts from climate change, which disproportionally affects the most vulnerable and the poor, reducing productivity and increasing food insecurity. It is expected that four of the five crops with the greatest harvested area in Honduras—maize, coffee, beans, and sugarcane—will reduce their yields. This will adversely impact subsistence farmers' food security—maize and beans are their main crops—as well as exports. In 2021, for example, coffee represented 54 percent of agriculture exports.

[1] Per capita GDP growth averaged 1.2 percent between 1989 and 2019 (World Bank data).

[2] This report measures poverty using the international poverty lines expressed in US$2011 PPP. A new set of international poverty lines, expressed in US$2017 PPP, were introduced in August 2022. Thus, while the overall trends over time remain unchanged, the levels are different under the two lines.

[3] The Intergovernmental Panel on Climate Change reported in 2022 that climate projections indicate an increase in the frequency of intense cyclones in Central America, accompanied by a decrease in the frequency of less intense tropical cyclones (IPCC, Climate Change 2022: Impacts, Adaptation and Vulnerability, Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, eds. H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, et al. (Cambridge, UK and New York, NY: Cambridge University Press, 2022), doi:10.1017/9781009325844.

» **Water resources management:** 71.6 percent of exports, one-third of electricity generation, and 47.9 percent of jobs in Honduras are water-dependent. It is projected that reduced river flows and groundwater recharge, saltwater intrusion, water shortages and disrupted water supplies, increased runoff, erosion, and reduced water quality and storage capacity will all have significant impacts on users. Droughts and floods pose a significant threat to the livelihoods of Hondurans, particularly farmers and those in the Dry Corridor and Sulla Valley.

» **Forests and marine and coastal ecosystems:** Climate change also threatens critical ecosystems such as forests, mangroves, coral reefs, and fisheries, and this is expected to impact biodiversity, livelihoods, food security, and tourism. Additionally, since agriculture is one of the main drivers of deforestation. climate-related threats to agriculture productivity will likely affect the forests as well.

» **Transport:** More than 60 percent of the transport network is exposed to natural hazards, with floods and landslides being the main sources of exposure, entailing severe impacts on connectivity and accessibility of rural areas. It is expected that climate change impacts will increase the number of people (mainly rural) who lack access to hospitals, schools, and markets.

» **Social footprint:** The impacts of climate change disproportionately affect the poorest Hondurans, especially women and IPADs, as they often live in the most vulnerable areas, are more dependent on agriculture and other natural resources such as forest and marine assets, and have limited resilience, low levels of infrastructure, and low capacity for institutional adaptation. Additionally, land disputes are likely to increase as land becomes more scarce, particularly in light of the historical land tenure insecurity for IPADs. Impacts are also expected to continue causing internal displacement and migration from rural areas to urban centers and outside Honduras.

» **Financial:** Honduras's bank-dominated financial sector is exposed to climate-related physical and transition risks. About 20.8 percent of the banking sector's credit portfolio to nonfinancial corporations has a high hazard mapping to hurricanes and 9.2 percent has a high hazard mapping to riverine floods. The economic sectors responsible for the most greenhouse gases (GHG) emissions—transport, agriculture, and electricity—account for 29 percent of sector-wide loan exposure. A significant proportion of firms in these sectors are exporters and hence could be affected by potential trading partners' carbon pricing and other plans in the future. In a scenario where global efforts to stop global warming are insufficient, the expected damage from tropical cyclones could increase the share of nonperforming and/or restructured loans by 6.2 percent by 2050.[4]

Indeed, climate change is already showing its effects and is expected to weigh on Honduras's outlook. Based on historical growth and natural hazard risk patterns, in the absence of any further climate or policy changes, the combined impact of productive capital destroyed through excess rain (flooding), tropical cyclones (strong winds), and earthquakes[5] is expected to result in a cumulative loss of around 5.4 percent of annual GDP by 2050 (relative to the hypothetical scenario without impacts caused by natural hazards). This would limit income opportunities, and therefore reduce the consumption of the population by 6.8 percent. Lower growth, foregone revenue, and the diversion of productive resources toward reconstruction and relief efforts also limit the private sector's profitability and stress the government's fiscal capacity, and it is projected that, by 2050 public debt levels will rise by around 6.2 percentage points of GDP, compared to a hypothetical scenario with no impacts from natural hazards.

[4] The importance of a 6.2 percentage point shock on the loan portfolio depends on the level of capitalization of local banks (essentially, the size of their cushion to absorb losses). As of this writing, Honduran banks are very thinly capitalized, and a 6.2 percentage point shock would leave almost 40 percent of the system precariously undercapitalized.

[5] For the purposes of this report, data on natural hazard risk could be obtained only for excess rain, tropical cyclones, and earthquakes. Estimations are based on the average value of capital destroyed by tropical cyclones, excess rains, and earthquakes from the exceedance curves that were provided by the Caribbean Catastrophe Risk Insurance Facility's SPHERA (earthquake and tropical cycles) and XsR2.5 (excess rain) models. Earthquake risk, while not susceptible to climate change, contributes to the base load of disasters and is kept constant across all scenarios. There are no robust loss models available to probabilistically estimate future losses in Honduras for other important climate change-related risks, such as excess heat, drought, landslides, and wildfires.

As a result, the rate of poverty reduction will be relatively stagnant during 2022–2050. Even though the country will not experience a significant increase in the poverty rate, population growth will raise the absolute number of poor substantially—from 3.9 million in 2019 to 5.3 million by 2050—thereby exposing more people to climate change risks. Extreme poverty is expected to follow a similar trend and remain stagnant over the period.

Climate change induced variations in the severity of weather events would further add to the macroeconomic disruptions and fiscal risks from these natural hazards. Using an annual probability of 1 percent, the contingent liabilities from excess rain, tropical cyclones, and earthquakes represent at least 8.5 percent of GDP, but this rises to 16.1 percent if a 0.2 percent (1-in-500 years) probability is considered – a more risk-averse scenario. Rural roads will also be further damaged by floods and landslides, with projections showing, for example, that climate change will cause an additional 300,000 people annually to lose 60-minute ("golden hour") access to hospitals, and up to 500,000 people annually by the end of the century. Access to agriculture and education will also be further restricted. (Impact analysis done in this CCDR does not consider losses due to other important climate change-related risks such as excess heat, droughts, and wildfires, although the available literature is referenced when appropriate.)

Although Honduras contributes little to global climate change, net emissions are on the rise, and this could lock Honduras out of future growth opportunities and mitigation co-benefits. Honduras emits about 0.06 percent of global GHG emissions. In 2018, total emissions per capita were estimated at 2.9 tons of carbon-dioxide-equivalent per capita (tCO_2-eq/capita)—significantly lower than the world average of 6.45 tCO_2-eq/capita, and than the Latin America and Caribbean Region average (6.22 tCO_2-eq/capita).[6] However, in the 2005–2015 period, Honduras's total GHG emissions increased 29.9 percent.[7] The energy sector accounted for 38 percent of emissions (of which 42 percent is transport and 31 percent is electricity production and heat), followed by agriculture (26 percent) and land use, land-use change, and forestry (LULUCF: 22 percent). Within the transport sector, road transport emits the most GHGs because of high volumes of road freight and the increase in motorization and population rates in Honduran cities.[8] Investments in climate change mitigation that create synergies with climate change adaptation could boost decarbonization efforts while delivering co-benefits in terms of jobs and improved air quality and health.

Forests and renewable energy generation sources play a crucial role in climate change efforts that create synergies between mitigation and adaptation. Forests cover more than 56 percent of Honduras and are essential for mitigation efforts through the absorption of carbon, resilience to natural hazards, and the income-generating opportunities they provide to rural populations. Nevertheless, the rate of tree cover loss is high by regional and global levels, with 12 percent lost between 2010 and 2021, driven mainly by small-farmer and commercial agriculture expansion. Tree cover loss is further affected by the 59.2 percent of rural families in Honduras who use firewood for cooking, and by illegal logging and drug-production activities. The forest sector can also create development co-benefits through the participation and empowerment of IPAD and local communities in serving as stewards of forest and natural resources.

Further, renewable power could drastically reduce carbon emissions (and the associated health impacts of co-emitted local pollutants), reduce the cost of fuel imports, and help mitigate climate change. Although the largest source of electricity in 2021 was renewable-generation sources (66 percent, with hydroelectric accounting for over half of it), nearly all the nonrenewable generation (34 percent) comes from thermal power plants mostly fueled by bunker oil, diesel, or coal. These fuels contribute significant amounts of GHG, sulfur, and other emissions that negatively affect climate change and have negative environmental and human health impacts. In this context, there are opportunities to foster low-carbon development pathways through green innovations in high-emitting sectors, forest preservation, and an increase in the share of renewable-generation sources.

With relatively low emissions but high vulnerability to climate change effects, Honduras's key development and climate change challenge is to build resilience in the face of intensifying disasters from natural hazards and to find synergies with targeted decarbonization policies. Although the frequency and

[6] World Resources Institute's CAIT Climate Data Explorer.

[7] According to the update of the National GHG Inventory developed during the Nationally Determined Contribution (NDC) update.

[8] Government of Honduras, updated NDC, 2020.

intensity of climate-induced natural hazards will likely increase, policies to reduce exposure and vulnerability should support not only climate change adaptation but also a broader development agenda, including policies to achieve, protect, and sustain incomes and poverty gains, to tackle exclusion and inequality,[9] and to strengthen social cohesion. Adaptation initiatives, including a financing strategy for disaster risk management (DRM) and nature-based solutions, can help the country achieve these developmental goals, particularly if they have a sustainable financing strategy. Low-carbon policies should be based on careful social and economic assessments to ensure that the rights and livelihoods of the most vulnerable are protected[10] and social and economic sustainability is sustained. Citizen engagement in, and participatory approaches to, these policies are critical for their public acceptance and sustainability. Additionally, low-carbon development is likely to generate significant health co-benefits (although the costs and risks of specific decarbonization investments could not be assessed because of institutional challenges and the unavailability of data).

Recognizing the country's high vulnerability to natural hazards and opportunities for low-carbon synergic development, the government of Honduras has set resilient reconstruction from the 2020 crisis, and green and inclusive development, as two overarching national priorities. The 2010–2038 Country Vision outlines Honduras's development priorities. The four objectives of the vision are a) poverty reduction, social welfare, and human development; b) security and democracy; c) sustainable productive development and jobs generation; and d) improved state capacity and transparency. Of these, the third objective focuses on climate change and sustainable development, including seven national priority targets aimed at reducing unemployment, increasing the exports of goods and services, increasing irrigation to meet national food demand, improving water management, increasing renewable energy, restoring forest landscapes, and reducing climate risk.

Following the 2020 crisis, the government developed its Plan for Reconstruction and Sustainable Development, a medium-term plan to achieve the Country Vision. The plan aims at rebuilding productive assets and infrastructure, strengthening economic sustainability and resilience to natural hazards, and expanding social protection programs.

In its first updated Nationally Determined Contribution (NDC), presented in 2021, Honduras increased its ambitions on mitigation, adaptation, and social inclusion. Honduras increased its ambitions for 2030 for two out of three mitigation commitments: a) reducing emissions by 16 percent relative to the business-as-usual (BAU) scenario, and b) restoring 1.3 million forest hectares (ha). The third commitment maintained the target of reducing 39 percent of family firewood consumption. The updated NDC also establishes the intention to formulate and communicate a long-term, low-emissions development strategy, which will be reflected in the 2020–2050 National Plan for Decarbonization. However, the plan is still under development and there is currently no available information that would allow an assessment of the extent to which NDC commitments and the decarbonization plan will reach carbon neutrality by 2050. The NDC also has nine adaptation commitments in five other key sectors: water resources, biodiversity and ecosystem services, agriculture and food security, infrastructure and socioeconomic development, and human health (see Appendix section A.3). The NDC also highlights the need for the increased participation and inclusion of women, youth, and IPADs through six commitments on social inclusion.

Despite the far-reaching ambitions and commitments, implementing the NDC faces substantial challenges. The government has conducted relevant analyses to support NDC implementation, including the identification of the main barriers for deploying the prioritized mitigation measures. What it has not yet done is to translate mitigation targets and commitments under the NDC into implementation details at the policy and investment level. In addition, there is no estimate of actual implementation costs. Another important implementation challenge is the lack of a robust measurement, reporting and verification system.

Although Honduras has undertaken important steps to articulate the regulatory and policy framework to promote low-carbon and climate-resilient development, significant institutional and financial challenges exist. There is a need to revise the climate change law and its implementing regulations

[9] While income inequality is expected to increase in Honduras in both rural and urban areas over the period 2019–2050 under the business-as-usual scenario, this CCDR does not explicitly discuss the impact of climate change on inequality.

[10] While co-benefits are likely, the same policies could impose costs on vulnerable groups in the form of reduced jobs in certain sectors, increased cost of critical inputs and assets, or limitations on IPADs' access to resources and lands.

considering the updated NDC. In 2018 the government approved the National Plan of Adaptation (PNA) as part of the Climate Agenda, but only two out of five sectors—health and agriculture—have adaptation strategies. Also, even with the high number of institutional arrangements, important challenges remain associated with the low adoption of these instruments into the operation plans of the responsible agencies; insufficient monitoring systems for accountability, transparency, and tracking; and weak budgetary and fiscal policies for an integrated climate agenda. An analysis of the government's climate change budget suggests that, even though it has almost doubled in recent years, no specific tagged funding could be identified for three NDC objectives: bioenergy, electromobility, and monitoring and evaluation.

DRM is one of the key aspects of climate change adaptation and an area in which the country has made substantial efforts, particularly by developing and approving a Disaster Risk Finance (DRF) Management Strategy in 2020. However, Honduras still faces important challenges in financial management and risk reduction to minimize the impact of future events. The financing requirements of adaptation and mitigation of climate risks exceed Honduras's current fiscal capacity. Moreover, current financial instruments are limited mainly to budget reallocations, domestic loans, and contingent credits and loans and are insufficient to address disaster risks, finance adaptation and mitigation needs, and other development priorities.

The objective of this CCDR is to identify climate change adaptation and mitigation strategies and investments that could achieve climate targets while also furthering the country's development objectives. The following sections aim to describe the key considerations for the country to align its climate policies to its development objectives, prioritizing policies that generate synergies between resilience, adaptation, mitigation, and development.

Macroeconomic Policy for Climate Resilience, Adaptation, and Mitigation

On adaptation, the key macroeconomic challenge for Honduras is to implement a forward-looking fiscal strategy that prioritizes adaptation investments, and a strategic natural hazards response and financing outlook, while preserving adequate fiscal buffers to respond to shocks, without jeopardizing other development objectives. In the past, the response to natural hazards has been largely reactive through the reallocation of budgetary resources in the aftermath of a disaster. This has had negative repercussions on spending in other priority areas and medium-term budget planning and monitoring. Dedicating budget resources to investment in disaster resilience and preserving adequate fiscal buffers to respond to shocks *ex ante* will enable Honduras to conduct a more countercyclical fiscal policy. Such a strategy will require additional fiscal resources that, in the medium term, could be mobilized through new revenue generation. In the short term, additional borrowing might be feasible to the extent that it helps improve Honduras's debt-carrying capacity by reducing the country's susceptibility to shocks. A proactive fiscal policy strategy could also involve planning *ex ante* a set of financial instruments with a predefined order of precedence in the event of a disaster caused by natural hazards. This comes at the cost of slight increase in debt in the short term compared to a no-adaptation scenario; however, it could also yield climate co-benefits. The implementation of the proactive fiscal policy also rests on strengthening the institutional quality and implementation capacity. Outcomes can be improved across the board through a proactive fiscal policy that combines accelerated reconstruction, cash transfers to households, investments in locally led interventions, and adaptation investment with a financing strategy that uses disaster risk insurance to provide additional quick liquidity in the event of a disaster, additional short-term borrowing to finance adaptation policies, and additional medium-term revenue generation.

Mitigation efforts should focus on areas with potential synergies with adaptation or other co-benefits. From a fiscal perspective, this could include the creation of new sources of revenue or expenditure reductions from measures such as carbon taxes, or a fuel subsidy reform that raises funds at a lower cost than some conventional sources of public revenues.[11] Results from the Climate Policy Assessment Tool (CPAT) suggest

[11] There is evidence that green taxes can have lower marginal costs than other taxes. See Salvador Barrios, Jonathan Pycroft and Bert Saveyn, The Marginal Cost of Public Funds in the EU: The Case of Labour Versus Green Taxes, Taxation Papers 35 (Brussels: Directorate General Taxation and Customs Union, European Commission, 2013); Dirk Heine and Christian Schoder, "The Role of Environmental Tax Reform in Responding to the COVID-19 Crisis" (Washington, DC: World Bank Group, 2022); and Christian Schoder, Regime-Dependent Environmental Tax Multipliers: Evidence from 75 Countries, Policy Research Working Paper 9640 (Washington, DC: World Bank Group, 2021).

that an ambitious carbon price[12] could yield up to 2.7 percent of GDP in additional revenue, increase growth by 0.6 percentage points, achieve the NDC's commitment to reduce energy-related emissions by 23 percent by 2030, and reduce inequality (albeit while increasing consumption levels). Additional revenues raised could be used to finance resilient development, including adaptation and mitigation investment, and to finance cash transfers to vulnerable households to help compensate for the consumption effects.

Moreover, carbon pricing policies could reduce ambient air pollution from the co-emission of GHGs and local pollutants from burning fossil fuels.[13] That, in turn, could reduce mortality and morbidity. Assuming an economy-wide upstream carbon charge on fossil fuels (Paris-aligned scenario), nearly 700 ambient air pollution-related deaths could be averted by 2030.[14] Achieving the NDC's commitment to reducing firewood consumption in households (indoor air pollution) by 39 percent by 2030 would yield a reduction of 1,500 premature deaths by 2030 and more than 11,000 deaths between 2022 and 2030. On the real economy side, the impact of structural transformation in response to decarbonization measures could be ambiguous in terms of disaster risk vulnerability. Still, a knowledge gap remains as to whether a move toward lower emissions activities would on average also reduce disaster risk.

In addition, mitigation efforts should consider the administrative and political costs of implementation. Although the CPAT tool shows a clear benefit of carbon pricing for the economy and climate, the design of this measure should consider the public appetite and political tolerance for reform, especially in the context of increasing fuel subsidies. Any pricing design for carbon should explore components to gain public support (for example, targeted transfers and a communications strategy to show the benefits and use of carbon pricing revenues). Other regulatory instruments that potentially reduce ambient air pollution and yield health co-benefits could be also considered. These instruments should provide the right incentives to decarbonize the economy and be designed along with complementary policies that are well aligned and integrated, both within the policy package and across the economy. Further, a deep and broad electricity sector reform addressing institutional, governance, operational, and regulatory and energy subsidy priorities, together with a program for energy conservation (energy efficiency), could incentivize more investment in renewable energy, help reduce consumption, and protect the most vulnerable. The implementation costs of such reforms constitute a knowledge gap for further research and analysis (see the Annex for more information on data gaps and methodological shortcomings).

To face current and expected impacts from natural hazards, long-term policy solutions need to increase the resilience of households and roll out an effective social protection agenda in a fiscally responsible manner. Scenario analysis suggests that future economic growth and investments in adaptation would not be enough to reduce poverty. Moreover, not all climate policies benefit poor households or have significant impacts on poverty; some mitigation policies could have adverse distributional effects. Preliminary estimates suggest that carbon pricing could result in consumption losses across the entire income distribution. Adaptation policies and investments should consider the higher and varying vulnerability of certain segments of the population, specifically women and the poor among others, and therefore embody progressive features. For example, policies targeted to vulnerable households, particularly transfers, would be needed to counteract income losses in the event of a natural hazard. Geographic targeting can help direct adaptation investments and transfers to municipalities that have a high risk of poverty and hazards. Furthermore, adaptation policies need to increase land tenure security, as well as access to reliant infrastructure and assets and to proper insurance in order to increase the resilience of households. An

[12] The Paris-Aligned scenario assumes an economywide upstream carbon charge on fossil fuels starting at US$5 per ton in 2020 and rising to US$9 in real terms by 2030.

[13] Local pollutants such as black carbon (BC), organic compounds (OC), ammonia (NH3), sulphur dioxide (SO_2), and non-methane volatile organic compounds (NMVOCs) are responsible for the formation of pollution from PM2.5—fine particulate matter that is less than 2.5 micrometers in diameter—and from ozone (O_3).

[14] A carbon price would reduce both GHGs and local pollutants—PM2.5, nitrogen oxides (NOx), SO_2, carbon dioxide (CO_2), NMVOC, BC, OC, methane (CH4), carbon monoxide (CO)—responsible for contributing to ambient PM2.5 and ambient ozone. However, the health impacts are attributed to the local pollutants, not to GHG emissions.

efficient (targeted), effective (adequate) and adaptive (responsive) social protection system is also needed to protect vulnerable households against the negative impacts of climate shocks. The design of the targeted transfer, its implementation, and its fiscal costs all need to be carefully considered.

Further strengthening the supervisory and regulatory environment of climate change mitigation targets and of efforts to enhance resilience, is important for bolstering the fiscal and financial sector's resilience in the face of physical and transition risks. Although authorities in Honduras have taken initial steps,[15] not much has yet been done to implement many of the evolving international good practices for integrating climate and environmental risks into the fiscal policy and prudential supervision of the financial sector, and for incentivizing the financial sector's contribution to greening the economy. Risk quantification is an essential step to implementing Honduras's DRF strategy because, as of mid-2022, no *ex-ante* financial instruments have been implemented. Strengthening the Honduran prudential supervision and capacity to address climate-related issues is crucial to enhancing the financial sector's role in managing these risks. In the short term, this includes improving current practices by creating *ex-ante* principles that guide loan restructuring and regulatory forbearance programs.

In the medium to long term, Honduras could work toward a more comprehensive DRF framework, which may, for example, include public DRF instruments as well as the development of private insurance markets. Additionally, better reporting and disclosure will further increase market transparency on climate-related risks, allowing financial actors to make better-informed investment and lending decisions that take climate considerations into account. Combined with targeted training programs, this will raise awareness throughout the financial sector about the potential risks and opportunities that climate change creates, encouraging institutions to better align their activities with climate goals.

A people-focused approach is needed in Honduras to ensure that policy protections and benefits reach the most vulnerable and excluded. Natural hazards disproportionally affect the most vulnerable, particularly IPADs, yet these groups are usually excluded from the policy-making process. A territory-based approach is warranted to understand the specific climate vulnerabilities of such excluded groups. To fill knowledge gaps on relatively understudied regions outside the Dry Corridor, this report looked in detail at overlapping vulnerabilities to climate impacts in the Atlantic Region among disadvantaged or vulnerable groups. The vulnerability of ethno-racial minorities in the Atlantic Region has three dimensions: a) socioeconomic vulnerability, b) spatial inequalities and climate threats, and c) low coping capacity. Even though they are vulnerable, however, IPADs have a critical role to play in delivering climate change reform.

To capitalize on this opportunity, Honduras needs to strengthen its local governments' ability to engage their citizens in understanding climate change and to empower communities to participate in resilience planning and locally led climate action. An inclusive and people-centered approach to climate policy, incorporating local governance and knowledge and livelihood diversification, would not only improve the effectiveness of climate policies but also help reduce the heightened effects of climate change on the most vulnerable. This approach needs to be supported by an inclusive institutional framework that establishes channels for active participation (such as meaningful consultations and the free, prior, and informed consent of indigenous peoples) and land recognition.

Water management for resilience. Water availability is high in Honduras, but it also comes with considerable geographical and temporal variability, and climate change is likely to put more water stress on highly populated regions that have vulnerable populations. There is great potential in the country to manage its water more effectively and use it efficiently. For this, more investments are needed to improve water governance and close the water-infrastructure gap.

Productivity and vulnerability challenges of the agriculture sector and deforestation. The agriculture sector's low productivity and low adaptability to climate events puts exports and the entire agrifood sector at risk, with an especially high burden on vulnerable households. Informal crop and livestock area expansion

[15] For example, the government of Honduras published its Strategy for Disaster Risk Finance Management in 2020, and the country's Financial Sector Supervisory Authority (part of the Comisión Nacional de Bancos y Seguros) enacted environmental, social and governance risk regulations in August 2020.

has been the main approach to increasing production, but this drives deforestation and increases net emissions. Honduras already has successful projects (for example, the Rural Competitiveness Project; COMRURAL) that increase the productivity and economic complexity of farms and agribusinesses through a cross-sectoral approach (including access to finance from private financial institutions). These projects should be expanded to increase the resilience of these groups and reduce deforestation. In addition, climate-smart agriculture (CSA) has the potential to support the reduction of emissions and increase the productivity of the sector, requiring spending in public goods and services, such as technical assistance.

Sustainable management of forests and ocean and marine landscapes. Honduras faces challenges in forest loss and reduced forest productivity. To manage these issues, significant efforts are needed to improve sustainable forest management, to detail the steps for the implementation of NDC commitments, and to develop information that could support the implementation of the forest-related commitments in the NDC to support these efforts. For its part, the planning of coastal and marine areas is fundamental to the economy and well-being of the country. Although coastal areas are mentioned in national policies, these policies require revision to add concrete components for a resilient and inclusive blue economy, which can support climate change resilience and a low-carbon path. Inclusion of local communities is key to ensuring correct planning and development gains.

Green, inclusive, and climate-resilient transport infrastructure. The transport sector has a key role to play in improving resilience and reducing emissions. Climate adaptations to rural roads would be highly beneficial, improving access to key services and working as a catalyzer of rural development, with a particular focus on IPAD communities. Estimates suggest that improving drainage on the flood-prone Atlantic coast and protecting targeted stretches of road against landslides in the rest of the country would cost less than US$1 billion over the 2022–2042 period, equivalent to 0.2 percent of Honduras's GDP annually, but it would bring savings of around US$50 million in repair costs per year. At the same time, as one of main carbon-emitting subsectors, transport has feasible pathways to decarbonize in the short term, with relatively low investment needs and large synergies with development goals. A combination of policies related to stricter emissions standards for new cars, the adoption of electric vehicles (EVs), bus rapid transit services in major cities, and cycling infrastructure could reduce sector emissions by around 17.8 percent by 2038, with significant co-benefits. These would be important areas in which to draw in private investments.

Green and resilient energy sector. In the energy sector, investment barriers for a resilient and low-carbon energy sector should be addressed to foster renewable energies. The energy sector is key to the development of the country and holds great synergic potential and development benefits through investments in renewable energies and the completion of planned megaprojects. Of particular benefit are hydroelectric dams that can support water management, resilience, and clean energy, while following good practices in social risk management and adequate prior consultations with IPAD and local communities. Other sources of off-grid renewable solutions, such as solar power, could also support the country's objective of improving energy access. However, a main priority is the need to fix the sector's current financial and technical unsustainability, particularly that of the National Company of Electrical Energy, by improving energy efficiency. This would open u fiscal space for investments and improve the competitiveness of the market to attract private sector investment. Without addressing the sustainability issues of the sector, mobilizing investments in renewable energy will be challenging, and the development benefits limited. At the same time, cost-effective energy efficiency measures can be implemented to support sustainability and reduce emissions.

Development and Policy Priorities

Given that climate change is expected to significantly impact the economy and vulnerable households and the synergic potential of low-carbon investments, this CCDR proposes that Honduras focus on six key policy areas as part of its climate change policy to ensure maximum development gains. The prioritization of these priorities and further detailing of policy actions are subject to quantification of the investment needs and further analysis of the impacts of climate change, the costs and benefits, and the policy impact. Hence, the numbering presented below does not imply prioritization.

Priority A: Ensure a robust institutional and policy framework and improved capacity for planning and implementation. Strengthening institutional capacity and planning sets the stage for the other priorities. Although the Honduran government has taken steps toward this, there is still work to do. It needs to align existing policy tools to the NDC commitments, incorporate climate policy instruments into agencies' strategic plans, develop financial strategies to budget the commitments (which is part of priority B, below), and complete pending plans such as the National Plan for Decarbonization. It is of utmost importance that data collection and the overall monitoring system be strengthened.

Priority B: Enact a proactive and strategic macrofiscal policy. The success of climate policy rests on the government's ability to align resources and incentives with climate objectives in a fiscally sustainable manner consistent with other development objectives. A macrofiscal policy that is more proactive toward the impacts of natural hazards should prioritize adaptation investment, with fiscal provisions to quickly finance additional expenditure for reconstruction, relief, and transfers to vulnerable populations affected by disasters. The Climate Change Finance Strategy and the implementation of the Disaster Risk Finance Management Strategy—including assessing the investment needs of the NDC's commitments and the liability costs of natural hazards, and integrating them in the medium-term budget planning—are important parts of the approach. The design of the fiscal strategy should be based on a careful prioritization across all development objectives, capacity constraints, and macroeconomic, fiscal, social, and environmental sustainability considerations. Quantifying the climate investment and financing needs for both adaptation and mitigation would allow the Honduran government to assess the financial challenges and the long-term fiscal sustainability, and guide the intersectoral prioritization or resource allocation.

Further analysis should be carried out to assess potential losses and contingent liabilities arising from the key economic sectors, particularly in the agriculture sector. Adaptation and mitigation should be focused on measures that have high potential co-benefits, such as alleviating poverty or enhancing development, and consider the public and political appetite. The introduction of a carbon tax could generate additional revenue that could help finance resilient development. Other measures that are not investment-based, such as strengthening public investment management for both adaptation and reconstruction, could enhance the effectiveness of the fiscal policy measures. Strengthening financial sector capacity in managing climate-related risks and resolving the issues in the electricity sector could help reduce fiscal risks, unlock fiscal space, and enhance fiscal resilience to climate change risks. Incentivizing private sector investment for climate action by enhancing access to green finance and strengthening investment management tools could support the climate change agenda.

Priority C: Ensure that the poorest and vulnerable are included and protected. Systems and policies for social inclusion and protection will help reduce the socially differentiated impacts of climate change and improve the effectiveness of climate policy. Umbrella policies would set the stage across sectors for inclusive policy, including adequate mechanisms to ensure the visibility and participation of vulnerable groups, particularly IPADs. Following this, policies should be implemented that do the following:

» Improve land security and cultural endowments;

» Invest in livelihood diversification and ensure a just and equitable transition to adaptation policies and measures in the LULUCF sector that avoid negative impacts on the most marginalized (for example, restrictions to areas that are becoming protected and that can cause livelihoods restrictions);

» Promote and recognize the importance of locally led investments and geographically targeted territory-based development; and

» Ensure that adaptation policies and investments have progressive features, and that policies that are needed to counteract income losses in the event of a natural hazard are targeted to vulnerable households, particularly transfers, including through the strengthening of an adaptive social protection system.

Priority D: Promote agriculture productivity and resilience and sustainable landscape practices with a cross-sectoral and territory-based approach. This priority aims to build resilience amid climate change impacts in the agriculture, water, and forestry sectors that will disproportionally impact the most vulnerable. At the same time, this policy priority should provide opportunities to create synergies between adaptation and mitigation measures in the agriculture, LULUCF, water, and energy sectors. Specific policies might include promoting CSA practices; refocusing existing subsidies to support farmers or specific businesses in order to produce positive environmental and social externalities; increasing capacities; improving research and information systems; improving water efficiency through resilient infrastructure that allows for increased water storage and irrigation; and strengthening the management of forest ecosystems.

Priority E: Work toward low-carbon and climate-resilient transport systems. The transport sector holds opportunities for both adaptation and mitigation actions that would achieve significant development benefits. Specific policies include increasing the resilience of rural roads, adopting the avoid-shift-improve framework to define low-carbon development pathways, developing policies to regulate emission standards for new vehicles, strengthening the policy and regulatory framework for EVs, and accelerating investment in urban transport infrastructure.

Priority F: Improve the sustainability of electricity generation and generate investment in hydropower and energy efficiency. A priority is to address sustainability challenges in the electricity sector, which would allow for investment in renewable sources of energy that have synergy potential, such as dam-based hydropower that can also support water storage and irrigation and protect against flooding. The government already has hydroelectric projects in the pipeline and should continue strengthening its social risk management capacity as well as its framework to ensure adequate consultations with local communities and IPADs. Reducing technical electricity losses would also allow for the increased impact of needed policies in energy efficiency. Energy efficiency measures could be a cost-effective strategy to start the needed changes in the sector, particularly those that reference public buildings, street lighting, and utilities.

Sequencing activities will be important for developing a strategic approach to enhancing climate action. All the priorities and policies outlined in this CCDR require a broad institutional framework and implementation capacity for them to become a reality. To optimize the capacities and resources available in Honduras, the CCDR recommends focusing on a parallel approach of a) cross-sectoral recommendations in the short term that allow for the creation of an enabling environment for sectoral recommendations in the long term and long term, while b) accelerating policy reforms and investments through a phased approach for priority sectors. This phased approach to sectoral action would help the country gradually enhance ambition while also harnessing the enhanced institutional capacities and increased enabling environment.

1. Climate-Related Risks and Opportunities for Development

Main messages

- Honduras's key medium and long-term development plans, such as the 2010–2038 Country Vision and the Plan for Reconstruction and Sustainable Development, emphasize the importance of reducing poverty and improving competitiveness while fostering climate change action and sustainable development.
- Honduras is highly vulnerable to extreme natural hazards, which are expected to increase because of climate change. These will have significant consequences for all of Honduran society, affecting important economic sectors and threatening food and water security and human health.
- The impacts of climate change are expected to disproportionately affect the poorest and most vulnerable, such as indigenous peoples and afro-descendants (IPADs) and women. These impacts will likely compound existing challenges such as migration, internal displacement, and land conflicts and insecurity.
- Even though Honduras's contribution to global emissions is significantly low, the country has opportunities to pursue low-carbon development that will create co-benefits and foster synergies with climate change adaptation, particularly in the agriculture, water, forestry, energy, and transport sectors.

1.1. Context and Development Priorities

Over the past 30 years, Honduras has experienced modest economic growth, but its high vulnerability to shocks and chronic challenges has not allowed it to sustain economic gains or significantly reduce poverty and social exclusion. Honduras is Central America's second-largest country, with a population of more than 10 million, a land area of about 112,000 square kilometers, and enormous productive resources. Advances in economic diversification, the creation of free-trade and export-processing zones, the development of the industrial sector, trade liberalization policies, and significant investment flows have supported the expansion of the tradable sector and accelerated job creation.[16] Moreover, increasing levels of remittance inflows (24 percent of gross domestic product (GDP) in 2020) have supported consumption, a key contributor to growth. Honduras's real GDP growth has averaged 3.8 percent a year over the past three decades. Although this exceeds the Latin America and Caribbean regional average of 2.6 percent and is on par with the Central American average of 3.9 percent, it is lower than the growth rates of Honduras's structural (4.0 percent) and aspirational (5.0 percent) peers.[17] The small, open, largely agricultural, and predominantly informal economy is sensitive to a wide range of shocks that have constrained its growth. High vulnerability to external shocks and exposure to natural hazards, combined with crime and violence, political instability, and a weak institutional and business environment, have inhibited structural transformation, job creation, and productivity growth. In turn, this has undermined the country's competitiveness, propelled out-migration, and slowed progress toward raising incomes, reducing poverty, and tackling exclusion.[18]

[16] International Finance Corporation (IFC), Creating Markets in Honduras: Fostering Private Sector Development for a Resilient and Inclusive Economy, Country Private Sector Diagnostic (Washington, DC: IFC, 2022).

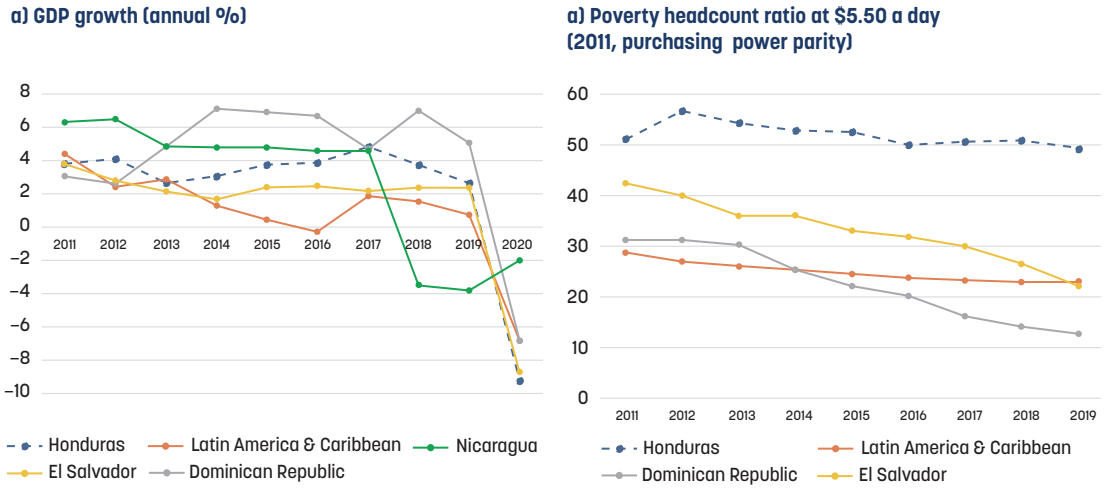
[17] Central Bank of Honduras; World Development Index; and World Bank staff calculations, March 2020. Structural peers include Nicaragua, El Salvador, Lao People's Republic, and Senegal. Aspirational peers include Benin, Cambodia, Dominican Republic, and the Philippines.

[18] For more information about the underlying development diagnostic, see Marco Antonio Hernandez Ore, Liliana D. Sousa, and J. Humberto Lopez, Honduras: Unlocking Economic Potential for Greater Opportunities, Systematic Country Diagnostic (Washington, DC: World Bank Group, 2015); and World Bank, Honduras: Paths toward Building a Resilient Society—Systematic Country Diagnostic Update, (Washington, DC: World Bank Group, 2022).

Honduras is one of the poorest and most unequal countries in Latin America and the Caribbean, its middle class remains one of the smallest in the region, and its poverty reduction lags other Central American countries. Honduras's average income has diverged further still from those of the advanced economies. In 1960, for example, Honduras's real GDP per capita was 6.3 percent that of the US, but by 2019 it had fallen to 4.0 percent. On average, almost one in six Hondurans has lived on less than US$1.90 per day over the past two decades—the second-highest international poverty rate in the Latin America and the Caribbean Region after Haiti. In 2019, almost half the population (4.8 million people) lived on less than US$5.50 per day, and an estimated 14.8 percent, or about 1.5 million people, lived in extreme poverty (figure 1.1).

Income inequality in Honduras has declined since 2005, but it remains among the highest in the world. Honduras faces low levels of economic and social inclusion, and lower-income households continue to be more vulnerable to shocks than other Hondurans. Honduras faces entrenched inequalities, and some groups therefore bear disproportional impacts of natural and external shocks. Poverty is most common among the rural populations (58 percent of them live in poverty), particularly within indigenous populations and in the southwestern area of the Corredor Seco (the Dry Corridor[19]), where 91.4 percent are poor. About 80 percent of poor households rely for income on agriculture, a sector that employs more than 30 percent of the country's population but is characterized by low productivity and high risk of impacts from climate change and natural hazards.

FIGURE 1.1. GDP Growth and Poverty Headcount Ratio



Source: World Development Indicators
Note: Nicaragua is not shown in panel b as it had only one year of poverty data.

The impacts of the COVID-19 pandemic and hurricanes Eta and Iota in 2020 exacerbated existing economic and social challenges, with particular impacts on areas with high concentrations of Indigenous peoples and Afro-descendants (IPADs). In addition to the coronavirus pandemic and the corresponding lockdowns, two back-to-back category-4 hurricanes brought heavy rains and severe flooding that affected 4.7 million people (48 percent of the population). The social and economic costs were estimated at US$1.8 billion (7.5 percent of 2020 GDP), with severe damage to key infrastructure, land, and crops. Real GDP contracted by a record 9 percent in 2020, with output contracting across nearly all sectors due to a sharp fall in trade, investment, and consumption amid the global recession, lockdown effects, and damage caused by the cyclones. Poverty (US$5.50 line) is estimated to have increased by 6.4 percentage points in 2020 and remains above the level in 2021. A full recovery from the two cyclones could take years. Failing to effectively address the socioeconomic shocks unleashed by the crises could reduce long-term productivity, slow income growth, and strain social cohesion.[20]

[19] Located in the southwest along the Pacific coast and covering 20,000 square kilometers, the Dry Corridor encompasses five water basins (Sampile, Choluteca, Nacaome, Lempa, and Goascorán), all of which are increasingly vulnerable to severe weather instability and climate shocks. This region is part of Central America's Dry Corridor, known for its variable precipitation patterns and increasingly unstable weather regime.

[20] Foro Social de la Deuda Externa y Desarrollo de Honduras (FOSDEH), or Social Forum on Foreign Debt and Development of Honduras.

The government of Honduras has outlined the country's development priorities in its 2010–2038 Country Vision, emphasizing poverty reduction and improving competitiveness. Honduras's Country Vision structures the country's development plans around four main objectives and sets the foundation for every plan and strategy of the government, including climate change policies. These objectives highlight poverty reduction, social welfare and human development, security and democracy, sustainable productive development and job creation, and improved state capacity and transparency.[21] Further details are provided in the appendix (section A.1).

In response to the twin crises of 2020—COVID and two back-to-back hurricanes—the government of Honduras created its Plan for Reconstruction and Sustainable Development (PRDS), which shows how government plans can be aligned with climate change action, sustainable development, and risk management. The PRDS aims to rebuild productive assets and infrastructure, strengthen the economy's sustainability and resilience to natural hazards, and expand social protection programs. This plan is also seen as a complementary medium-term instrument to help achieve the objectives of the Country Vision. The plan prioritizes four strategic areas: i) Development and Social Welfare, ii) Empowerment and Transformation of Productive Sectors, iii) Infrastructure Modernization and Resilience, and iv) Environmental, Risk Management and Climate Change Framework. The inclusive approach of this plan is also incorporated in its cross-cutting principles: food security, decentralization, gender equality, human rights, and the inclusion of women, the poor, migrants, and IPADs in social protection arrangements, governance processes, and national discussions. The PRDS highlights the main sectors and populations that natural hazards and climate change are expected to affect and how attending to these risks can support the development of Honduras.

The following sections outline the main adaptation and mitigation risks and opportunities to the country, which will be further explored with analytical contributions in chapters 3 and 4.

1.2. Climate Change and Natural Hazard Risks and Development Opportunities

Historically, Honduras has been highly exposed to extreme natural hazards,[22] and this has posed persistent challenges to the achievement of the country's economic and social development objectives. Honduras's recent history shows a close interplay between socioeconomic development, environment, and natural hazards, both extreme and slow-onset events. Perhaps the clearest examples of this are the devastating economic and human impacts of hurricanes and their corresponding floods (see figure 1.2). In 1998, Hurricane Mitch, the worst disaster in the country's recent history, generated economic damage estimated between 59.6 and 70 percent of annual GDP,[23] significantly setting back Honduras's development process and poverty reduction efforts. In 2020, losses and damage from hurricanes Eta and Iota totaled US$1.8 billion dollars (approximately 7.5 percent of 2019 GDP).[24] The agriculture sector suffered heavily, with some sources reporting 72 percent of cropped area affected.[25] Food insecurity virtually doubled—from 1.8 million people before 2020 to 3.3 million in October 2021.

[21] Particularly Objective 3: "A productive Honduras, which creates opportunities and worthy jobs, harnessing its resources in a sustainable fashion and reducing the vulnerability of the environment, shows the most direct focus on climate change and environmental policies. This objective includes seven national priority targets seeking to reduce unemployment, increase exports of goods and services, increase irrigation to meet national food demand, improve water management, increase renewable energy, restore forest landscapes, and reduce climate risk."

[22] Natural hazards include geological events. Although Honduras has remained largely unaffected by the frequent earthquakes and volcanic activity that have beset other Central American countries, in 2009, a magnitude 7.1 earthquake killed seven people and caused estimated losses of US$100 million, including US$35 million in damage to infrastructure. (See World Bank, Disaster Risk Management in Central America: Global Facility for Disaster Reduction and Recovery GFDRR Country Notes, Honduras, (Washington, DC: World Bank Group, 2010), http://web.worldbank.org/archive/website01539/WEB/IMAGES/GFDRR_HO.PDF.)

[23] Estimates vary among sources, ranging between 59.6 percent to 70 percent (see CEPAL, 1999 EM-DAT, CRED/UCLouvain, Brussels, Belgium – www.emdat.be; and Economic Commission for Latin America (ECLA, or CEPAL in Spanish) – https://www.cepal.org/en-).

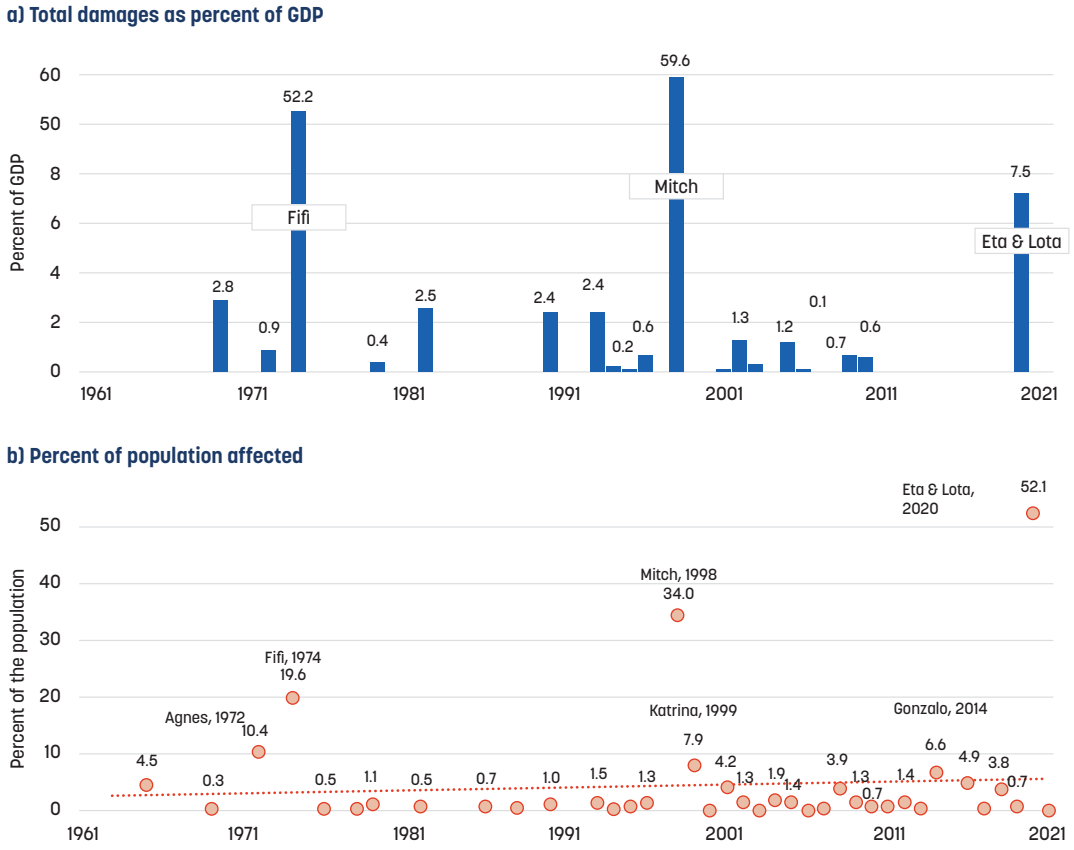
[24] EM-DAT, CRED/UCLouvain, Brussels, Belgium – www.emdat.be; Centre for Research on the Epidemiology of Disasters (CRED)/ UCLouvain; Honduras Central Bank.

[25] IDB and ECLAC, "Evaluation of the Effects and Impacts Caused by Tropical Storm Eta and Hurricane Iota in Honduras," internal report (Washington, DC: World Bank, 2021).

Between 1919 and 2012, floods were the natural hazard that caused the greatest economic loss in Honduras (48.5 percent of total losses due to natural phenomena), followed by droughts (34.1),26 with some areas harder hit than others (figure 1.3). For example, people living in the Dry Corridor, where between 60 and 70 percent of the population depends on agriculture and other natural resources for their livelihoods, are particularly vulnerable to constant droughts, and most of the territory of the Atlantic coast, such as the Sula Valley, is vulnerable to flooding, affecting the crop yields and food security of poor agriculture-dependent households.[27]

In this sense, Honduras consistently ranks among the countries most vulnerable to natural hazards. In 2019, the Global Climate Risk Index[28] classified Honduras as the second country most severely affected by extreme weather events in the 1998–2017 period,[29] with annual average losses equivalent to 1.8 percent of GDP,[30] affecting critical sectors such as transportation, telecommunications, health, education, water, and sanitation.

FIGURE 1.2. Natural Hazards



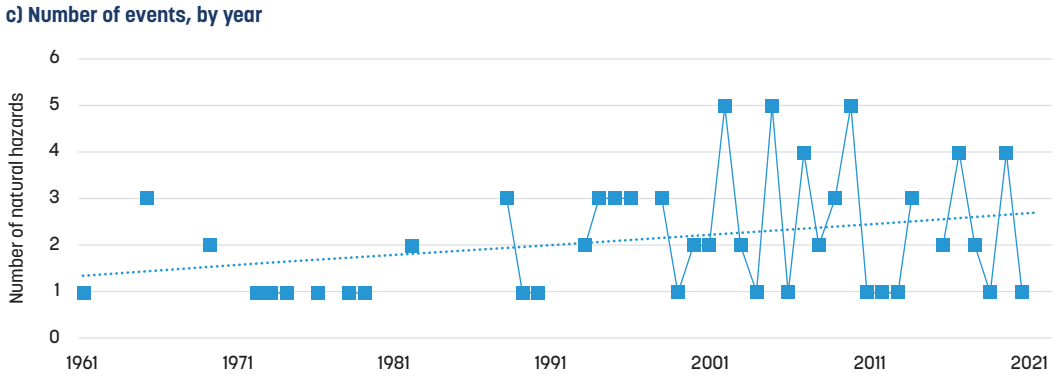
[26] Permanent Contingency Commission of Honduras (COPECO), Coordination Center for the Prevention of Disasters in Central America and the Dominican Republic (CEPREDENAC), and United Nations Office for Disaster Risk Reduction (UNISDR), Honduras National Report on Comprehensive Disaster Risk Management, https://www.sefin.gob.hn/download_file.php?download_file=/wp-content/uploads/2021/02/Honduras-Disaster-Risk-Finance-Management-Strategy-2020.pdf.

[27] World Bank, Honduras – Paths Toward Building a Resilient Society: Systematic Country Diagnostic (Washington DC: World Bank Group, 2022), https://openknowledge.worldbank.org/handle/10986/37081.

[28] David Eckstein, Marie-Lena Hutfils, and Maik Winges, "Global Climate Risk Index 2019: Who Suffers Most from Extreme Weather Events? Weather-Related Loss Events in 2017 and 1998 to 2017," Germanwatch.

[29] In 2020 and 2021, Honduras's positional rank in the Commitment to Reducing Inequality index was at 42 and 44, respectively. Alternative sources such as the EM-DAT, CRED/UCLouvain database that account for longer timeframes, including hurricanes like Fifi (1974), have estimates of annual losses closer to 5.6 percent of GDP.

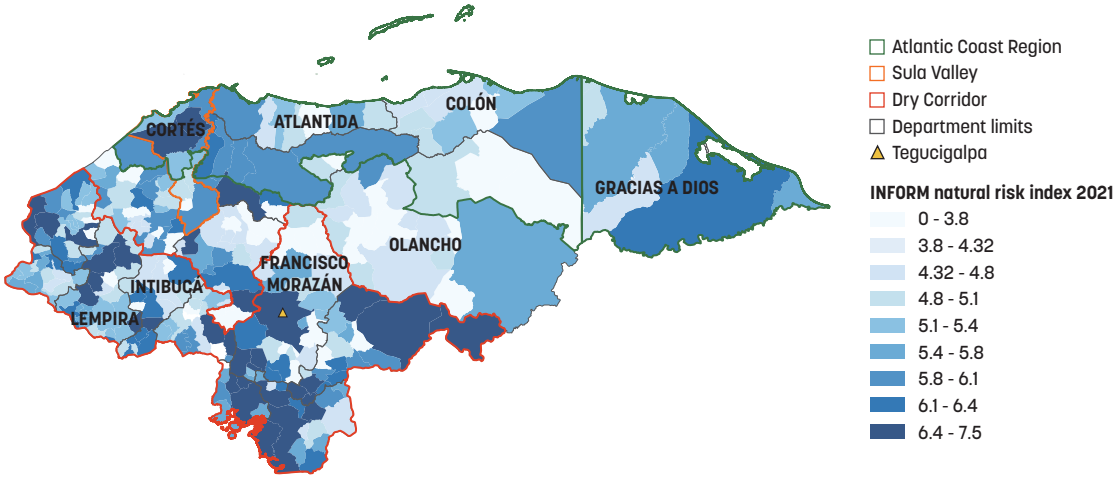
[30] It should be noted that certain events, like Hurricane Mitch, on their own represent significantly large losses that pull the average up.



Source: International Disaster Database (EM-DAT), Centre for Research on the Epidemiology of Disasters (CRED) / UCLouvain; Honduras's Central Bank
Note: Natural hazards include droughts, floods, storms, and earthquakes (2009). Data are unavailable for some of the recent years, especially for damage. GDP = gross domestic product.

Climate change is expected to intensify the country's vulnerability, specifically through the rise in mean temperatures, sea-level rise, and the increasing intensity of extreme weather events, highlighting the need for enhanced resilience and adaptation. As figure 1.2, panel c shows, in the last few decades there has been a general increasing trend in the number of natural hazards. According to the World Bank Climate Change Knowledge Portal, under a high-emissions scenario—Representative Concentration Pathway (RCP) 8.5[31]—Honduras's mean annual temperature is projected to rise by 1.8°C by 2050, and by 3°C to 5.6°C by the end of the century.[32] Starting in the 2050s, the number of days with a heat index above 35°C is expected to increase sharply, with the largest increase occurring in the months between July and September, with around 5.6 more days in September, and focused most intensely in the southern regions of the country. In the northeast, climate change is expected to bring more prolonged, intense heat waves and drought, and an increase in rapid, heavy rainfall events and flooding. By the 2050s and through to the end of the century, annual precipitation is likely to decrease, with the most notable reductions occurring in states such as Colón, Olancho, and Yoro during the months between June and September. By the 2050s, coastal Honduras is likely to experience sea-level rise of around 20 to 30 centimeters (against the mean value of 1986–2005), with larger increases on the Atlantic coast.

FIGURE 1.3. INFORM Natural Risk Index 2021 and Locations of Interest



Source: INFORM 2021
Note: A higher value on the index represents greater risk and exposure to natural hazards, including earthquakes, floods, cyclones, and tidal waves, landslides, droughts, wildfires, and environment degradation by forest pests. Bolded uppercase words are names of departments mentioned in the Country Climate and Development Report (CCDR). Colored outlines are relevant regions mentioned in the CCDR.

[31] While long-term GHG emissions rates in the RCP 8.5 are considered overly pessimistic, the Coupled Model Intercomparison Project Phase 5 (CMIP5) climate change scenarios, used together with RCP 8.5, provide useful, and not implausible, high-warming scenarios, which would be consistent with continued GHG emissions and high climate change sensitivity or positive feedback from the carbon cycle.

[32] Climate Change Knowledge Portal of the World Bank. The base temperature used was 23.99°C.

The agriculture sector is expected to suffer reductions in productivity from climate change, which will affect some of the most vulnerable and poor households. Droughts, floods, and rainfall variability have contributed to reduced food availability and increased food prices in Central America, disproportionally affecting poor areas.[33] Under a high-emissions scenario (RCP 8.5), four of the five crops with the greatest harvested area in Honduras—maize, coffee, beans, and sugarcane[34]—are expected to be affected,[35] with near-term losses that will only increase over time. By 2050, projections show a reduction of 37 percent in yields of rainfed sugarcane, 30 percent of irrigated sugarcane, and 21–26 percent of coffee. These are also Honduras's highest value agricultural commodities. Coffee alone accounted for 54 percent of total agricultural exports in 2021 and provides income for more than a million Hondurans.

Maize and beans, produced mostly by the subsistence sector, are expected to fall in yield by 12 percent and just under 10 percent, respectively (as are other subsistence sector crops). Although these impacts are smaller than for the cash crops, they are still sizable and could represent significant impacts on poor households in the subsistence sector, which represents more than 70 percent of agriculture families.[36] Decreases and instability of crop production, in turn, are expected to affect food security, labor markets, the supply and prices of basic goods, and internal and international migration, especially among rural populations of women, youth, and IPADs. Livestock systems are also susceptible to damage and losses from weather-induced changes in the availability of forage and feeds, changes in the availability of water, and increases in the incidence and severity of diseases. The agriculture sector will also be indirectly affected by substantial impacts of climate change on transport, power generation, and ecosystems, all of which are critical to the productivity of agriculture.

Sustainably managing water resources will be critical for improving agricultural productivity, sustaining basic services such as sanitation, maintaining food security, keeping water-dependent jobs open, and ensuring a continued supply of renewable hydroelectric power. A total of 71.6 percent of exports, 33 percent of electricity generation, and 47.9 percent of jobs are water-dependent in Honduras, one of the Central American countries most affected by drought.[37] The geographical and temporal variability of water resources—exacerbated by high levels of contamination, a lack of hydraulic infrastructure, and inefficient water usage in key sectors—is already compromising water security, and climate change is expected to worsen these issues. Reduced river flows and groundwater recharge, saltwater intrusion, water shortages, increased runoff, erosion, and reduced water quality are all projected to have significant impacts on many water users. Changes in temperature, precipitation, and the intensity of natural hazards resulting from climate change will likely also affect the already stressed power sector, reducing hydropower generation.

Forests and marine and coastal ecosystems are expected to experience climate change effects with direct impacts to livelihoods. Climate change also threatens critical ecosystems such as mangroves, coral reefs, forests, and fisheries, all of which are important to livelihoods and tourism. Threats to forests mediated by climate change include increased wildfires and pine beetle attacks. Impacts on agricultural productivity also contribute to deforestation, as farmers need to expand crop areas to make up for lost production and decreasing productivity. Expected impacts from climate change on coastal and marine ecosystems include changes in fish stock behavior, migration of marine species away from Honduras to colder waters, a decrease in coral abundance and mangrove productivity, and an increase in coral bleaching events. Storms, hurricanes, and other extreme events destroy or modify the dynamics of coastal and marine ecosystems and the infrastructure built by the communities around the coast, which increases vulnerability and reduces income from economic activities.[38]

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[33] IPCC, Climate Change 2022.

[34] Palm oil is not expected to be significantly affected. See Arie Sanders, Timothy S. Thomas, Ana R. Rios, and Shahnila Dunston, Climate Change, Agriculture, and Adaptation Options for Honduras, IFPRI Discussion Paper 01827 (Washington DC: International Food Policy Research Institute, 2019).

[35] Sanders et al. "Climate Change, Agriculture, and Adaptation."

[36] Government of Honduras, National Climate Change Adaptation Strategy in the Agriculture Sector 2014–2024, 2014.

[37] Andrés C. Ravelo, Ana M. Planchuelo, Roberto Aroche, José C. Douriet Cárdenas, Michelle Hallack Alegría, Renato Jimenez, Héctor Maureira, et al., Monitoreo y Evaluación de las Sequías en América Central, technical report (Brussels: Joint Research Centre, the European Commission, 2016).

[38] "Agriculture, Forests and Oceans," a World Bank deep dives internal study.

Recent natural hazards have highlighted the vulnerability of infrastructure and transport services to climate events. Every year, Honduran firms lose US$400 million (1.81 percent of GDP) due to infrastructure disruptions, the majority of which are due to transport and power disruptions.[39] More than 60 percent of the transport network is exposed to natural hazards, with floods and landslides being the main sources, entailing severe impacts on connectivity and the accessibility of rural areas. Projections suggest that disruptions are expected to increase, with greater numbers of the rural population more frequently losing access to critical services and markets during natural hazards, particularly IPADs in the eastern region. For example, it is expected that, by 2064, more frequent floods and landslides will increase the proportion of the population that lose total access to a hospital by 2.2 percentage points.[40] Additionally, the vulnerability of the physical infrastructure is increased by the relative absence of climate considerations in the construction code and the weak application and enforcement of the code.[41]

Climate change is expected to significantly impact human health. This will occur through food and water shortages, injuries, and illness caused by severe weather events such as floods, heatwaves, and drought, as well as changes in disease patterns as a result of the changing climate. Identified vulnerabilities in the agriculture and water sectors will contribute to an increase of malnutrition and diarrheic diseases, affecting particularly infants and young children in the most vulnerable areas. The prevalence of vector and water-borne diseases is expected to increase because of rising temperatures and changes in precipitation patterns. Vector-borne diseases—such as dengue, which is already endemic to Honduras—will expand both their geographical and seasonal ranges, and malaria could reemerge. Higher-altitude regions of Honduras, such as the central region, are expected to experience increases of an additional about 1.6 climatically suitable months for malaria transmission and 4.0 months for dengue transmission.

There is also the potential for increased risk of vector-borne disease during periods of water shortage or disasters caused by natural hazards. The incidence of water-borne diseases is also expected to increase because of extreme precipitation resulting in flooded water sources, and because of droughts leading to increased disease transmission through exposed water stored in containers. The effects of climate change on health could also have impacts on future learning and earnings.

The impacts of climate change are expected to disproportionately affect the poorest and most vulnerable, such as IPADs and women.[42] In Honduras, IPADs and smallholder farmers dependent on subsistence agriculture face aggregated risks and are particularly vulnerable to climate change. This vulnerability is related to their small land holdings, land tenure insecurity, attachment to place, and reliance on a narrow resource base for their livelihoods. In addition, their resilience is constrained by factors including limited access to technical assistance, lack of capital for implementing adaptation strategies, and limitations to livelihood diversification due to low education levels. Also, natural hazards may disproportionally affect women. For instance, in the wake of a major disaster in a developing country, it often falls on women farmers to shoulder the heavier part of the increased domestic responsibilities and burdens that the disaster brings—from cleanup, to caring for the injured, to cooking with fewer resources—typically at the cost of missing out on other income-generating activities. Additionally, their assets are less protected than men's due to their limited access to bank accounts and lower land tenure holdings.[43] At the same time, women have lower representation and participation on local disaster management committees, meaning that the committee decisions reflect less of the priorities, positions, and perspectives that women would have brought. Lack of representation and power in decision-making spaces also influences the potential impacts that policies of mitigation and adaption might have on IPADs, particularly in a poverty-stricken country such as Honduras.

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[39] Stéphane Hallegatte, Jun Rentschler, and Julie Rozenberg, Lifelines: The Resilient Infrastructure Opportunity (Washington, DC: World Bank Group, 2019) https://openknowledge.worldbank.org/handle/10986/31805.

[40] Transport deep dive for the CCDR internal study. Modeling used both SSP 245 and 585.

[41] Government of Honduras, National Adaptation Plan (2018).

[42] Indigenous peoples and Afro-descendants are the groups most severely affected by poverty and social exclusion in Honduras. While these groups account for an estimated 8.6 percent of the national population, rough estimates from indigenous organizations indicate that more than 70 percent live in poverty and over half are unemployed. A lack of information from household surveys has translated into a lack of official estimates of poverty rates among these groups.

[43] Alvina Erman, Sophie Anne De Vries Robbe, Stephan Fabian Thies, Kayenat Kabir, Mirai Mauro, Gender Dimensions of Disaster Risk and Resilience: Existing Evidence (Washington, DC: World Bank Group, 2021).

The differentiated impacts to these groups are also expected to further foster other issues, such as out-migration and internal displacement,[44] together with land conflicts and insecurity. Between 2000 and 2020, the number of Honduran international emigrants doubled, with the first large wave triggered by Hurricane Mitch in 1998 after it disrupted millions of livelihoods. Since 2007, the emigrational trend has accelerated, growing faster than comparable countries such as El Salvador and Guatemala. Internally, climate change impacts are expected to force between 40,600 and 56,400 people to move within Honduras by 2050.[45] This is in addition to the 247,000 internally displaced persons (IDPs) currently living in Honduras, the second-highest in the Latin America and the Caribbean Region after Colombia.

Further, in areas where homicides rates are high (above 26 per 100,000 people), families affected by natural events are more prone to leave their country entirely because safe, viable places for internal migration, also referred to as displacement, are perceived as lacking.[46] Rapid-onset events such as floods tend to have temporary effects on migration, while slower-onset events such as droughts and erosion, especially affecting harvest and livestock, can have permanent effects.[47]

Migration pressures also tend to fall more heavily on the most vulnerable. The share of vulnerable migrants as a percentage of the total migrant stock is particularly high in Honduras (27 percent), ranking among the highest in the world.[48] Honduras is also the only Central American country with a gender disparity in its migrant population (59.2 percent female in 2020).[49] Land is likely to become an even more scarce resource and land disputes could increase due to expected climate-led impacts, such as the loss of productivity of agricultural land, high deforestation rates, and permanent loss of lands near coastlines due to flooding or saltwater intrusion from sea-level rise.

Despite these challenges, IPADs have a critical role to play in ensuring that the country can fulfill its climate change commitments. These groups have developed grassroots coping capacities that can be strengthened and scaled up. Examples include environmental and conservation practices based on traditional knowledge—as in the case of the biodiversity conservation knowledge and practices that the Tawahka indigenous peoples on the Atlantic coast of Honduras have acquired over many centuries. These groups have also developed support networks—such as grassroots organizations, remittance schemes, and collaboration mechanism as in the case of Local Emergency Committees (CODELs, in Spanish)[50]—that can enhance the resilience of IPADs to climate change-related shocks.

Moreover, Honduras's bank-dominated financial sector is exposed to climate-related risks. Climate-related financial risks arise from natural hazards and climate change (physical risks), leading to economic costs and financial losses. They can also arise from the economic adjustment costs associated with the transition toward a greener, more carbon-neutral economy (transition risks), which can negatively impact the value of assets. A total of 30 percent of the banking sector's credit portfolio to nonfinancial corporations have a high hazard mapping to hurricanes or floods, and around 29 percent of banks' credit portfolio are tilted toward transition-sensitive industries, making it vulnerable to a disorderly adjustment during the transition toward a greener, more carbon-neutral economy.

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[44] Quentin Wondon, Andrea Liverani, George Joseph, and Nathalie Bougnoux, Climate Change and Migration: Evidence from the Middle East and North Africa (Washington, DC: World Bank Group, 2014), https://openknowledge.worldbank.org/handle/10986/18929; and B. Šedová, L. Čizmaziová, and A. Cook, A Meta-Analysis of Climate Migration Literature, CEPA Discussion Papers 29 no. 83 (2021), https://publishup.uni-potsdam.de/frontdoor/index/index/docId/49982.

[45] World Bank staff calculations based on data from the City University of New York (CUNY) Institute for Demographic Research (CIDR), Center for International Earth Science Information Network (CIESIN), Columbia University, and the World Bank. Groundswell Spatial Population and Internal Migration Projections at One-Eighth Degree According to SSPs and RCPs, 2010–2050 (data set).

[46] S. Bermeo and D. Leblang, Honduras Migration: Climate Change, Violence, & Assistance, policy paper, (Durham, North Carolina: Duke Stanford Center for International Development, 2021), https://dcid.sanford.duke.edu/wp-content/uploads/sites/7/2021/03/Honduras-Migration-Policy-Brief-Final.pdf.

[47] Wondon et. al., Climate Change and Migration.

[48] Vulnerable migrants refers to refugees, asylum seekers, and internally displaced persons (IDPs). Using information from the United Nations Department of Economic and Social Affairs (UN-DESA), United Nations High Commissioner for Refugees (UNHCR), and World Bank data, the global average of the share of vulnerable migrants is largely driven by countries such as Colombia, at 269 percent when accounting for IDPs, and 12 percent when accounting for refugees and asylum seekers only) and Afghanistan (at 76 percent when accounting for IDPs and 54 percent without IDPs). When excluding outliers, the global average is 13 percent.

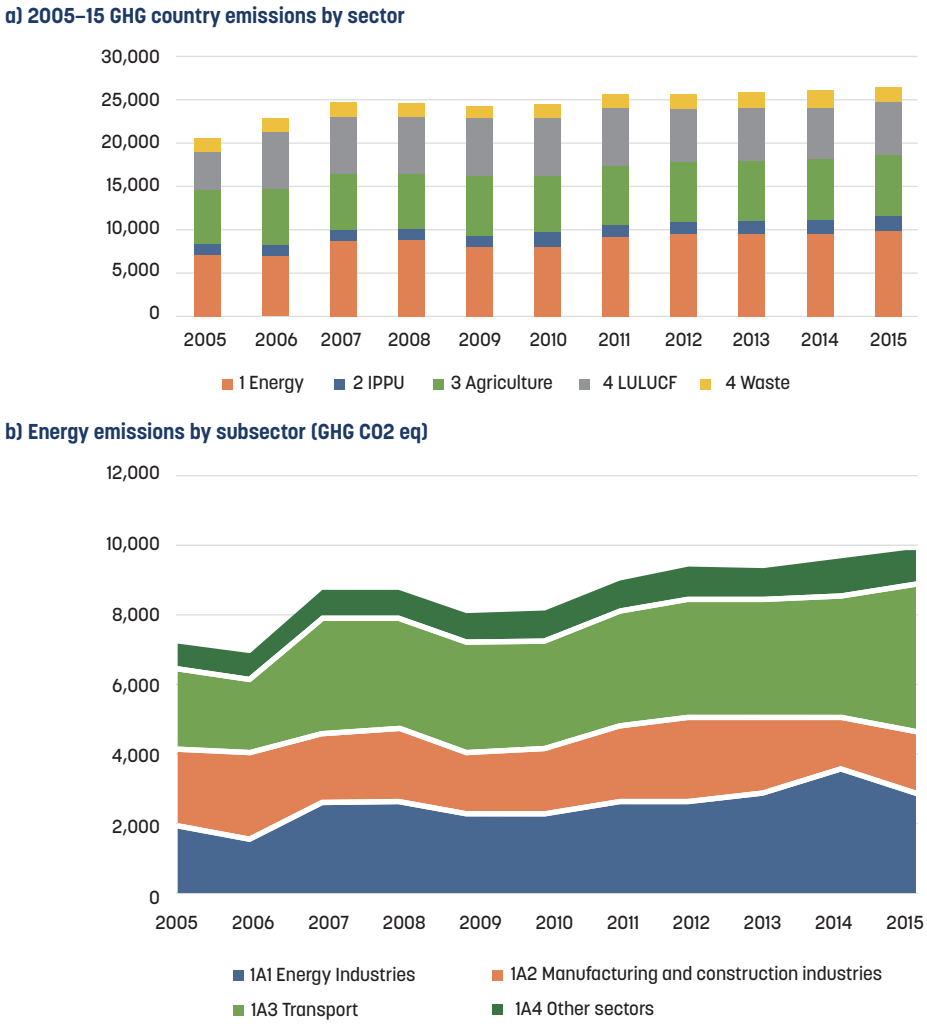
[49] United Nations Department of Economic and Social Affairs (UN-DESA), 1990–2020.

[50] Local Emergency Committees, or CODELs, have a growing role as the preeminent disaster risk reference agencies for community members, largely because they are constituted by local residents and are in charge of producing disaster risk management policy at the community level. In the Atlantic Region, CODELs are often the leading authorities in the absence of other state or municipal actors that lead such policy.

1.3. Risks and Opportunities for a Synergic Low-Carbon Growth Path

Honduras contributes 0.06 percent of global emissions.[51] According to the World Resources Institute's CAIT Climate Data Explorer, total emissions per capita in 2019 were estimated at 2.9 tCO_2-eq/capita (tons of carbon-dioxide-equivalent per person), significantly lower than the world average of 6.5 tCO_2-eq/capita and the average in the Latin America and the Caribbean Region of 6.3 tCO_2-eq/capita. According to updated estimations of the National Greenhouse Gas (GHG) Inventory used for the Nationally Determined Contribution (NDC) update,[52] emissions in 2015 were mainly generated in the energy sector (38 percent), followed by agriculture (26 percent), then land use, land use change and forestry (LULUCF, 22 percent), industrial processes and product use (IPPU, 7 percent), and waste (7 percent). The emissions from the energy sector consisted of road transportation (42 percent), electricity production and heat (31 percent), manufacturing and construction industries (16 percent), and other sectors (11 percent).[53] More than half of agriculture emissions in 2015 (66 percent) were derived from livestock, in particular digestive processes (enteric fermentation).[54] See figure 1.4.

FIGURE 1.4. Honduras Greenhouse Gas Emissions



Source: Government of Honduras (2020). National GHG inventory in the updated NDC
Note: CO_2 eq = carbon dioxide equivalent; GHG = greenhouse gas. IPPU = industrial processes and product use; LULUCF = land use, land use change, and forestry.
Note 2: Codes next to each sector refer to the IPCC categories for GHG emissions sources, 1 refers to the Energy sector and subsequent characters indicate the subsector. 1A1 = Energy Industries, 1A2 = Manufacturing and construction industries, 1A3= Transport, 1A4 = Other sectors.

[51] Share of global emissions in 2018: 0.06 percent = 28.13 $MtCO_2$eq/48,940 $MtCO_2$eq. Source: Climate Watch (WRI-CAIT).
[52] The latest national GHG inventory was also used for Honduras's Biennial Update Report (2020) and the Third National Communication.
[53] Government of Honduras, Updated NDC (2020).
[54] Government of Honduras, Updated estimations of the National GHG Inventory used for the NDC update, 2020.

Although Honduras's electricity supply is led by renewable energy production, significant dependence on nonrenewable energy still remains. Gross electricity generation in Honduras during 2021 was led by renewable sources (60 percent), mainly hydroelectric power plants (33 percent), followed by solar (9 percent), wind (7 percent), biomass (4 percent), biofuels (4 percent) and geothermal (3 percent). Even though thermoelectric power plants represented 38 percent of generated electricity in 2021, these plants were mostly fueled by oil (28 percent) and coal (8 percent).[55]

The carbon intensity of the energy sector, which computes GHG emissions as a ratio of total electricity production, has varied significantly between 2011 and 2015, for example, increasing by 19 percent in 2014, then decreasing in 2015 to levels even below 2011 (0.34 GHG CO_2 eq/gigawatt).[56]

Honduras has opportunities to foster low-carbon development pathways for economic growth in the energy sector (electricity and transport). Electricity generation has increased 4.2 percent annually in Honduras over the last 10 years[57] and the government has established an ambitious policy to diversify the energy matrix with renewable energy by replacing some of the conventional thermal power plants with renewable energy, particularly hydroelectric plants.[58] However, electricity shortages are common, and in the 2017–2019 period, the energy deficit during peak hours increased fivefold.[59] The difference in access to electricity between urban and rural areas is substantial: most urban households (97.3 percent) access electricity through the national grid, compared to 69.3 percent in rural areas, where 22.5 percent of households have no access to any kind of electricity.[60]

Opportunities in the energy sector include implementing energy-efficient initiatives, integrating resilience considerations in energy planning, accelerating the diversification of the electricity generation matrix with more renewable energy, and investing in hydropower rehabilitation. Strengthening the existing framework of public-private partnerships (PPPs) with additional access to finance for new solar and wind power capacity, as well as for replacing old carbon-intensive infrastructure, could hasten the exit of conventional power plants, building resilience against climate-related transition risks. Supporting renewable energy projects can also generate adaptation co-benefits by increasing access to energy, and can create synergies across various sectors, including agriculture, forestry, and water management. When designed with adequate social risk management, such projects could also lead to significant progress in local community development.

Transport represents another growing and sizable emissions contributor, particularly because of its predominant use of fossil fuels, growing private vehicle fleet, inefficient freight transport, and low-quality public transport, representing opportunities to reduce emissions by phasing in more efficient, non-fossil-fuel-based mobility.

Forests are key to reducing carbon emissions, and addressing their vulnerabilities represents an opportunity to create synergies with adaptation, and may yield positive results for the rural poor. Covering more than 56 percent of the country's territory,[61] forests play a crucial role in climate change mitigation efforts in Honduras. The LULUCF sector removals reduce around 65 percent of Honduras total emissions.[62] Yet the tree cover loss rate of 12 percent from 2010 to 2021 exceeds the global, Latin America and the Caribbean Region, and Central America averages.[63] Deforestation is mainly driven by agriculture

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[55] Operador del Sistema (ODS), Informe Preliminar Anual de Operación del Mercado y Sistema Eléctrico Nacional 2021 (Honduras: ODS, 2022), Informe_Preliminar_Anual_Operacion_Y_Sistema 2021 (ods.org.hn).

[56] Values estimated by the CCDR team based on the Balance Energético Nacional and the GHE Inventory for the NDC update. Estimates of these two sources have some inconsistencies, and hence these estimates could be improved.

[57] World Bank, Assessment on Energy Efficiency Potential and Demand-Side Management Opportunities in Honduras: Final Report (Washington, DC: World Bank Group, 2019).

[58] ODS, Plan Indicativo de Expansión de la Generación del Sistema Interconectado Nacional (Honduras: ODS, 2019), http://www.ods.org.hn/pdf/2020/Plan%20Indicativo%20de%20Expansion%20de%20Generacion_2020%20-%202029.pdf.

[59] ODS, "Plan Indicativo de Expansión de la Generación."

[60] World Bank, Honduras Beyond Connections: Energy Access Diagnostic Report Based on the Multi-Tier Framework, Internal Report (Washington, DC: World Bank Group, 2019).

[61] Instituto de Conservación Forestal, Anuario Estadístico Forestal de Honduras, 2019 (34.ª ed.) (Centro de Información y Patrimonio Forestal, Unidad de Estadísticas Forestales, 2020).

[62] Government of Honduras, Biennial Update Report (2020).

[63] Calculation for this publication using data from Global Forest Watch.

and livestock practices and unsustainable land management. Other causes include illegal logging and, increasingly, drug-production activities as well as fuelwood collection. Addressing the root causes of deforestation would not only contribute to the country's GHG mitigation efforts and therefore provide global benefits, but also create local co-benefits by enhancing natural capital and creating jobs and income opportunities. Healthy and well-managed ecosystems are more resilient in the face of natural hazards and the long-term consequences of climate change and are critical for maintaining the services they provide, including regulating the hydrological cycle, increased soil stability, and flooding and landslide prevention.[64]

Decarbonization policies could represent further co-benefits for the country, although careful assessment must be made to ensure these reach vulnerable populations. Although the costs and risks of decarbonization have not been fully assessed in Honduras, the country recently launched a study on the co-benefits of its main updated NDC commitments.[65] These mitigation policies could contribute to green jobs, reduced costs from energy efficiencies, better air quality, and better resilience of agricultural and productive systems and natural ecosystems, among others benefits.

[64] Claudia Sobrevila and Valerie Hickey, The Role of Biodiversity and Ecosystems in Sustainable Development, Environmental Strategy Analytical Background Paper (Washington, DC: World Bank Group, 2010).

[65] Climate Change Atelier, "Assessing Institutional, Policy and Planning Systems to Deliver on Key Climate Transitions in Honduras," World Bank internal study (2021).

2. Country Climate Commitments, Policies, and Capacities

Main messages

- Honduras presented its first updated Nationally Determined Contribution (NDC) in 2021, increasing its ambition on mitigation, adaptation, and social inclusion. Despite high ambitions and commitments, the NDC implementation faces considerable challenges.
- Also, although important efforts have been made to articulate the regulatory and policy framework for low-carbon and resilient development, significant institutional and financial challenges still exist for the strategies to be adopted and financed.
- There are opportunities to strengthen the regulatory and business environment to leverage private sector investment to finance the NDC, including reviewing climate policy, developing incentives, and encouraging innovation.
- There are no specific mechanisms designed to support the population in the transition to a low-carbon future, although new social protection strategies have been proposed that could support this objective. At the same time, the social protection system could be strengthened for it to support the population after natural hazards in an efficient, effective, and adaptive way.

2.1. Country Commitments and Capacity

In 2021, Honduras presented its first updated Nationally Determined Contribution (NDC), increasing its ambitions on mitigation, adaptation, and social inclusion. The updated NDC recognizes the need to develop climate action that ensures synergies between mitigation, adaptation, and sustainable development. The NDC outlines 13 objectives: i) reducing emissions from deforestation and forest degradation (REDD+) action, ii) sustainable rural development, iii) renewable energy, iv) bioenergy, v) energy efficiency, vi) electromobility, vii) integrated waste management, viii) smart cities, ix) water security, x) sustainable economy, xi) social inclusion, xii) knowledge management, and xiii) monitoring and evaluation. With respect to mitigation, Honduras established a mitigation commitment to reduce emissions by 16 percent relative to business-as-usual (BAU) levels by 2030. The updated NDC provides indicative targets for the sectors in the BAU scenario (9 percent energy, 5 percent agriculture, 1 percent industrial processes, and 1 percent waste). It includes a commitment to restore 1.3 million ha of forest[66] and maintains the commitment of reducing family firewood consumption by 39 percent.

Despite high ambition and commitments, NDC implementation faces formidable challenges. Honduras lacks an estimate of the actual NDC implementation costs and does not have a robust measurement, reporting and verification (MRV) system. Although the country has made substantial improvements in GHG measurement, the need to improve the latest national GHG inventory were evidenced in the difficulty of incorporating accurately the LULUCF sector in the NDC's BAU. Recognizing these difficulties, the government has included strengthening these monitoring systems as an objective in the NDC.

Although the private sector in Honduras also has developed a strategy for sustainability, it lacks specific plans and objectives that could contribute to the national commitments, an indication of low coordination between the public and private sectors. The Honduran Council of Private Firms developed a national strategy for 2020–2025 and an action plan for sustainable firms, establishing pillars to achieve better growth, productivity, stability, and sustainability. However, this strategy does not specify

[66] Honduras updated the NDC, increased the original emissions reduction target by 1 percentage point, and increased the restoration target by adding 300,000 ha of forest.

adaptation or decarbonization plans or targets for reduced emissions that could contribute to the country's commitments. Furthermore, there is no clear strategy to leverage private sector investment to finance the NDC, although this may later be developed as part of the NDC's implementation strategy.

Private sector development in Honduras remains constrained by an underdeveloped regulatory regime and a weak business environment. Honduran firms cite complex tax policies and onerous tax administration as the most egregious constraints on doing business. This is followed by ii) insecurity due to crime and violence; iii) limited access to finance, especially for micro, small, and medium enterprises (MSMEs); iv) inadequate infrastructure, especially road networks and public utilities; v) an undereducated and inadequately skilled labor force; and vi) weak rule of law, policy uncertainty, and other governance issues. Such an adverse business climate severely undermines competitiveness, productivity, and return on investment throughout the private sector.[67]

Box 2.1. Constraints on private sector growth and investments in climate policy

Private sector development holds investment opportunities for sectors such as agriculture, electricity, and transport infrastructure. Honduras has unexploited opportunities in nontraditional agricultural products, including high-value vegetables, cocoa, cashew nuts, crustaceans, horticulture, and agro-forestry products. The country can add value to its agricultural export portfolio by improving product quality, expanding processing, and identifying complementary value chains for current products such as coffee, avocados, and tilapia fish. There is also an opportunity to catalyze private investment in renewables and resilient transport infrastructure—for example, supporting the sustainability of the energy sector through the diversification of the energy matrix (for example, solar photovoltaic technology) and metering/digitalization infrastructure to reduce energy losses. The provision of infrastructure for charging EVs is another promising new area in which the private sector could make a contribution to a more sustainable urban transport system.

Entry points to stimulate private sector investment for climate action include i) pricing and regulatory incentives from the government, ii) the dissemination of information to promote action on these incentives, iii) competitive markets that encourage innovation in the application of cleaner technologies, and iv) instruments to enhance access to green finance, v) fostering financial sector development through innovations, with an emphasis on MSME finance and climate finance, and vi) continuing to support select banks and microfinance institutions (MFIs) with long-term funding targeted at strategic areas such as SMEs, climate and agriculture—for example, by improving financial inclusion for small farmers and supporting the development of green finance taxonomy guidelines.

Developing a framework for climate finance holds great potential to support the country's climate change and development objectives. While the financial sector has begun to develop the basis for climate finance, significant implementation work is still needed. The Bankers Association – AHIBA and the National Banking and Insurance Commission (CNBS for its Spanish acronym) joined the Sustainable Banking Network in 2015 and AHIBA started the Sustainable Banking Initiative in 2018. The initiative supported drafting of regulation to require all banks to apply an environmental and social (E&S) management system based on categorization of projects by E&S risks, which was released by the regulator (CNBS) in June 2020. The financial

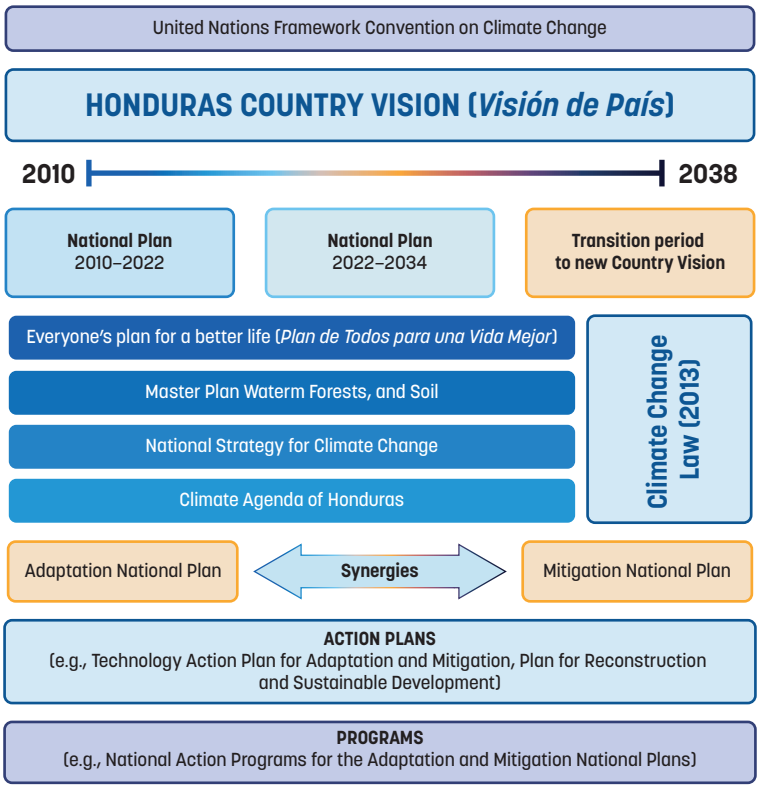
[67] World Bank, "Creating Markets in Honduras: Country Private Sector Diagnostic" (Washington, DC: World Bank Group, 2022), http://documents.worldbank.org/curated/en/099028308052239516/IDU0ee3caf2805321044fa0af840421771bb4c2c; IFC, Honduras Country Strategy; World Bank, World Bank Group Climate Change Action Plan 2021–2025: Supporting Green, Resilient, and Inclusive Development (Washington, DC: World Bank Group, 2021), https://openknowledge.worldbank.org/handle/10986/35799.

sector has been working on an action plan for climate and Environmental, Social and Governance (ESG) standards and regulation and support of sustainable financing. Development of a green taxonomy – green asset classes based upon which regulatory frameworks and climate finance incentives can be built – is an important element of the proposed action plan. Additionally, Honduras could further advance this work by producing guidelines for climate risk assessments and stress tests to help private sector actors understand and manage climate risks and opportunities. The limited understanding of these currently exacerbates a predominant hesitance of most financial entities to enter spaces such as agriculture finance. Among the priorities on climate risk management are carbon accounting, climate risk assessment, management and disclosure, green financing, and financed linked to climate-smart agriculture (CSA) products, with special attention to MSMEs that are often financially excluded.

Sources: Honduras Country Private Sector Diagnostic, IFC Honduras Country Strategy, Latin America and the Caribbean (LAC) Climate Change Action Plan

Honduras has made substantial efforts to articulate a regulatory and policy framework to promote low-carbon and climate-resilient development. The Climate Change Law (Decree 297–2013) establishes the principles and regulations needed to plan, prevent, and respond to the impacts of climate change in Honduras. Following the update of the NDC, however, there is a need to revise the law and its implementing regulations to align them with the revised commitments. Through the National Strategy for Climate Change and the Climate Agenda (comprising the Adaptation and Mitigation National Plans), the climate change policy framework aims to ensure alignment with national development goals by reducing poverty, inequality, and exclusion through the benefits that adaptation and mitigation plans are expected to bring (figure 2.1).

FIGURE 2.1. Policy Structure of the Climate Agenda in Honduras



Source: Adapted and augmented from the original version in the Third National Communication for Climate Change, 2019

The institutional arrangement for this includes several high-level agencies in charge of implementing climate change policies, as well as several supporting units, but weak institutional capacity hampers their effectiveness. In Honduras, the National Directorate of Climate Change (DNCC), within the Ministry of Environment (MiAmbiente+), is the leading agency in charge of formulating, implementing, and monitoring climate change policies, supported by several other interinstitutional agencies. Weak institutional capacity across the responsible entities, and insufficient collaboration toward consolidating climate objectives, have hampered the implementation of climate change policies and initiatives, and led to a maintenance of low capacity and lack of leadership in key legislative and accountability institutions with responsibilities over climate change policy.

Even with the number of institutional arrangements, important challenges remain as the government attempts to align budgetary and fiscal policies to its climate agenda. According to the Climate Change Institutional Assessment finalized in December 2021, the government's budget is not yet aligned with the NDC's objectives. Alignment will require a fiscal strategy that allocates resources in a sustainable way, given a careful prioritization process inclusive of all development objectives, and working around the limited fiscal space, and capacity constraints. In light of the government's fiscal constraints, a more involved role for the private sector and better investment management could support this climate agenda. The development of associated plans, such as the National Mitigation Plan, a climate finance strategy, and a comprehensive system to track financial resources for climate change action, and setting up the Economic Unit for Climate Management and Finance within SEFIN, will help achieve better alignment with the NDC.

However, despite insufficient budget coordination to achieve the NDC, the government budget assigned to climate change has increased in recent years. An analysis of the budget allocation to the NDC's objectives was carried out based on budget-tagging data for Honduras from SEFIN. Since the budget is not directly linked to NDC objectives, commitments, or measures, many assumptions had to be made to group the allocations under the objectives.[68] Notwithstanding the weakness of the data, this broad analysis shows that the budget allocations to climate change actions have almost doubled since 2017. They are concentrated in three NDC objectives: sustainable rural development, energy efficiency, and knowledge management (which includes tagged allocations for education and universities).[69] At the same time, the analysis suggests that no specific funding can be tracked to these three NDC objectives: bioenergy, electromobility, and monitoring and evaluation.

2.2. Government Policies for Adaptation and Risk Management

As part of the Climate Agenda, the government in 2018 approved the PNA, the guiding document for adaptation and climate resilience. This plan has a series of strategic measures and vulnerability assessments for each of the five adaptation sectors of the NDC. Although it is expected that each sector will have its own adaptation strategy, currently only the health and agriculture sectors have them, along with a few adaptation strategies focused on specific geographical regions.[70] The challenges of implementing the PNA resemble those for the NDC more generally: difficulty in articulating the many strategies and their implementing agencies, limited capacity to monitor results and impacts achieved, and insufficiently detailed estimations of costs and budgeting mechanisms to fund the strategies.

Because of Honduras's vulnerability to natural hazards, disaster risk management (DRM) is a key aspect of climate change adaptation and an area in which the country has made substantial efforts. In 2010, 2013, and 2014, the Honduran government created, respectively, the law, national policy, and national plan that established the normative framework for risk management. It is currently strengthening

[68] Tendency analysis was used for the unavailable budget of 2020. Since the exact amount under a budget line spent on climate change could not be established, the full tagged amount was counted. It was not possible to link budget data to the objectives of bioenergy, electromobility, and monitoring and evaluation.

[69] Fluctuation in the allocation of resources to this objective could be partly explained by the budget allocation to the National Autonomous University of Honduras, which comprises of 6 percent of national GDP.

[70] Estrategia de Adaptación al Cambio Climático y Plan de Acción para la Cuenca del Río Aguán; Estrategia de Mitigación de los Efectos del Cambio Climático y Reducción de la Vulnerabilidad en la Costa Garífuna de Honduras; Estrategias de Adaptación en Zonas Marino-Costeras Frente a los Impactos del Cambio Climático en el Caribe de Belice, Guatemala y Honduras; Estrategia Local de Adaptación al Cambio Climático en la Cuenca Media del Río Guacerique.

the legal framework by creating technical risk management units in all relevant public entities in charge of issuing sector-specific DRM plans. In 2020, a DRF Management Strategy[71] was approved and, in 2021, the implementation of its operational plan began. The plan prioritizes actions along the following strategic lines: a) knowledge generation of disaster risk, b) resource mobilization and financial protection using a combination of DRF instruments, c) disaster risk reduction through resilient public investments, d) public expenditure efficiency and transparency regarding DRM spending, and e) capacity development of SEFIN to enhance DRF management.

Another strategic initiative put forward is streamlining resilience in key sectors, such as water and sanitation, marine and coastal areas, and the financial sector. Relevant for DRM is the previously mentioned Plan of Reconstruction and Sustainable Development (PRDS), which was launched to support reconstruction and climate resilience after the two hurricanes of 2020. In addition to these national policies, several municipalities have their own plans. A 2013 study of 91 municipalities found that 66 of those had municipal risk management plans, 27 had prevention and response plans, and 60 had emergency plans.[72]

Despite recent efforts to increase fiscal resilience against disaster risk, Honduras faces important financial management and risk reduction challenges in minimizing the impact of future climate events. In 2020 SEFIN activated a range of diverse financial mechanisms and instruments to respond to the COVID-19 and Eta and Iota crises.[73] They included the Contingent Emergency Response Component, a catastrophe deferred drawdown loan of US$119 million (fully disbursed), and emergency response Investment Project Financing (IPF) of US$150 million, credits, placements of bonds, international support and budget reallocation.[74] Notably, the National Fund for Preparedness and Response did not play a prominent role in financing the response. Currently, SEFIN is finalizing entrance into the Caribbean Catastrophe Risk Insurance Facility Segregated Portfolio Company (CCRIF SPC) with a planned policy for excess rainfall, and evaluating continent credits with the World Bank and Inter-American Development Bank. All these efforts are expected to increase the country's fiscal resilience and the effectiveness of the National System of Risk Management.

2.3. Existing Policies for Low-Carbon Development

Honduras is in the process of developing a 2020–2050 National Plan for Decarbonization.[75] The process is being coordinated between MiAmbiente+, the Ministry of Energy (SEN), and the European Union program EUROCLIMA+.[76] Although the concrete targets and specific objectives are yet unknown, the main objective of the plan is to achieve the decarbonization of the economy and increase the country's resilience. Other objectives include economic development, reducing inequality, and raising quality of life.

The energy and forest sectors have a prominent role to play in the mitigation objectives of the updated NDC. Four of the seven mitigation measures in the updated NDC—promoting renewable energies, strengthening energy efficiency, promoting electric mobility, and strengthening bioenergy[77]—are related to the energy sector. Together, they account for a 20 percent reduction of emissions by 2030 with respect to the sector's BAU. In 2021, the government developed the 2050 roadmap of the National Energy Policy, integrating energy planning with development goals and establishing detailed action plans. Similarly, the government has an Indicative Plan of Expansion of the National Interconnected System toward 2029, detailing concrete targets for the inclusion of renewable energy power plants and the withdrawal of thermal

[71] Government of Honduras, Ministry of Finance (SEFIN), Ministerial Agreement No. 195–2020, Disaster Risk Finance Management Strategy (2020).

[72] Climate Change Atelier, "Assessing Institutional, Policy and Planning Systems."

[73] SEFIN, Ministerial Agreement No. 195–2020.

[74] Government of Honduras, PCM Decree 005–2020: Declaration of State of National Health Emergency, Article 5, commands the reallocation of HNL110.000.000 (approx. US$4.4 million) from the Trust Fund for Poverty Reduction (FINA 2) and from the national budget to cope with this emergency.

[75] The NDC mentions that there is a goal to develop a long-term, low-GHG-emissions strategy in accordance with Article 4, paragraph 19, of the Paris Agreement.

[76] EUROCLIMA+ is a program led by the European Union to support 18 Latin American countries to reduce the adverse impacts and effects of climate change by implementing key actions to achieve their NDC commitments.
See https://www.euroclima.org/en/home-en/about-the-programme.

[77] MiAmbiente and DNCC, Actualización de la Contribución Nacional Determinada de Honduras (2021).

plants. For transport, there are car circulation levy initiatives, with higher fees for cars that pollute more heavily, as well as plans for bus rapid transit in the capital that are in their early stages. The country also has a series of plans for the LULUCF sector that include forest conservation, reforestation, and reduction of deforestation, including the Master Plan for Water, Forests, and Soil. In terms of cooking fuel, Honduras launched the National Strategy for the Adoption of Improved Stoves in 2020. The strategy recognized the importance of promoting a transition to the sustainable use of improved cook stoves because rural households without access to electricity typically use firewood for cooking.

2.4. Mechanisms for Just Socioeconomic Transitions and Protection from Future Climate Change Risks

Honduras does not have specific policy instruments to support its population during the transition to a low-carbon economy. There are existing instruments that could support the poor and vulnerable during the transition, but inefficiencies cast doubt on the suitability of the system to achieve even its current objectives. Despite a well-performing conditional cash transfer (CCT)[78] program to support the poorest, and an increase in spending in social protection over the last decade, a recent analysis of the entire system (including other programs—contributory and noncontributory—and labor regulation) suggests that it does not fully achieve its objective of protecting Hondurans. Two major problems offer a clear indication of this:[79] i) workers are not effectively protected from a range of risks, and those in need do not receive enough resources; and ii) inefficient rules and misuse of resources reduce productivity and growth, essentially taxing formality and subsidizing informality. To manage a just transition, active labor market policies, unemployment insurance, and productive inclusion interventions will be needed.

[78] Formerly known as the Bono Vida Mejor Program. The current administration is reforming the CCT program, and it will be operated by the Red Solidaria, the new strategy to eradicate poverty and extreme poverty in Honduras.

[79] Andrés Ham and Sergio Membreño-Cedillo, ¿Cuán efectiva es la protección social en Honduras? LAC Working Paper 21 (New York: United Nations Development Programme, 2021).

3. Macrofiscal Policy for Adaptation and Mitigation

Main messages

- Honduras is already highly exposed to natural hazards, and climate change could further increase them. Resilience could be strengthened through a more proactive fiscal policy that dedicates additional resources to DRM and combines a layered disaster-risk financing strategy with budgetary provisions for adaptation investment. This would require fiscal space, which could be created through additional revenue and some additional debt financing in a sustainable manner.

- Carbon pricing could leverage up to 2.7 percent of GDP in additional revenues while simultaneously supporting Honduras's NDC targets and delivering health co-benefits. Carbon prices will need to provide the right incentives to reduce carbon, and be designed along with complementary policies that are well aligned and integrated. The design of this measure will also need to consider public acceptance and political feasibility.

- Future economic growth and adaptation investments need to be aligned with resilience and social protection policies to effectively reduce poverty. Long-term policy solutions need to increase the resilience of households and roll out effective, targeted social protection in a fiscally responsible manner. Adaptation policies and investments need to have progressive features.

- The Honduran banking sector is highly exposed to physical risks stemming from hurricanes, with lower exposure to flood and drought risks, and has transition-sensitive sectors that have sizeable exposure. Further strengthening the climate-related supervisory and regulatory toolkit is important to enhance the financial sector's resilience in the face of physical and transition risks.

A proactive fiscal policy, beyond reallocation within existing budgets, could support Honduras's disaster resilience by partially alleviating the fiscal tradeoffs between reconstruction, adaptation investment, and other development priorities. In the event of a natural disaster, such a strategy would provide for the financing of adaptation and recovery spending through *ad hoc* reallocations within the budget without jeopardizing other development objectives. Dedicating budget resources to investment in disaster resilience and response to shocks *ex ante* will enable Honduras to conduct a more countercyclical fiscal policy in responding to shocks. Such a strategy will also require additional fiscal resources which, in the medium term, need to be mobilized through new revenue generation.

3.1. Opportunities and Threats to Macroeconomic Performance and Incomes

Honduras's high exposure to natural hazards threatens its economic stability and social development objectives. Disasters caused by natural hazards in Honduras have, on average, affected 4.5 percent of the population each year and caused more than 2.3 percent of GDP in damage,[80] setting back years of economic development. Amid historic sizeable public debt and a lack of financial strategy for disaster risk management, financing needs for the adaptation and mitigation of climate risks have exceeded Honduras's fiscal capacity, prompting the government to rely mainly on the reallocation of resources from within the budget for post-disaster reconstruction. Damage caused by natural hazards is most likely to be absorbed

[80] Based on data from the EM-DAT database compiled by CRED (www.emdat.be), Honduras experienced at least 92 natural hazards between 1961 and 2021. Natural hazards include droughts, earthquakes, epidemics, floods, landslides, mass movements (dry), storms, and wildfires. Although registered, the data on the impact of natural hazards are limited to 76 events (number of people affected) and 27 events (total damage).

primarily by the poor—because the poor tend to live in high-risk areas, rely on fragile infrastructure, have jobs such as farming that depend on the weather,[81] and do not have insurance or the resources to rebuild their lives—and the agriculture sector—after an extreme event.[82]

With limited fiscal resources, balancing DRM and reconstruction with other development needs is a critical fiscal policy challenge for Honduras. Given its many pressing development priorities and limited financial resources, the opportunity cost of having to reallocate fiscal resources toward disaster response in an *ad hoc* manner is particularly high because it typically results in significant efficiency losses. Adaptation investment, while more plannable, will also necessarily compete with resources available for other purposes. Identifying and planning financial resources for addressing reconstruction and adaptation needs, and reflecting them in fiscal policies, budget allocation, and public investment, is an essential step to overcoming efficiency losses from *ad hoc* reallocation. But, as discussed in the next section and illustrated by simulation results, a proactive fiscal policy that mobilizes additional resources is critical to overcoming fiscal policy tradeoffs between DRM and other development priorities.

Severe data limitations in Honduras prevent a comprehensive assessment of the economic cost of disasters caused by natural hazards and climate change, but scenario simulation can provide useful insights into the direction and order of magnitude of climate change impacts and policy responses. Detailed assumptions, methodology employed, and results achieved can be found in the Appendix (sections A.5 and A.6). In light of these shortcomings, the macroeconomic modeling focuses on the current stock of disaster risks (which includes climate change effects to the extent that they have already materialized) rather than climate change modeling, hence it does not attempt to quantify the effect of climate change or natural hazards on the economy as a whole. However, the CCDR employs macroeconomic modeling techniques to simulate the impact of different hypothetical increases in disaster risk due to climate change, and different policy responses on economic outcomes, applying a Monte Carlo approach to model the probability distribution of potential outcomes based on the historical distribution of damage.

The results indicate that, even without climate change, natural hazards weigh heavily on the macrofiscal outlook, and the impact is driven by years with severe events when damage could not be repaired quickly. Based on historical growth and projections regarding natural hazard risk patterns,[83] and subject to the above-described data and modeling shortcomings, the median combined impact of productive capital destroyed through excess rain, strong winds, and earthquakes by 2050 amounts to cumulative losses of around 5.4 percent of GDP. Due to lower growth and diversion of spending toward reconstruction of privately owned assets, consumption is reduced by about 6.8 percent. In the worst 5 percent of outcomes, cumulative GDP losses by 2050 nearly double compared to the baseline and exceed 10.5 percent, while consumption losses rise above 12.8 percent. The distribution of economic outcomes is strongly skewed to the downside, where the main mechanism driving the asymmetric distribution is that losses beyond a certain threshold can no longer be repaired within a year and thus continue to limit output beyond the impact year. It is noteworthy that contingent liabilities from disasters, including emergency and rehabilitation expenditures and reconstruction, are highly clustered around high-impact, low-probability events. For instance, with an annual probability of 1 percent, contingent liabilities would amount to at least 8.5 percent of GDP—13.1 percent on average for the 1 percent worst outcomes (see Box A5.2).

Although serious knowledge gaps remain on the magnitude of climate change effects on natural disaster risk, even small increases would further add to macroeconomic disruptions and risks, with the negative growth effects of increased event severity outweighing those of higher event frequency. Although no data on the exact effects of climate change on the impact of natural hazards in Honduras are available, simulation results illustrate that a moderate 10 percent increase in the severity of tropical storms

[81] P.K. Freeman, M. Keen, and M. Mani, Dealing with Increased Risk of Natural Disasters: Challenges and Options, Working Paper WP/03/197 (Washington, DC: International Monetary Fund, 2003); World Bank, Caribbean Economic Overview 2002: Macroeconomic Volatility, Household Vulnerability, and Institutional and Policy Responses, Report No. 24165-LAC (Washington, DC: World Bank Group, 2003).

[82] Given the lack of statistics on total damage and production losses across sectors in Honduras, and the associated costs to the economy, this report relies on global studies on the economic impacts of natural hazards in developing countries. See Food and Agriculture Organization (FAO), The Impact of Natural Hazards and Disasters on Agriculture and Food Security and Nutrition: A Call for Action to Build Resilient Livelihoods, brochure (Rome: FAO, 2015), https://www.fao.org/3/i4434e/i4434e.pdf.

[83] These future projections assume that natural hazard risks follow historical patterns, and thus account for climate change only to the extent that its impact already manifests in the current levels of natural hazard risk.

and excess rain across the board would translate into a proportional increase in economic losses in a median scenario, but result in a 20 percent increase in economic losses in the worst 5 percent of outcomes, thus further aggravating downside risk.

On the brighter side, according to projections from the Intergovernmental Panel on Climate Change (IPCC), Central America is likely to experience a decrease in the magnitude of extreme heavy rain but an increase in their frequency. In contrast, a decrease is predicted for the frequency of tropical cyclones, but they are projected to become more intense.[84] In economic terms, increased intensity of events is more impactful than increased frequency.

The Honduran government has a number of policy levers at its disposal to mitigate the effects of natural hazards, but within a tightly constrained budget they each come with significant tradeoffs. For instance, in a zero-sum budget scenario, improvements in reconstruction capacity reduce the downside risks of natural disasters but aggravate the opportunity costs of reallocated funds. As a result, they limit GDP losses in the worst 5 percent of outcomes. Similarly, adaptation investment reduces the downside risk of large events, but simultaneously also diverts resources away from productive investment if it is financed through reallocation from within the budget, and thus leads to slightly lower GDP growth in outcomes with below-median disaster incidence. Post-disaster transfers are a social necessity and can have important second-round effects on growth and consumption that are not captured by the macro model—for example, avoiding emergency asset sales, school dropouts, and emigration. However, if financed from within the budget, they also impact negatively on other spending priorities, and additionally, their effectiveness depends on precise targeting.

Combining adaptation measures with a proactive fiscal strategy improves outcomes for GDP, consumption, and investment, with the largest improvements in downside risk. Such a fiscal strategy would minimize the tradeoffs between adaptation and other development priorities. Outcomes can be greatly improved through, for instance i) introducing a combination of disaster risk insurance[85] to provide quick additional liquidity in the event of a disaster, ii) additional borrowing in the short term to finance midterm adaptation policies that help the country to better prepare and adapt for future climate scenarios, or iii) medium-term, additional revenue generation equivalent to 0.25 percent of GDP per annum by the year 2030 into the simulation scenario. As a result, GDP and consumption losses decrease from 5.4 to 4.7 percent and 6.8 to 5.8 percent, respectively, in the median outcome. Downside risk is reduced more significantly as GDP losses go from 10.5 to 7.6 percent and consumption losses from 12.8 to 9.2 percent in the worst 5 percent of outcomes. A carbon tax can be an efficient instrument to finance such a strategy, with additional mitigation effects and health-related co-benefits (Box 3.1).

Box 3.1. Carbon Pricing Could Provide Funding for Adaptation While Encouraging Low Carbon Development and Delivering Health Co-Benefits

Carbon pricing can be a substantial source of revenue while driving innovation and supporting Honduras's Nationally Determined Contribution (NDC) targets. Three scenarios are explored using the IMF-World Bank spreadsheet model—the Carbon Pricing Assessment Tool (CPAT)—which assesses the macroeconomic effects of economy-wide upstream carbon charges at different levels and progressions:

[84] IPCC, Climate Change 2022; and R. Ranasinghe, A.C. Ruane, R. Vautard, N. Arnell, E. Coppola, F.A. Cruz, S. Dessai, et al., "Climate Change Information for Regional Impact and for Risk Assessment," in Climate Change 2021: The Physical Science Basis, Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, eds. V. Masson-Delmotte, P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, et al. (Cambridge, UK and New York, NY: Cambridge University Press, 1767–1926), doi:10.1017/9781009157896.014.

[85] The insurance scenario assumes that disaster risk insurance pays out 20 percent of the damage of any event at a premium cost of 20 percent of the average damage in Honduras (2.3 percent of annual GDP) multiplied by a markup of 1.2. The insurance premium is therefore calculated as 2.3 percent of GDP × 20 percent × 1.2.

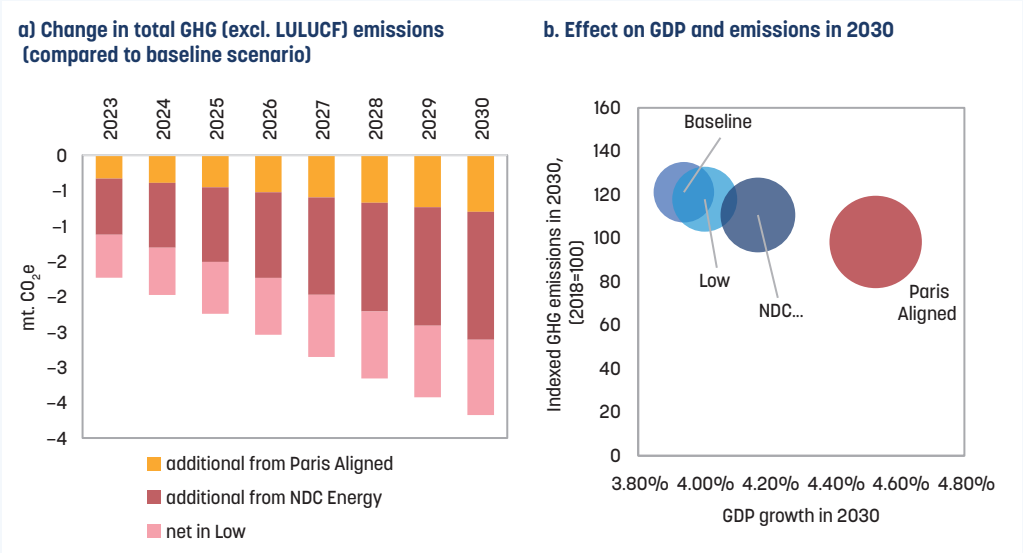
» Under a "low" scenario, the charge starts at US$5.0 per ton of carbon dioxide equivalent (tCO_2e) in 2020 and rises to US$9.0 in real terms by 2030. This results in additional revenue of US$100 million (0.30 percent of GDP) per annum and a 3 percent reduction in CO_2 emissions (0.8 metric ton) compared to a business-as-usual baseline by 2030.

» Under an "NDC Energy" scenario, the charge starts at US$18 per tCO_2e in 2020 and rises to US$33 in real terms by 2030. This results in additional revenue of US$380 million (1.06 percent of GDP) per annum and a 9 percent reduction in CO_2 emissions (2.6 metric tons), consistent with Honduras's NDC commitments, by 2030.

» Under a "Paris Aligned" high scenario, the charge starts at US$50 per tCO_2e in 2020 and rises to US$93 in real terms by 2030. This results in additional revenue of US$1 billion (2.69 percent of GDP) per annum and a 20 percent reduction in CO_2 emissions (5.7 metric tons) by 2030.

Note: All the scenarios assume that 20 percent of the revenues are used to lower income taxes, 60 percent go to public investment, and 20 percent go to current spending. This revenue recycling scheme is used for illustration purposes, and other schemes could be considered. In all scenarios, 43 percent of the new revenues would arise from non-road oil, followed by diesel (29 percent) and gasoline (23 percent). Even under the low scenario, the revenues raised would be sufficient to cover the additional revenue needed for natural hazard adaptation consistent with simulation scenario D2. A more ambitious carbon tax could raise additional revenue to finance key development priorities. Depending on the revenue use, a carbon price could have near-zero negative impacts on GDP growth in the near term, and long-term growth benefits if revenues are used for human capital development or productive investment (see figure B3.3.1).
Carbon pricing, through its impact on fuel prices, modifies driving behavior and can contribute to internalizing externalities from driving. Increases in fuel prices lead to reductions in vehicle-miles traveled. As road traffic has many externalities aside from carbon emissions, the reduction in vehicle-miles traveled also leads to a reduction in transport-related externalities such as congestion, accidents, and road damage. According to CPAT estimates for 2022 to 2030, cumulative road fatalities could be reduced by 128 in the low scenario, 441 in the NDC energy scenario, and 1,090 in the Paris-aligned scenario, relative to the business-as-usual scenario. Cumulatively, reduced road fatalities and reduced air pollution could avert between 200 and more than 1,700 deaths, depending on the scenario.
Although the CPAT tool shows a clear benefit of the Paris-aligned carbon pricing for the economy and climate, the carbon tax is not the only, or most, suitable instrument to finance resilience, rather just one way. A carbon tax is suggested, given the global evidence that green taxes can have lower marginal costs than other taxes.* Although not explored in this CCDR, four other types of instruments are: i) ecological fiscal transfers (EFTs), which is a deforestation-conditional fiscal transfer of budgets from the central to regional and local governments; ii) sustainability-conditional export tariffs; iii) land taxes; and iv) input taxes to combat deforestation and land-use change while (partially) increasing fiscal space.

FIGURE 3.3.1. Changes in GHG Emissions and GDP Impacts of a Carbon Tax in Honduras



Note: excl = excluding; GDP = gross domestic product; GHG = greenhouse gas; LULUCF = land use, land use change, and forestry; $mtCO_2e$ = metric tons of carbon dioxide equivalent.
* See Jonathan Pycroft Salvador and Bert Saveyn, *The Marginal Cost of Public Funds in the EU: the Case of Labour Versus Green Taxes*, Taxation Papers 35, Directorate General Taxation and Customs Union (Brussels: European Commission, 2013); and Dirk Heine and Christian Schoder, *The Role of Environmental Tax Reform in Responding to the COVID-19 Crisis*, Working Paper 166126 (Washington, DC: World Bank Group, 2022).

A proactive fiscal policy strategy also involves planning *ex ante* a set of financial instruments with a predefined order of precedence in the event of a disaster caused by natural hazards. Not all financing instruments are cost-efficient for all cases, and a layered financing approach should consider the following criteria:

1. **High frequency,** low severity events: Risk retention instruments based on budgetary resources, for financing short-term needs.

2. **Medium frequency,** medium severity events: Risk retention instruments, usually through external financing via contingent credits such as contingent loans (for example, World Bank catastrophe deferred drawdown loans) for quick liquidity to finance emergency expenditures on top of budgetary resources planned *ex ante*.

3. **Low frequency,** high severity events: Risk transfer instruments such as parametric insurance, cat-bonds, and financial derivatives; they provide quick liquidity but can be expensive and carry basis risk.[86]

4. **Very low frequency,** very high severity events (rare): A residual risk layer for which it is not cost-efficient to arrange *ex-ante* financing instruments; can be financed only with post-disaster instruments.

3.2. Impacts on People

3.2.1. Distributional Impacts of Natural Hazards and Adaptation Policies[87]

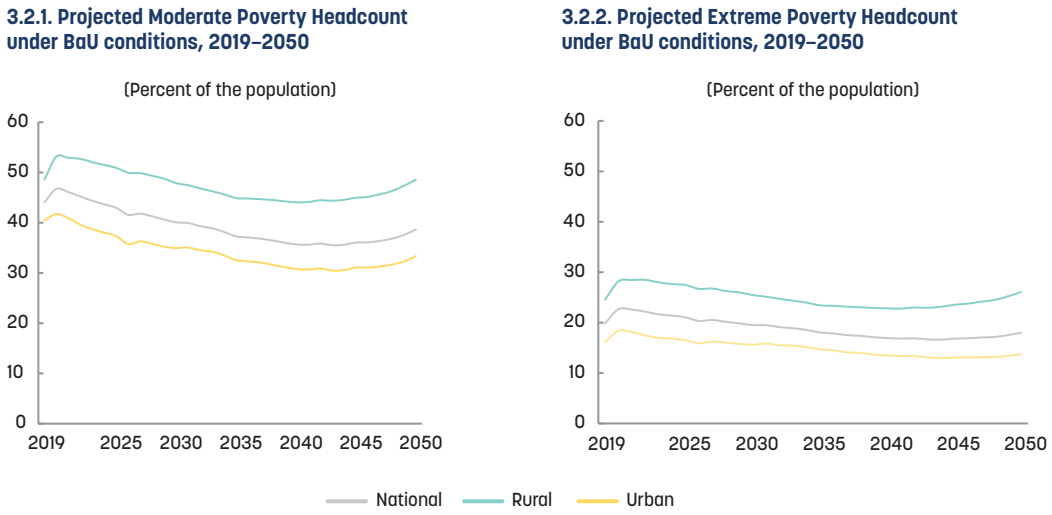
Despite the high level of uncertainty surrounding the future of poverty reduction in Honduras, the CCDR simulated the income losses due to natural hazards as well as the impact of the different adaptation strategies earlier presented in section 3.1. The analysis is divided into two periods: 2019–2030 and, where relevant, 2030–2050. The model assesses the welfare impacts in the different scenarios, identifies potential winners and losers, and develops a number of policy recommendations.

In the baseline scenario, the country is expected to continue experiencing weak poverty reduction over the long term (2019–2050). After the combined impact of the pandemic and two back-to-back hurricanes in 2020, slow and stable economic growth is expected to be accompanied by a modest reduction in moderate and extreme monetary poverty. The trend is expected to be reversed in the subsequent period, 2030–2050, when poverty reduction is expected to slow and then increase at a faster rate, for a total poverty reduction of 5.4 percentage points over nearly three decades. Even though the country experiences a decrease in the poverty rate, with population growth the number of poor is expected to significantly increase from 3.9 million in 2019 to 5.3 million in 2050. Extreme poverty is expected to show similar trends and remain stagnant over the period (figure 3.1), but the number of extreme poor is expected to increase from 1.7 million in 2019 to 2.4 million in 2050. These overall trends are similar to those observed in 2014–2019, when progress on moderate and extreme poverty was limited.

[86] Negative basis risk is the possibility that losses are suffered but the instrument does not pay out, while positive basis risk is the opposite—that is, that the instrument triggers a payout when there are no losses in the field.

[87] This subsection summarizes the main results of the distributional impact of climate, which will be presented in more detail in an upcoming World Bank publication, Honduras Poverty Assessment.

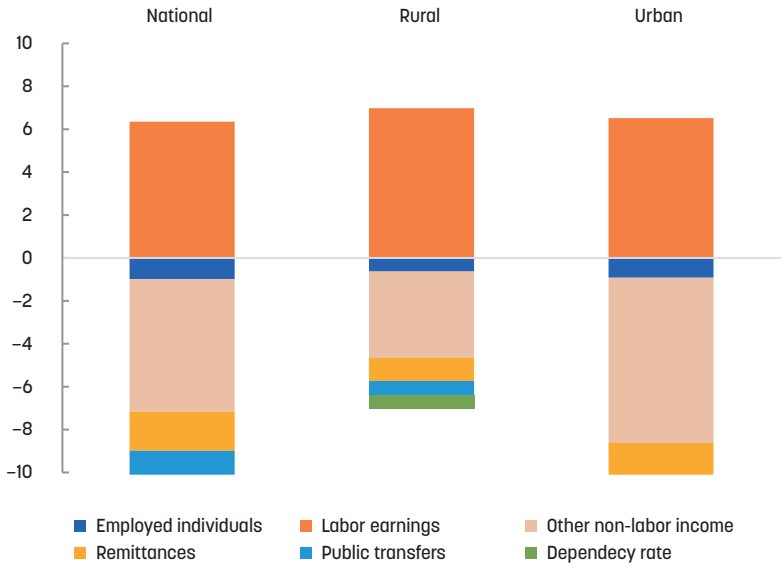
FIGURE 3.1. Projected Poverty Headcount under Baseline Conditions 2019–50 (percentage of the population)



Source: World Bank projections based on Encuesta Permanente de Hogares de Propósitos Múltiples (EPHPM) Consolidada (2019)
Note: Poverty headcount in 2019 differs from the official poverty rate published by Instituto Nacional de Estadística (INE) because a) the data source is EPHPM Consolidada instead of the June round; b) weights from census data were used; and c) underreporting of public transfer was corrected for.

It is expected that the already large urban-rural divide will widen in the long term (2019–2050) as rural poverty stagnates while urban poverty declines. In 2050, poverty in rural areas is expected to be at the same level as in 2019, driven mostly by sizable declines in labor earnings, particularly through lower production and productivity in the agriculture sector. Nonlabor income (pensions, the value of housing services, and capital income) is expected to partially counteract earnings losses, with public transfers, remittances, employment, and demographic factors playing a marginal role in mitigating the negative income shock. Conversely, the projected decline in urban poverty is expected to be driven primarily by substantial increases in nonlabor income, an effect reinforced by the benefits of remittances, public transfers, and the demographic dividend. These positive income effects more than compensate for the sizable decline in urban labor earnings. Employment is expected to contribute very little to these poverty dynamics (figure 3.2).

FIGURE 3.2. Decomposition of Changes in Poverty by Income Source under Baseline Scenario 2019–2050 (in percentage points)



Source: World Bank projections based on Encuesta Permanente de Hogares de Propósitos Múltiples (EPHPM) Consolidada (2019)

The Gini index is predicted to increase in both rural and urban areas over the 2019–2050 period and lagging regions may lag behind even further. The Gini index is expected to increase from 49.1 to 51.3 between 2019 and 2050. Similar to poverty, most inequality outcomes are driven by sectoral labor market outcomes that are projected by the World Bank's Macroeconomic and Fiscal (MFMod-C) model. For example, income inequality is mostly driven by a rising earning inequality, as suggested by a rising Gini index of labor incomes, in both urban and rural areas. This is driven by higher annual wage growth in some high-paying jobs (–0.8 and –1.9 percent in low-paying sectors such as agriculture and mining, respectively, compared to 1.13 percent in low but slightly higher-paying sectors such as manufacturing, to 1.2 percent in higher-paying sectors such as transport and communication), assuming no change in social policy.

Considering a moderate economic growth strategy, and despite the current incidence of natural hazards already causing significant damage to household welfare and poverty, there is no significant variation in the poverty effect of income losses as a result of the higher downside risks from natural hazards.[88] In 2050, the combined losses of excess rain, strong winds, and earthquakes will likely increase poverty by 1.9 percentage points and extreme poverty by 0.9 points, compared to a hypothetical scenario without natural disasters. This small variation can be explained by two opposing effects. On the one hand, lower labor earnings in the worst-case scenario are driving up poverty. On the other hand, employment in poor-dependent sectors such as agriculture is increasingly driving poverty down.[89] The expected effect of a higher poverty rate in the worst-case scenario is slightly lower for extreme poverty. These simulations indicate that the current incidence of natural hazards already does significant damage to household welfare and poverty, but the increased risk from natural hazards could have a relatively smaller additional impact on poor households.[90]

If adaptation measures were to be financed from budget resources, an accelerated reconstruction of capital stock is not expected to have a significant effect on poverty reduction; indeed, it could even increase poverty if resources are reallocated from other spending priorities. Increasing the budget to implement reconstruction projects is expected to have a limited effect on poverty reduction (about 0.1 percentage points in 2050). Reallocating resources from other spending priorities could actually increase poverty (as in 2030) if resources are taken away from other pro-poor projects and spending. Accelerated reconstruction has a relatively larger effect in the worst-case scenario, suggesting that this policy could reduce the downside risk from natural hazards but risk aggravating the opportunity costs of reallocated funds.

A post-disaster transfer in the form of a universal cash transfer is expected to significantly reduce poverty and erase the negative effect of being in a scenario with downside risks of natural hazards. Interventions such as safety nets, food aid, or cash transfers could provide short-term protection against shocks and decrease the reliance on coping mechanisms that might have adverse effects in the long run. A universal transfer of 0.06 percent of GDP is expected to decrease poverty by 2.3 percentage points by 2030 and by 3.1 points by 2050. This transfer would be enough to bring poverty below the simulated rates in a baseline scenario. For example, poverty in 2030 and 2050 with a universal social transfer is expected to be 37.8 percent and 35.6 percent, respectively, while poverty under the baseline scenario is 40.3 percent and 38.7 percent.

This simulation exercise points to several conclusions regarding the cost of climate inaction and the optimal policies to protect the poor from natural hazards and climate change. First, although future economic growth would likely continue to reduce poverty, it will not by itself sustain poverty reduction efforts. Second, not all climate policies benefit poor households or have a significant impact on poverty. Some mitigation policies can have adverse distributional effects. Also, adaptation policies and investments need to have progressive features built into them in order to address the adaptation needs of poor and vulnerable households and to benefit and protect them. As a starting point, geographic targeting (as proposed in the next section on spatial assessment) can help direct adaptation investments to municipalities with a high risk of poverty and hazards. It is also critical to mitigate the expected increases in poverty through the social protection system, with well-targeted transfers playing a key role in poverty reduction. Consistent with international evidence,[91] the fiscal cost of reducing poverty through a well-targeted transfer compared

[88] See Box A5.2 for a description of scenarios.

[89] There is no available information on the impacts of water scarcity and heat on agriculture. However, previous evidence from Honduras has shown that agricultural employment serves as a buffer, for example, in times of crisis.

[90] Results should be interpreted with caution as they depend on modeling assumptions and are subject to the caveats mentioned above.

[91] Karen Macours, Patrick Premand, and Renos Vakis, Transfers, Diversification, and Household Risk Strategies: Experimental Evidence

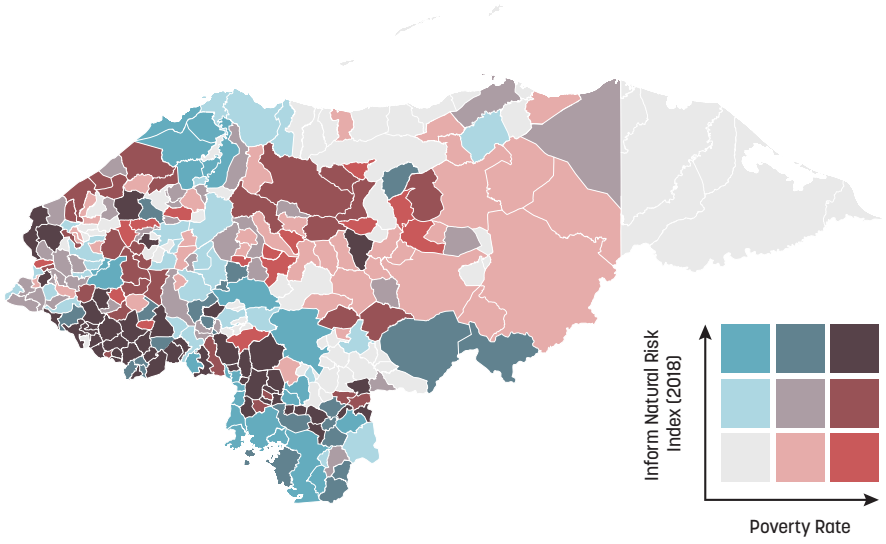
to a universal transfer is significantly lower in Honduras and can help vulnerable households protect themselves against the negative impacts of climate shocks. However, the design of the targeted transfer, its implementation, and its fiscal costs need to be carefully considered.

Although climate mitigation policies have not been modeled because Honduras is not a significant emitter of GHG emissions, carbon pricing has the potential to reduce inequality in Honduras. A preliminary analysis using partial consumption data for Honduras[92] shows that a carbon price from the Paris-aligned scenario (assuming no recycling of additional revenues) would reduce inequality in Honduras but would also reduce consumption (an average consumer surplus loss) by at least 2.5 percent of total consumption across the income spectrum (0.27 percent in the scenario). Urban households would face a larger impact from the carbon price than rural households. Transfer plans to households would help reduce consumption effects, but further analytical work is needed to assess the optimal design for this.

3.2.2. Spatial Patterns of Poverty and Risks

The CCDR team used updated poverty maps to analyze spatial correlations between the moderate poverty headcount ratio and several natural and human hazards. Maps show that certain parts of the country are more at risk of natural hazards than others; and the distribution of poor population partly coincides with these areas. Subnational risks of natural hazards are positively correlated with the subnational rate of moderate poverty. Also, municipalities with high rates of moderate poverty headcounts and risks of natural hazards are concentrated along the southwestern border, but there is not a full overlap of both populations. When differentiating by type of natural hazard, it becomes clear that municipalities with moderately high poverty rates are marked by higher risk of droughts and landslides, but this does not seem to hold for earthquakes. Nevertheless, municipalities with moderately high poverty rates are less exposed to typhoons and flooding, and vice versa. Importantly, there is a large overlap between the poorest municipalities and those with the lowest capacity to manage the consequences of natural and human hazards. As a result, some municipalities are affected by a triple vulnerability (figure 3.3).

FIGURE 3.3. Bivariate Map of Poverty Headcount Ratios (2019) and Subnational INFORM Natural Risk Index (2018)



Source: World Bank preliminary estimates based on consolidated household survey (2019), Population Census (2013), and the Subnational INFORM Risk Index (2018). The gray area in the east of the country represents municipalities for which no poverty estimates are available.

with Lessons for Climate Change Adaptation, Policy Research Working Paper 6053 (Washington, DC: World Bank Group, 2012).

[92] The most recent consumption survey for Honduras was used to carry out a distributional analysis of carbon pricing. However, it dates back to 2004. A more recent survey, The Household Survey for Multiple Uses (https://www.ine.gob.hn/V3/ephpm), from 2019, is available but it lacks consumption expenditure data. The World Bank team therefore employed an imputation method to partially simulate consumption for 2019. Available consumption expenditure items include food, durable goods, other nonfood household products, and electricity. Among the items not included are direct fuel expenditures. Incomplete consumption data do not allow for the estimate of the full magnitude of the consumption incidence impacts of carbon pricing.

Since targeting interventions to lagging areas may help with the country's exposure to hazards and with its capacity to adapt to human and natural hazards, municipalities that have low coping capacity should be prioritized. National or neighborhood intervention strategies targeting crime may be the ideal strategies in the case of Honduras, because of the heterogenous causes and at the municipality level. On the other hand, there is a clear positive relationship between moderate poverty rates and the risk of natural hazards at the municipality level. Municipality-level adaptation policies and investments and social policies can help reduce these vulnerabilities, particularly in those municipalities that also have lower coping capacity. To further develop this territory-based approach in lagging regions, a deep dive into the social and climate vulnerabilities of these regions and their populations is also needed (see the example in section 4.6 on a people-focused approach in the Atlantic Region).

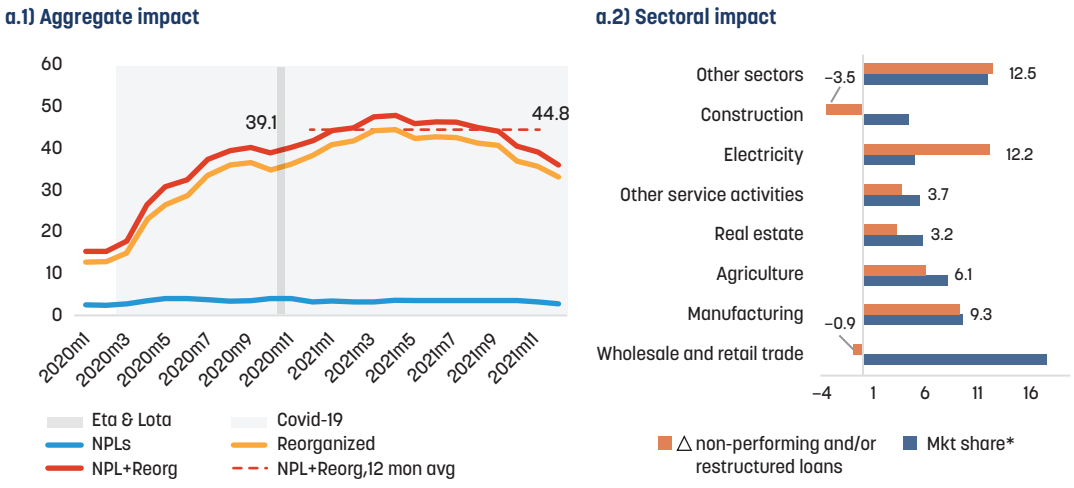
3.3. Risks of Climate Impacts and Policies to the Financial System

Over the past decade, several natural hazards have had a significant impact on the banking sector. The most impactful events over the past decade were hurricanes Eta and Iota in late 2020. Although identifying the precise impact has been complicated by the concurrent incidence of the COVID-19 pandemic, estimates suggest that the hurricanes resulted in a 5.7 percentage point increase in the share of nonperforming and restructured loans. The negative effect on banks' credit portfolios spread across virtually all economic sectors, reflecting the breadth and depth of the disruptions caused by the two hurricanes. Loans to the electricity, manufacturing, and agriculture sectors—which together account for roughly one-third of total corporate loans—experienced the sharpest deterioration (see panels a1 and a2 of figure 3.6).

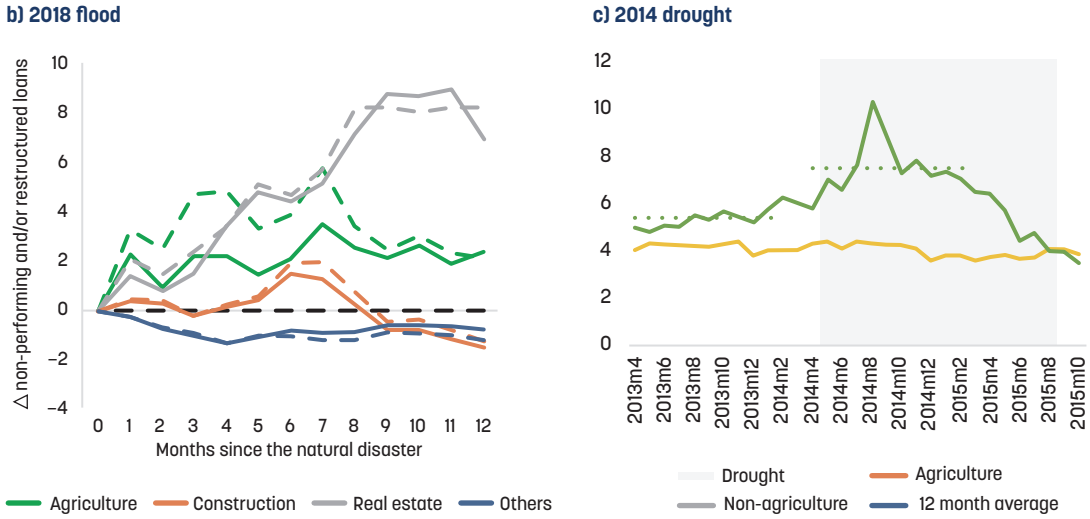
Compared to hurricanes, the impacts of past droughts and floods on the banking sector were lower and more concentrated. For floods—as evident by an excess rainfall event in October 2018 that affected over 12,000 people—impacts were concentrated in the agriculture, real estate, and construction sectors, and in 6 out of Honduras's 18 departments (see panel b of figure 3.6). The flood triggered an estimated 2.8 percentage points average increase in nonperforming and restructured loans in the affected sectors and departments.

The impact of droughts is even more concentrated, and events in the recent past have shown a significant impact only on loans to the agriculture sector. For example, a major drought in 2014—during which an estimated 70 percent of crops were lost—resulted only in an average increase of 1.9 percentage points in agriculture nonperforming loans (NPLs), while loans in other sectors were not affected.[93] The impact on the agriculture sector, however, was enduring, and it took more than 18 months before agriculture NPLs returned to their predrought level (see panel c of figure 3.4).

FIGURE 3.4. Historical Impact of Large-Scale Natural Hazards (in percentage of total credit)



[93] To estimate the causal effect of floods and droughts on banks' asset quality, the CCDR employed a difference-in-difference approach.



Source: Original figure for this publication is based on National Banking and Insurance Commission data.
Note: Panel c—Solid lines reflect the whole country; dotted lines reflect departments declared to be in a state of emergency. For presentation purposes, the names of the economic sectors were shortened: "Agriculture" stands for "Agriculture, hunting and forestry," and "Real estate" stands for "Real estate, renting and business activities." Mkt = market; NPL = nonperforming loans; reorg = reorganized (loan).
* Average market share for 2020, panel a.2.

Climate change is likely to increase the impacts of natural hazards on the financial sector in the future. The CCDR analyzed the potential impact of future natural hazards using information on past impacts, transmission channels, and scenarios of future hazards.[94] Using as a benchmark the impact of Hurricanes Eta and Iota on borrowers' creditworthiness, 6.2 percent of all loans could turn to nonperforming, which would trigger a 3.3 percentage point drop in banks' Tier 1 capital ratio by 2050.[95] Climate change could also increase the expected annual damage from river floods by 13 percent by 2050.[96] However, the risk to the banking sector from these bigger floods remains moderate. Moreover, although longer and more frequent droughts are expected to affect agriculture production, the impacts on the banking sector's credit quality are expected to be limited. Even severe drought scenarios are unlikely to induce substantial capital losses in the banking sector.[97] In contrast to their effect on banks, droughts and floods may have a sizeable impact on financial cooperatives in Honduras, given their prominent role in providing credit to the agriculture sector.[98]

Honduran banks have sizeable exposure to transition-sensitive sectors. The Honduran banking sector is significantly exposed to high-emission sectors—transport, agriculture, electricity generation, mineral products, and waste management.[99] They account for 29 percent of sector-wide loan exposure. The largest number of loans in these sectors are in manufacturing (10.7 percent of total loans), agriculture (7.2 percent), electricity generation (4.9 percent), and construction (4.8 percent). A significant share of large firms in the high-emission sectors are exporters, which means that in addition to domestic developments and

[94] For example, in a scenario where international efforts to stop global warming are insufficient (current policies), the 1-in-100-year expected damage from tropical cyclones in Honduras is expected to increase by 18 percent by 2050. Based on the Network for Greening the Financial Sector (NGFS) Climate Impact Explorer—Climate Analytics current policies scenario for a 1-in-100-year expected damage from tropical cyclones in Honduras, median values.

[95] Tier 1 capital refers to the core capital held in a bank's reserves. The exercise used a static balance sheet (as of June 2021) approach, which assumes that balance sheets are "frozen" over time, allowing only balance sheet changes that directly result from risks materializing in the scenario. The exercise is not intended to provide forecasts or assign probabilities to certain outcomes. The impact of hurricanes on NPLs and capital adequacy ratio are obtained by using coefficients on the link between past hurricane events (particularly Eta and Iota) and nonperforming loans and NGFS scenarios on the evolution of hurricane damage going forward. The estimate uses the NGFS Climate Analytics Climate Impact Explorer's current policies scenario for 1-in-100-years expected damage from tropical cyclones in Honduras for 2050. A more detailed discussion of the modeling approach and different scenarios are available in the forthcoming World Bank report, Greening the Financial Sector in Honduras: Climate Risk Assessment.

[96] Based on NGFS Climate Analytics Climate Impact Explorer's current policies scenario for annual expected damage from river floods in Honduras, median values.

[97] As in the case of floods, this exercise was calibrated using a past large-scale event (2018 flood and 2014 drought). We employed a difference-in-difference approach that allows for identifying the causal effect of natural hazards on banks' asset quality.

[98] Data constraints do not allow similar exercises to be performed for this market segment. However, aggregate data show that cooperatives present an overall credit portfolio comparable in size to the sum of loans granted by the left half of the distribution of banks. For additional details, see Comisión Nacional de Bancos y Seguros (CNBS), Reporte de Inclusión Financiera en Honduras (2021).

[99] Emissions data for Honduras from the United Nations Framework Convention on Climate Change (UNFCCC) Greenhouse Gas Inventory show that almost 85 percent of total emissions come from transport, agriculture, electricity generation, mineral products, and waste management.

conditions, they could also be affected by carbon pricing plans implemented by major trading partners such as the European Carbon Border Adjustment Method. Any major effort to reduce the country's GHG emissions will require mitigation efforts from these sectors. Policy measures such as a carbon tax or preference shifts could disproportionally affect the operating costs, profitability, and financial risks of firms in these sectors if the transition is disorderly.[100]

Further strengthening the climate-related supervisory and regulatory toolkit is important to enhance the financial sector's resilience in the face of physical and transition risks. The current approach to safeguarding financial stability in response to disasters relies primarily on *ex-post* loan restructuring and regulatory forbearance programs. Although this approach has helped prevent systemic crises in the past, adjustments to increase the efficiency and minimize the distortions of the interventions are recommended. In the short term, this includes improving current practices by creating *ex-ante* principles that guide loan restructuring and regulatory forbearance programs. In the medium to long term, Honduras could work toward developing a more comprehensive DRF framework. Further, it is important to address remaining data gaps to improve the granular assessment of climate risk exposures and run stress tests and scenario analysis exercises. Incorporating climate risk aspects into the regulatory and supervisory framework, and improving the disclosure of climate risks, are also essential. Finally, steps should be taken to continue to strengthen the sector's internal capacity for handling climate risks and to promote awareness. (See appendix section A.7 for further details on the methodology of this analysis.)

[100] Disorderly scenarios refer to the higher transition risk that stems from policies being delayed or divergent across countries and sectors.

4. Sectoral Priorities and Inclusive Considerations for Climate Policy and Development

Main messages

- Crop area expansion, the main strategy to increase agriculture sector production, drives deforestation and increases net emissions. Although needs vary by the scale of each farmer, CSA, cross-sectoral measures, and focusing on public goods and services can increase productivity, reduce emissions, and raise the economic complexity—that is, the variety and sophistication of export crops produced in the sector—of agricultural production.

- Climate adaptations to rural roads would be highly beneficial—it would improve access to key services and catalyze rural development. At the same time, because transport is one of the high emissions sectors, there are feasible pathways for low-carbon development of this sector.

- Improving the management of forest, coastal, and marine ecosystems is crucial and requires significant efforts to develop better data, more transparent information systems, and more detailed plans that would facilitate a green and blue economy.

- The energy sector holds great synergic potential through energy-efficiency measures and investments in renewable sources such as hydroelectric dams. However, mobilizing these investments will be difficult without fixing the sector's current financial and technical unsustainability.

- An inclusive, people-centered, and territory-based approach to climate policy—incorporating local governance and knowledge and livelihood diversification—supported by an inclusive institutional framework and land rights recognition, would not only improve the impact of climate policies but also help reduce the heightened impacts of climate change on the most vulnerable.

Effective formulation of climate policy requires incorporating considerations from key economic sectors that hold opportunities for resilience, adaptation, and mitigation and that also generate development co-benefits. This chapter outlines priority areas of engagement for water management, agriculture, transport, and energy. Additionally, the chapter explores the cross-sectional topic of improving social inclusion in the lagging area of the Atlantic Region. It provides a people-focused, territory-based analysis of social vulnerabilities, differentiated threats from natural hazards, and opportunities for inclusion.

4.1. Water Management and Infrastructure for Increased Resilience

Water is at the core of a broad range of climate-induced impacts in Honduras. Increasing water scarcity, increasing unpredictability of supply, reduced water quality, increasing rainfall intensity, more frequent floods and droughts, and the mounting inability of the natural ecosystems to mitigate these impacts will have serious human and economic consequences in the coming years. A Climate and Economic Analyses for Resilience (CLEAR) Water Diagnostic of Honduras undertaken for this CCDR shows that, although Honduras ranks reasonably well on access of services compared to other countries in the region, it is poorly prepared to face climate risks (see Appendix section A.9). The country is particularly challenged in its financing and governance of the water sector and should be better prepared in infrastructure and efficiency. In this sense, water management is a key aspect of climate change and development policy.[101]

[101] The sectoral priority of water management focuses on the broader topics of sustaining resources, delivering services, and building resilience. More details are included in the deep-dive appendix, on water management. Further analysis could be undertaken to build on the information provided in this report, including a) analysis of the water supply sector and its institutional strengths, weaknesses, and challenges; b) assessment of climate impacts in nontraditional sectors such as tourism and industry; and c) an extended heterogeneity analysis of water impacts in the country and particularly, the combined impacts in Tegucigalpa.

Honduras is well endowed with water—9,450 cubic meters per person[102]—but its availability is influenced by high levels of geographical and seasonal variability. About 170.43 cubic meters per capita of water, including surface water and groundwater, is withdrawn for use each year.[103] Of this total, about 20 percent is municipal (domestic) consumption; 73 percent is used for agriculture, mostly irrigation, and 7 percent for industrial uses. Honduras's current water stress level, at 4.6 percent, is relatively low for the region.[104]

Water availability and stress vary considerably by location and season, and are much more constrained in certain regions such as the aptly named Dry Corridor. Up to 33 percent of the population resides in the Pacific drainage basin, a watershed flowing toward the Pacific and that coincides partially with the Dry Corridor, where only 14 percent of the national renewable water resources flow. Seasonal variability is also relatively high in Honduras, compared to other countries in the Latin America and the Caribbean Region, with greater extremes in the Pacific basin. The Honduran portion of the Central American Dry Corridor is particularly vulnerable to seasonal variability. The Dry Corridor is dry for 4–6 months a year. Up to 4 percent of the area is affected by severe levels of drought, and an additional 54.3 percent by high levels of drought.[105]

Honduras regularly faces droughts and floods that affect crop production, livelihoods, and health. An estimated 27.3 percent of the national territory is routinely subjected to droughts.[106] On the other extreme, high rainfall intensity, combined with mountainous geography, generates large amounts of runoff that can cause severe flooding. The Sula Valley is nationally the area with the highest flood risk[107] (mostly associated with hurricanes)[108] but it also experiences annual river overflows—with serious impacts on the surrounding communities. Estimates suggest that, between 1915 and 2015, there were up to 2,000 deaths in the valley, with over 250,000 people and more than 100,000 ha of cropland affected.[109] In addition, flooding always carries the risk of the increased incidence of water-borne diseases (diarrhea, other gastrointestinal diseases, cholera) often of epidemic proportions. Urban areas with dense populations and poor access to sanitation and water services are especially vulnerable.

Honduras does not have the infrastructure—storage capacity, irrigation, flood protection—to adapt to current and expected climate variability or to improve its low quality of water and low efficiency of use. Honduras has limited superficial storage capacity, with an estimated 605 cubic meters per capita. By comparison, Nicaragua has almost 5,000 cubic meters per person and Panama 2,200 cubic meters. Water use efficiency is also low, with industrial efficiency significantly lower than in peer countries (by a factor of almost 10). Honduras could potentially irrigate up to 500,000 ha,[110] but the country lacks the needed infrastructure to fully exploit this, and most of the available irrigation capacity is already being used.[111]

Although irrigation performance in Honduras is better than in regional peers in terms of yields and infrastructure utilization, so far only about 15 percent of the country's irrigation potential has been developed, and only 4.6 percent of cultivated land is under irrigation. Most irrigated land (77 percent) is controlled by the private sector, primarily large agribusinesses. The government has plans by 2038 to significantly increase the area of irrigated cultivated land by up to 400,000 ha from the current estimated 81,600 ha[112]—including for smallholders—through improved

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[102] Third in the region after Panama (32,703 cubic meters per capita) and Costa Rica (22,602 cubic meters per capita).

[103] From the World Bank climate and water indicators dashboard. Although the dashboard uses the Aquastat database, the per capita consumption estimate differs. Aquastat presents a value of 225.3 cubic meters per capita, while UN Water uses a figure of 203 cubic meters per capita.

[104] This is Sustainable Development Goal (SDG) indicator 6.4.2, also known as water withdrawal intensity. The value was obtained from the SDG 6 portal. It tracks how much fresh water is being withdrawn by all economic activities, compared to the total renewable freshwater resources available. It also considers environmental flow requirements.

[105] World Bank and Government of Honduras, Estrategia de seguridad hídrica del corredor seco en Honduras (2019).

[106] This territory consists of 146 municipalities located in 13 departments of the south, west, and central parts of the country (except for the 18 departments, Islas de la Bahía, Atlántida, Colón and Gracias a Dios). Secretaría de Recursos Naturales y Ambiente (Mi Ambiente+), Plan Nacional de Reducción de Riesgos por Sequía (2021).

[107] In the municipalities of Potrerillos, Pimienta, San Manuel, San Pedro Sula, and La Lima, the central part of the valley is the area most affected by floods.

[108] IDB and ECLAC, Evaluation of the Effects and Impacts Caused by Tropical Storm Eta and Hurricane Iota in Honduras (2021).

[109] The DesInventar data cover the period from 1915 to 2015, plus data from Eta and Iota in 2020.

[110] That would be 100,000 ha in the interior highlands, 340,000 ha in the lowlands of the Atlantic slope, and 60,000 ha in the lowlands of the Pacific slope.

[111] Aquastat, the FAO's global information system on water and agriculture, reports that of the approximately 6.1 percent of the cultivated area that is equipped for irrigation, 90 percent is currently irrigated. This means that most of the available irrigation capacity is already in use. Water Action Hub reports that Honduras could potentially irrigate 500,000 ha, of which only 73,000 ha are presently irrigated, and this is largely controlled by the private sector.

[112] Target 3.4 of the 2014 National Plan, Legislative Decree No. 286–2009.

water resource management.[113] In the past three years, water service discontinuity has been the norm for most households in the capital, Tegucigalpa. Costs are often borne by those who can least afford it, since they are more likely to live in underserved slum areas, less likely to have household storage systems, and therefore more likely to rely on costly tanker services for water of unknown quality.

There is an increasing trend of groundwater extraction, but a poor understanding of the groundwater resources in general and no systematic groundwater monitoring. The current estimate is that 8 percent of irrigation water is from aquifers. However, there is evidence of increasing, undocumented, groundwater extraction by private agribusiness, generally located in valleys where larger rivers flow. This negatively affects the water resource needs of IPADs and other smallholder farmers. Although most wells are registered,[114] very few are reported to the General Directorate of Water Resources to be registered for an official contract, and extraction is not documented.[115] In coastal areas, overextraction of groundwater is already leading to salinization.

Honduras does not yet have the enabling framework for effective integrated water resource management (IWRM). However, there are several national initiatives aimed at protecting certain basins and micro-basins that produce water for human consumption and are experiencing accelerated degradation. There are currently 968 "declared" microwatersheds in the country.[116] They play a critical role in maintaining the hydrological regime by securing ecosystem services, including water, that supply and benefit the Honduran population. Fewer than 10 percent of these watersheds have management plans, and fewer than 3 percent have compensation mechanisms that focus on water resources.

There is great potential in Honduras to manage water more effectively and use it more efficiently. For this, more investments are needed to improve water governance and close the water-infrastructure gap. The first step is to ensure that water is managed in an integrated way within a consolidated IWRM framework. Appropriate management instruments need to be in place, and available to stakeholders. Some efforts are already under way and can be used as a steppingstone to determine a realistic strategy moving forward. Three key areas to develop would be a) better water sector knowledge management, particularly of basins and aquifers that are under stress and have high value; b) understanding and managing groundwater better; and c) identifying, protecting, and restoring key water sources and their recharge areas, potentially through payments for ecosystem services and nature-based solutions. A territory-based, decentralized, and locally led approach is fundamental to the success of water management.

Second, it is important to promote water efficiency and equality in access in all sectors, but with a special emphasis on the agriculture sector. Designing effective measures to reduce losses in distribution systems is the most critical step, followed by demand management and the promotion of overall efficiency measures. First, large commercial farms—the largest water consumers—could be approached and technically supported to pilot tailored water-use efficiency measures. A second approach would be to support the government's objective of 400,000 ha by 2038 of irrigated cultivated areas and design irrigation systems that are climate-resilient and efficient, linked to a permit and payment system, and including smallholders. Third, water losses are often caused by inadequate maintenance of canals and distribution systems. On that front, strengthening and funding water user organizations to maintain these systems could extend their life span while reducing water inefficiencies.

Finally, Honduras should increase its infrastructure stock and make it more climate-resilient. Securing enough stock and the climate resilience of water infrastructure, including irrigation and water storage systems, will be critical in ensuring the continuity and quality of water supply. At the same time, promoting a transition to renewable energy, while recognizing the importance of the hydroelectric sector, could help realize a resilient and low-carbon future (see section 4.5. on electricity).

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[113] Ministry of Agriculture and Livestock (2011).

[114] These agribusinesses are certified for export, and part of the certification project includes identifying the primary irrigation water source.

[115] The Directorate has about 1,200 water contracts, although it is estimated that there may be up to 9,000 or 10,000 wells currently exploiting water.

[116] These microwatersheds are spread across the country but concentrated in the central and northern areas O. Raudales, Entrevista Departamento de Cuencas de ICF (T. Peña, interviewer) December 21, 2021.

4.2. Productivity and Vulnerability Challenges of the Agriculture Sector and Deforestation

Two agricultural subsectors are especially prevalent in Honduras: The first is commercial, based on the national market and the export of products such as coffee, sugarcane, palm oil, and melons, produced mostly on large farms.[117] The other subsector is characterized by farms smaller than 5 ha in area and dedicated to basic grains and some livestock. The first subsector accounts for the majority of Honduras's agricultural land and most of agriculture's GDP (90 percent) and export earnings, while the second accounts for more than 70 percent of the farms, but only 9 percent of farming area. These smallholder farmers are usually poor and produce subsistence crops that are important for food security. Low productivity from extensive livestock grazing occurs on the large farms, but the products are mainly oriented to national consumption. Although challenges and needs vary by type of farming, the low productivity and its vulnerability to natural hazards is common across both the commercial and smallholder subsectors.

Both subsectors have an impact on deforestation and GHG emissions. Changes in the productivity of most crops over time are largely due to expansions in cropped area rather than improvements in yield (with some commercial crops being exceptions). This leads to deforestation, with palm oil and coffee being particularly responsible.

Several factors contribute to the low productivity of the agriculture sector and its vulnerability to climate events. Limited public spending on services that support the generation and adoption of improved technologies and practices is one of the main factors behind stagnant productivity and low climate resilience. Agricultural research and development (R&D) represents only 0.17 percent of agricultural GDP, the lowest in the Latin America and the Caribbean Region.[118] According to the most recent agricultural survey available, undertaken in 2007–2008, only 4.2 percent of farmers receive technical assistance. Limited access to financing, especially among smaller farmers, also restricts not only the use of inputs and technology, but also investments in adaptation and mitigation of the sector. The agriculture sector represents only 7.5 percent of the total credit portfolio of banks.

In addition to productivity issues, agricultural production systems in Honduras have low economic complexity and diversity. The productivity of agrifood export commodities is generally low, and the composition of export products has changed little during the last decade. It lacks substantial diversity and is concentrated on primary goods, without an evident increase in aggregated value or economic complexity over time. The low complexity and limited export basket, concentrated in primary goods, increases vulnerability to volatile changes in international commodity prices.[119] These characteristics, coupled with low access to financial products to manage risk, and a still lagging adoption of CSA technologies and practices, increase the sector's vulnerability to natural hazards.

Family farmers face additional challenges. Most family farms are found on hillsides with poor or degraded soils and minimal access to markets, inputs, improved seeds, water, credit, technical assistance, and roads.[120] Except for large-scale maize production in western Honduras, which tends to be irrigated, maize, beans, sorghum, and coffee are mostly rainfed, which makes farmers vulnerable to seasonal hunger, climate variability, and long-term climate trends. Poor land management practices—in combination with limited access to key assets and services (such as electricity and technical assistance), credit, information, and modern production technology—exclude many small farmers, especially IPADs, from the benefits of modernization that would lead to economic growth. This limits their ability to take advantage of market opportunities.

[117] Coffee, produced predominantly on small farms, is an exception.

[118] Based on the latest available Agrimonitor data, Honduras also has the lowest share of agriculture general services support devoted to R&D in Central America—36.27 percent—compared to 53.91 percent in Costa Rica, 53.54 percent in El Salvador, 45.05 percent in Nicaragua, 42.43 percent in the Dominican Republic, 37.44 percent in Guatemala.

[119] Banco Interamericano de Desarrollo (BID), Honduras: Retos de Desarrollo del País (Washington, DC, BID: 2018).

[120] B. Serna, "Honduras: Tendencias, Desafíos y Temas Estratégicos del Desarrollo Agropecuario (Serie Estudios y Perspectivas No. 70 (Mexico City: United Nations Economic Commission for Latin America and the Caribbean (ECLAC), 2007).

Honduras is faced with the challenge and opportunity of transforming its agriculture sector to increase its productivity and economic complexity while reducing deforestation, GHG emissions, and its vulnerability to climate and economic risks. It will be critical to consolidate and build upon the successes of agricultural exports, and at the same time improve the livelihoods, food security, and climate resilience of family farmers. Overall, commercial agriculture would benefit from a diversification of export opportunities and products, jointly with an expansion of secondary processing and value addition. Family agriculture, in turn, could be strengthened through multifaceted approaches that promote the adoption of good agricultural practices and technologies, increase capacities, and improve access to finance and markets, among other benefits. In the case of both commercial and family agriculture, it will be important to mainstream climate-smart technologies and practices in agricultural and livestock production while reducing land expansion into forests and exploiting on-farm opportunities for more sustainable land use management.

Honduras has proven that, with the appropriate set of agriculture policies and investments, the rural poor can improve their food, nutrition, and income security while reducing the GHG emissions of key value chains in the agrifood sector. An example of a success is COMRURAL, a flagship initiative of the government, which has been able to mainstream climate-smart and nutrition agricultural practices through investment in agribusiness plans developed and presented by family farmers.

Honduras currently has a number of programs that could serve as vehicles for the transformation of its agriculture sector, and planning and implementing these programs will benefit from more integrated, cross-sectoral coordination and institutional strengthening. Institutional coordination will be especially important in the transportation, agriculture, water, and forestry sectors to increase agricultural productivity and reduce forest loss. Similarly, strengthening the Ministry of Agriculture, including its capacity to manage climate change adaptation and mitigation, will be instrumental in consolidating the government's long-term vision, public policies, and programs around climate change for the agriculture sector.

4.3. Sustainable Management of Forests and Coastal and Marine Ecosystems

Honduras faces challenges of forest loss and reduced forest productivity. Historically, the forestry subsector has contributed to the country's GDP through the production of whole logs—mostly pine—sawn wood, and resin and its derivatives, mostly for the domestic market. But limited management and capacities have resulted in declining production and shrinking contribution to the GDP. For example, in 2000, the sector's contribution to GDP was 2.12 percent, compared to 0.66 percent in 2019.[121] Low productivity is largely driven by an estimated 80,000–100,000 ha of forest loss a year.[122] Two climate scenarios, RCP 4.5 and RCP 8.5, predict a significant reduction in net primary productivity in tropical forests in Central America as a result of rising temperatures, less precipitation, and droughts. This not only has direct repercussions for the income-generating capacity of the low-income households associated with these forests, but also increases the threat of a decline in water availability in Honduras.

Purposeful efforts are needed to improve information that can support the implementation of the forest-related commitments included in the NDC. Current data are not enough to systematically track the progress of the NDC commitments nor the development objectives related to the forest sector. Furthermore, the information currently generated does not accurately reflect the real contribution of the forests to the economy and misses important environmental goods and services.[123] Improving the information and data on the economic value of the forests and their contribution to GDP and job generation can support these efforts. This implies the development of national accounting and monitoring systems that incorporate climate and other nonmarket ecosystem goods and services.

[121] Instituto Nacional de Conservación y Desarrollo Forestal, Áreas Protegidas y Vida Silvestre (ICF), Anuario Estadístico Forestal de Honduras, 2019, 34th edition (Tegucigalpa, Honduras: ICF, 2020).

[122] Global Forest Watch, https://www.globalforestwatch.org/dashboards/country/HND.

[123] CCDR technical note: A compilation of forest economics data to better understand the contribution of forests to Honduras's economy.

The planning of coastal and marine areas is fundamental to the economy and well-being of the country. Honduras stands out as an important producer of crustaceans and marine and coastal aquaculture (14th in the world),[124] with 10.5 percent of the national territory being wetlands, located mostly in the coastal areas.[125] Climate change effects are expected to affect the health of coastal and marine ecosystems and the local and IPAD communities that depend on them for their livelihoods.

Although coastal areas are mentioned in national policies, the focus on sustainability in the country's long-term vision is skewed toward terrestrial planning and development, and needs to be revised to embrace the development of a resilient blue economy by adding concrete components. It is essential to review fishing policies and tourism promotion in coastal areas. This includes existing buildings and infrastructure to ensure that short and medium-term climate predictions are taken into consideration. Although the fishing law mandates the establishment of fishing management plans, it is important to ensure that they can be adapted to current and expected changes in temperature and subsequent changes in the migratory patterns of commercially important species.[126] It will also be critical to have adaptation measures for marine and coastal protected areas, with periodic assessments. Promoting a blue economy and coastal/marine resilience needs the establishment of clear, interinstitutional coordination structures among the different ministries and bodies that have control over the uses of coastal and marine resources and the active participation of coastal communities in the process of planning and prioritizing actions related to the blue economy. Fostering a blue economy model for Honduran coastal areas can support resilience to climate change and a low-carbon path.

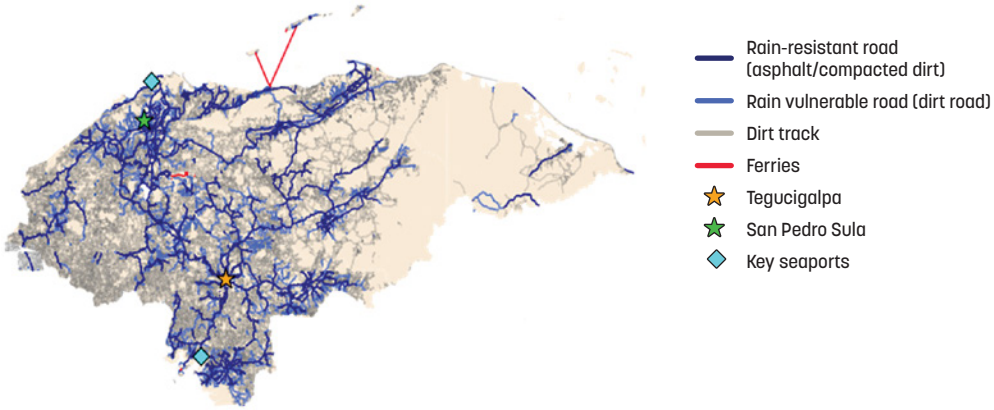
4.4. Opportunities for Green, Inclusive, and Climate-Resilient Transport Infrastructure

4.4.1. Infrastructure Resilience as a Catalyst for Rural and Inclusive Development

Rural accessibility to critical services is low and highly uneven in Honduras. Overall, the central corridor that runs from the Fonseca Gulf to Puerto Cortés has good accessibility to critical services and economic opportunities and is where most of the country's population is concentrated. Rural departments have much poorer infrastructure, leading to lower levels of transport accessibility. In particular, nationally, around 5.3 million people (51 percent of total population) live within the "golden hour" (60 minutes) of travel time to a hospital. This number drops to only 27 percent and 7 percent of the population in the Colón and Gracias a Dios (La Mosquitia) departments, respectively (see figure 4.1).

FIGURE 4.1. Rural infrastructure and accessibility in Honduras

a) Road network in Honduras

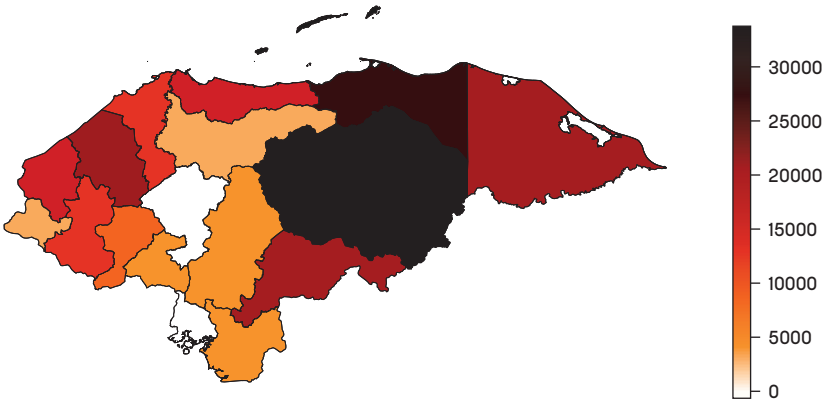


[124] FAO, El Estado Mundial de la Pesca y la Acuicultura: La Sostenibilidad en Acción (Rome: FAO, 2020), https://doi.org/10.4060/ca9229es.

[125] MiAmbiente, "Política Nacional de Humedales de Honduras 2018–2028" (Honduras: MiAmbiente, Tegucigalpa, 2017).

[126] See Fishing Law (Honduras), articles 1, 2, 8, 10, and 15. The law mentions climate variations, but it does not make specific references to climate change modeling.

b) Number of People Who Would Lose Access to Hospitals Due to Climate Change Impacts



Source: World bank staff estimates

Climate disruptions to existing transport infrastructure hinder rural accessibility, which will be exacerbated by climate change but can be mitigated through interventions. The regions that suffer the most are Olancho, Colón, Gracias a Dios, Lempira, and Intibucá because dirt roads and tracks, more common in these areas, are less resilient under assault by floods than the tarmacked roads in urban areas (figure 4.1). This translates into rural inaccessibility. Currently, climate impact causes 300,000 people a year to lose" golden hour" access (that is, 60 minutes travel time) to a hospital. By the end of the century, that number is expected to reach 500,000 people a year.[127] The probability of these disruptive events occurring is expected to rise by a factor of 1.25 by around 2050 and by a factor of 2.3 by the end of the century under the Shared Socioeconomic Pathway (SSP) 245 and 585 scenarios.[128] Colón and Cortés are particularly exposed to floods, while the mountainous departments of Lempira and Intibucá are frequently exposed to landslides. Climate adaptation interventions that could slow these impacts include a) compacting dirt tracks into gravel roads, b) paving vulnerable gravel roads, c) improving the drainage on vulnerable roads, and d) protecting roads against landslides.

The CCDR team modeled four different road adaptation scenarios to determine their costs and potential benefits.[129] i) Dirt road improvement (scenario 1) includes compacting 5,447 kilometers of vulnerable dirt tracks (those that are flooded in the 1-in-5 years flooding scenario) into gravel roads. ii) Paving roads (scenario 2) assumes the paving of 1,251 kilometers of vulnerable gravel roads (those that are disrupted in the 1-in-50 years flooding scenario) and rebuild 115 bridges. And iii) spot improvement (scenario 3) improves the drainage of dirt tracks that are flooded, with a return probability of 1-in-50 years to have a drainage capacity that is similar to compacted gravel or paved roads by building culverts. A total of 3,180 kilometers of dirt tracks would be improved to a level of drainage comparable to that of compacted gravel roads, and 5,783 kilometers improved to a drainage capacity equivalent to a paved road. iv) Landslide protection (scenario 4) involves protecting compacted gravel and paved roads that are vulnerable to landslides, with a return probability of once every 50 years.

Recent World Bank analysis shows that climate adaptation of rural roads has a high social and economic impact, since they could prevent 100,000 to 150,000 people a year from losing access to hospitals (that is, not being able to reach any hospital due to road disruptions). That number is expected to increase by the end of the century. A similar number of people would also gain high-quality access to hospitals because close to 120,000 additional people would then live within one hour of a hospital. The message is similar

[127] The duration of this loss of access is difficult to estimate because it depends on many factors such as the type, length, and intensity of the hazard, making it highly uncertain. The values correspond to an expected annual calculation using flood events from six return periods, ranging from 5-year events to 100-year events.

[128] Shared Socioeconomic Pathways (SSPs) were used in the IPCC Sixth Assessment Report and complement the RCPs. An exploration of future climate change scenarios considers different levels of emissions and climate change along the dimension of the RCPs, while additionally considering different socioeconomic development pathways.

[129] Maintenance costs are given over 20 years, with a yearly discount factor of 6 percent. Additional details can be found in the transport sector deep dive (2021), unpublished internal World Bank document, available upon request.

when considering access to schools, although the impacts are less dramatic because school coverage is better than hospital coverage. Additionally, about US$10 million of agricultural production would gain access to markets annually with these interventions.

Climate adaptation of rural roads favors IPADs in particular. Nearly 8 percent of them, or 54,000 people, do not have access to a hospital, even without considering the effects of floods or landslides. During the rainy season, this figure rises to 13 percent or 94,000 people due to climate-related disruptions of the road network. In contrast, these figures are respectively 2 percent and 5 percent for the whole population. When looking at the demographics of beneficiaries of climate adaptation of rural roads, the suggested adaptation interventions allow at least 20,000 IPADs to access a hospital, representing 14 to 23 percent of all beneficiaries who gain access to a hospital thanks to climate adaptation of rural roads, while accounting for 7 percent of the total population.

Although the investment needs for the climate adaptation of rural roads are substantial in Honduras, they would bring large financial benefits by reducing maintenance and rehabilitation costs. These scenarios are expected to cost from US$1 billion (for the drainage improvement scenario) to US$3 billion (for the dirt track improvement scenario), including maintenance costs over 20 years (with a discount factor of 6 percent). However, because the roads become more resilient, they result in savings of around US$50 million per year, adding up to approximately US$600 million over 20 years using the same discount factor. Note that this figure is a lower bound because it does not take into account savings in repairs after damage from landslides, and other economic benefits such as income generation through road construction labor, increase in agriculture productivity, or human capital gains.

Overall, a cost-benefit analysis suggests that the best form of intervention is to undertake combined improvements: improve drainage in the flood-prone Atlantic coastal areas, and protect targeted stretches of road against landslides in the rest of the country. The cost of this mixed intervention should be below US$1 billion, including maintenance costs over 20 years. Around US$50 million will be saved in repair costs per year under this scenario. Incentivizing private sector investment could also support the climate-resilient agenda. Additional policy recommendations include a) employing a lifecycle approach to climate resilience of infrastructure, b) including and empowering local communities through rural road works, c) leveraging and incorporating nature-based solutions to protect assets, and d) introducing innovative maintenance and rehabilitation approaches to rural roads.

4.4.2. Low-Carbon Development in the Transport Sector as a Catalyst to Healthier Communities

The transport sector is one of the largest contributors to climate change emissions in Honduras. Within the sector, road transport accounts for the most GHG emissions despite growing emissions from maritime and air transport. If it follows its current growth path, the transport sector would generate emissions of more than 6,650 kilotons of CO_2 by 2038, representing a greater than 55 percent increase over that period. Freight is one of the biggest sources of emissions in the transport sector, accounting for an estimated 2,300 kilotons of CO_2 emissions in 2021—53.7 percent of the sector's total emissions.[130] Two other important sources of emissions are the increasing rates of population growth and motorization in Honduran cities. Passenger travel accounted for 1,500 kilotons of CO_2 emissions in 2021, approximately 35.1 percent of the sector's emissions. Motorization rates have grown rapidly, with 2018 data showing a 10.6 percent annual increase in newly registered vehicles and 178,000 new vehicles registered within 12 months.

Legislation to reduce emissions in the sector, however, has been limited. Honduras has been involved in regional and global initiatives to begin developing an environment that would enable the introduction of EVs into its vehicle fleet but has not yet adopted the necessary legislative and regulatory framework for this. Policy actions are limited to a single electric-bus pilot program in Tegucigalpa. Moreover, the first charging stations for EVs were introduced only in 2020. Honduras also had plans to introduce bus rapid transit (BRT) services to replace

[130] These data were provided by the Secretaría de Energía (SEN) of Honduras and elaborated on internally by the CCDR team.

traditional bus operations. In Tegucigalpa, the infrastructure for a BRT line has been built but service has yet to be introduced after negotiations with existing bus operators broke down. The infrastructure, recently utilized in the aforementioned electric bus pilot program (November 2021–February 2022), appears to remain operational.

The transport sector in Honduras has feasible pathways to reduce GHG emissions in the short term, with low investment needs and large synergies with development goals. The CCDR background analysis on transport considered four policy options that could reduce CO_2 emissions by up to 17.8 percent by 2038: a) introduce stricter emissions standards for new vehicles in road freight and passenger transport (scenario E4 in table 4.2), b) develop new policies that could encourage the adoption of EVs (scenario EV in table 4.2) in road freight and passenger transport, c) introduce BRT services (scenario BRT in table 4.2) in major cities, and d) build bicycling infrastructure to promote active mobility (scenario AM in table 4.1). Costs for these strategies, estimated using regional benchmarks for cost values, time of implementation, and emissions reductions, are in the range of government spending capacity, with a total cost of US$2.173 billion from 2023 to 2038, equivalent to 0.6 percent of GDP per year. These policies for reducing carbon will produce an estimated US$302 million in economic co-benefits during that same period in the form of reductions in road accidents, traffic congestion, damage to roads, and deaths from air pollution.[131]

TABLE 4.1. Impacts of Four Emissions Reduction Scenarios, 2023–2038 (millions of each unit)

	BAU	Scenario 1 (E4)	Scenario 2 (EV)	Scenario 3 (BRT)	Scenario 4 (AM)
Estimated cost (US$ 2021)	N/A	33.2–55.3	381	1,700	17.5–43
Estimated fossil fuel usage (BOE)	218.7	212.3	213.3	210.3	217
Cumulative emissions (tCO_2)	90.3	87.7	86.8	86.6	89.6
Economic co-benefits (US$ 2021)					
Reduced air pollution	0	7.88	10.87	18.81	1.68
Reduced road accidents	0	0	0	99.97	21.57
Reduced congestion	0	0	0	1.47	0.30
Reduced road damage	0	0	0	115.86	23.43
Total co-benefits	0	7.88	10.87	236.11	46.99

Source: World Bank staff estimates
Note: BAU = business as usual; EVs = electric vehicles; BRT = bus rapid transit; AM = active mobility; BOE = barrel of oil equivalent; tCO_2 = tons of carbon dioxide. For scenario 1, this does not include additional costs such as land purchase and construction. For scenario 2, cost covers only investment needs until 2030. Scenario 3 includes only capital costs for BRTs.

4.5. A Low-Carbon, High-Resilience Energy Sector

Electricity generation from renewable sources can increase access to reliable electricity while supporting mitigation of GHG emissions and increased resilience of vulnerable populations. Honduras has been historically vulnerable to floods and droughts, particularly in areas of the country such as the Sula Valley or the Dry Corridor. In this sense, hydroelectric plants can have multiple objectives: generate clean energy, protect populations from natural hazards related to water, and provide energy storage capacity that can facilitate the expansion of wind and solar power by limiting the risk of power supply variability. In 2021 nearly 66 percent of the total electricity generated on the national grid came from renewable sources, with hydropower (39 percent) representing the largest share (11.6 percent from private hydro plants).[132] Nevertheless, less that one quarter of Honduras's technically feasible hydropower potential of 12,500 gigawatt hours has been developed.[133]

In addition, because of the high risk of flooding in the Sula Valley, construction plans have been prepared for the El Tablón, Llanitos and Jicatiuyo dams over the last several decades, with the shared objective of electricity generation and flooding minimization in the area, while also supporting irrigation during

[131] World Bank, "Transport at the Core of the Climate and Development Action in Honduras," internal study (year).
[132] Operador del Sistema (ODS), Informe Preliminar Anual de Operación del Mercado y Sistema Eléctrico Nacional 2021 (Honduras: ODS, 2022), INFORME_PRELIMINAR_ANUAL_OPERACION_Y_SISTEMA 2021.pdf (ods.org.hn).
[133] The calculation of Honduras's technically feasible hydropower potential is based on data from the Hydropower and Dams International journal.

droughts. Additionally, off-grid renewable solutions are already starting to be used[134] and can support the government objective of increasing access to reliable electricity by complementing on-grid energy in difficult-to-reach areas.

However, the financial and technical situation of Honduras's electricity sector has been and remains unsustainable, which constrains the potential for additional investments in renewable energy and resilience. First, serious governance issues and mismanagement have resulted in unreliable and poor electricity service, while deficits and the growing debt of the National Company of Electrical Energy (ENEE) pose a macrofiscal liability for the country (see box 4.1). Second, the electricity sector is characterized by low efficiency and significant losses of generated electricity, which further undermines ENEE's financial condition. Finally, existing investment initiatives to develop renewable sources of energy suffer from contractual deficiencies that have reduced the competitiveness of renewable energy. In the 2019 Global Competitiveness Index, Honduras ranked 110th out of 141 countries in electricity access and 103rd in electricity service quality. Frequent power outages compel firms and some households to purchase expensive generators, further increasing costs, diminishing operational efficiency, and diverting revenue away from the ENEE. Resolving this situation would help improve the business environment and attract new investors.

Box 4.1. Unsustainable Situation of the National Company of Electrical Energy

Opportunities to enhance the institutional capacity and management of the ENEE are at the root of the energy sector challenges, and its deteriorating financial situation threatens the country's macrofiscal stability, absorbing fiscal space that could be used on productive investment and responding to shocks. ENEE's persistent deficit stems from a combination of structural weaknesses and high commercial losses stemming from inefficient distribution and transmission systems, expensive and limited generation capacity, misaligned tariffs, and weak institutional and governance frameworks. These factors have exacerbated structural challenges related to the financial sustainability of the utility. The ENEE's deficit, which represents the key challenge for Honduras meeting its Non-Financial Public Sector deficit ceiling, rose markedly in 2018 as distribution losses remained high, investment in infrastructure remained insufficient, and higher oil prices raised production costs in the run-up to the COVID-19 crisis. The sector's dysfunctions pushed the debt stock of the ENEE to nearly US$3.7 billion (13 percent of GDP) in 2021, up from US$1.9 billion in 2016 (9 percent of GDP), while the company's fiscal deficit stood at 1.1 percent of GDP. The utility also faces significant direct and contingent liabilities. As a result, the ENEE is the source of significant fiscal costs and risks to the government and a threat to the country's macro stability.

Minimizing inefficiency in the energy sector, both in terms of reducing energy losses and introducing energy-efficient measures, is essential to advancing on emission reductions and improving the financial sustainability of the sector. The ENEE's combined technical and nontechnical distribution and transmission losses were estimated at 36 percent in 2017 and remain elevated at 33.4 percent in 2021—the highest level in Central America—compared to 8 percent for best industry practice.[135] In terms of energy-efficient measures, a 2019 World Bank analysis estimates that reductions of 148.6 megawatts of peak demand at 19 hours (8 percent of BAU in 2030) could be generated with consumer savings close to US$422.7 million by 2030.[136] Behavioral change interventions could also be used to promote more efficient consumer habits,[137] although further analysis is needed to identify the most suitable for Honduras.

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[134] Lucia Luzi, Abdul-Farouk Bemba Nabourema, Bryan Bonsuk Koo, Dana Rysankova, and Elisa Portale, Honduras: Beyond Connections: Energy Access Diagnostic Report Based on the Multi-Tier Framework (Washington, DC: World Bank Group, 2019).

[135] World Bank, Honduras Public Expenditure Review 2022 (Washington, DC: World Bank, forthcoming.)

[136] World Bank, "Assessment on Energy Efficiency Potential and Demand-Side Management Opportunities in Honduras" (Washington, DC: World Bank Group, 2019).

[137] Energy Sector Management Assistance Program (ESMAP), "Integrating Behavior Change in Energy Efficiency Programs in Developing

The Special Law for Electric Energy will not be enough by itself to reform the sector. Despite various legal and regulatory reforms enacted over the past decade, little progress has been made in terms of improving the ENEE's financial situation. Governance and structural and institutional reforms are needed to prevent the ENEE from accumulating further liabilities. This would first require some short-term priority measures: a) prepare a credible loss-reduction program, including measures to improve governance, and take adequate steps toward its early implementation; b) take steps to implement the 2019 tariff regulations based on an updated cost-of-service study with a view to reaching full cost-recovery by 2027, and c) adopt a time-bound program to eliminate arrears from public-sector consumers. Improvement of the ENEE's financing strategy to reduce risk concentration could also help improve the quality and affordability of the energy supply. Addressing these issues would enable the country to strengthen the electricity sector and attain fiscal sustainability.

Despite current challenges in the electricity sector, the expansion of generation capacity from renewable sources has steadily increased over the last several decades. Nevertheless, the contractual costs of these investments have been relatively high when compared with competitively sourced renewables in the Latin America and the Caribbean Region. The installed capacity of renewable energy has been on an upward trend, from 25 percent in 2005 to 65 percent in 2018, and the government has set a target of 100 percent decarbonization by 2050.[138] However, the costs of renewable energy are relatively high, which has led the new administration to call for contract renegotiations. There is a case to be made for a transparent and competitive framework for future-generation investments, which would give Honduras the full benefit of the continued downward trend in the costs of variable renewable-energy technologies.

4.6. A People-Focused Approach to Reducing the Differentiated Impacts on the Most Vulnerable: The Case of the Atlantic Region

Climate change does not harm everyone equally. Historically excluded groups, such as indigenous peoples and IPADs, are more exposed and more vulnerable to the effects of climate change owing to their chronic poverty, land tenure insecurity, tendency (often as a last resort) to live in high-risk areas, and restricted access to infrastructure, social safety nets, and decision-making spaces. But over time, climate change itself can in turn also amplify these structural inequalities, putting these groups in an even worse position to cope with the challenges of a warming planet. A people-focused approach to climate change, one that takes full account of people's vulnerability, exposure, and coping capacity, is therefore crucial to reducing the differentiated effects of climate change.

Although the challenges of climate change for IPADs merit a countrywide or parallel cross-regional analysis, this CCDR concentrates on the Atlantic Region as a case study because it is relatively understudied. Acknowledging that there are also IPAD and vulnerable groups outside this region, the aim is to develop concrete recommendations that can be applied nationwide. Although other lagging regions deserve to be studied further, the Atlantic Region was prioritized in this report for four reasons: a) the Atlantic Region's status as a relatively understudied area compared to lagging regions in the Dry Corridor; b) the high proportion vulnerable populations in the form of ethno-racial minorities who are less represented in other geographic studies; c) strong operational engagements and relations with local stakeholders that helped inform the analysis; and d) the region's lack of representation in quantitative data, particularly of La Mosquitia, which often results in its invisibility in the policy-making process. Although other lagging regions, including those within the Dry Corridor, should be considered in future studies, the vision is that the analysis undertaken in this in-depth study could be replicated in those other regions, and the policy recommendations applied nationwide.

The Atlantic Region of Honduras, home to 28 percent of all IPADs in the country, including the Miskito, Garifuna, Tolupan, Pech, the Tawahka people, and other groups, is rich in natural and cultural diversity. The IPADs of this region face multiple barriers, including limited access to basic services and development opportunities, a long history of discrimination, encroachment on their land, and heightened exposure to natural hazards. Yet as effective agents and custodians of natural resources and carriers of ancestral knowledge, these groups have a critical role to play in ensuring that the country can fulfill its climate change commitments.

Countries: A Practitioner's Guide" (ESMAP Knowledge Series, No. 029/20, (Washington, DC: World Bank Group, 2020).

[138] Government of Honduras, Hoja de ruta de la Política Nacional de Energía al 2050 (Government of Honduras, 2021).

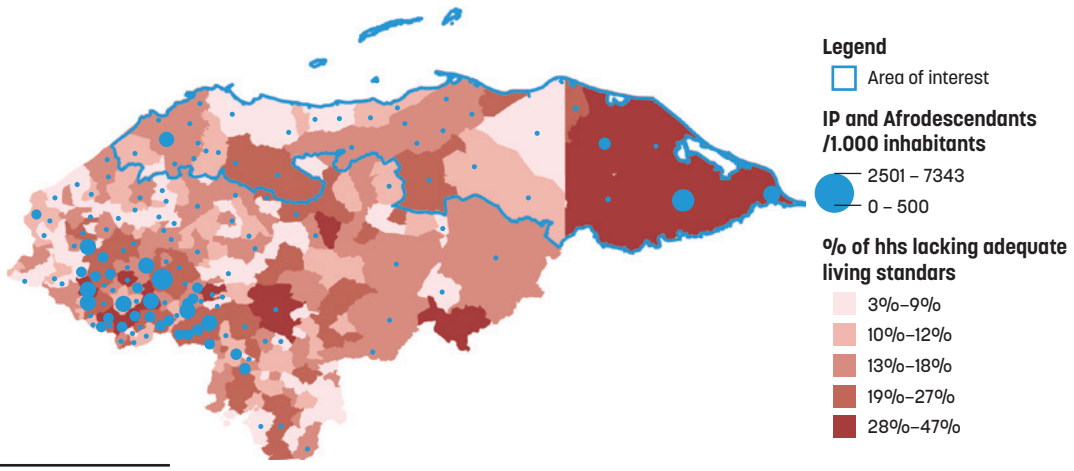
The vulnerability of ethno-racial minorities in the Atlantic Region has three dimensions: a) socioeconomic vulnerability, b) spatial inequalities and climate threats, and c) coping capacity.[139] Following the recommendation in chapter 3, this section focuses on an area suffering from high socioeconomic vulnerability, high exposure to natural hazards, and low coping capacity, zeroing in on their specific needs. These three dimensions reflect the long-standing forms of exclusion that have affected ethno-racial minorities in the Atlantic Region, and now mark their current and future challenges in managing climate change.

Social exclusion exacerbates climate change impacts by increasing the monetary and nonmonetary losses of IPAD communities following climate events. These losses are directly related to the socioeconomic vulnerability of these groups, which stems from their poverty, historical exclusion, lack of infrastructure, and narrow set of options for diversifying their livelihoods (figure 4.3, panel a). High poverty and high deprivation levels enable higher impacts after a climate-induced event, such as food insecurity, malnutrition, and stunting, loss of homes and assets, and a high incidence of water and vector-borne diseases. IPADs depend heavily on economic sectors that are vulnerable to natural hazards such as agriculture, fishing, tourism, and forest resources.

Similarly, although the capacity to develop new infrastructure is low for most municipalities in Honduras, it is lowest in territories with a high prevalence of ethno-racial minorities. This means that road density, electricity coverage, and digital connectivity are restricted or inadequate. In fact, although 5 out of 10 Hondurans live within 60 minutes of a hospital, in Colón only 3 people out of 10 do, and in La Mosquitia (Miskito territory to the east of Atlantic Region) fewer than 1 in 10 do.[140] In addition, 9 out of 10 inhabitants of La Mosquitia do not have access to agricultural markets (see section 4.6 on rural road resilience). Furthermore, especially in the LULUCF and agriculture sectors, adaptation and mitigation measures can affect IPAD populations; for example, their livelihoods can be affected (or even restricted) by the additional costs, technology, or training needed to transition to more sustainable productive practices.

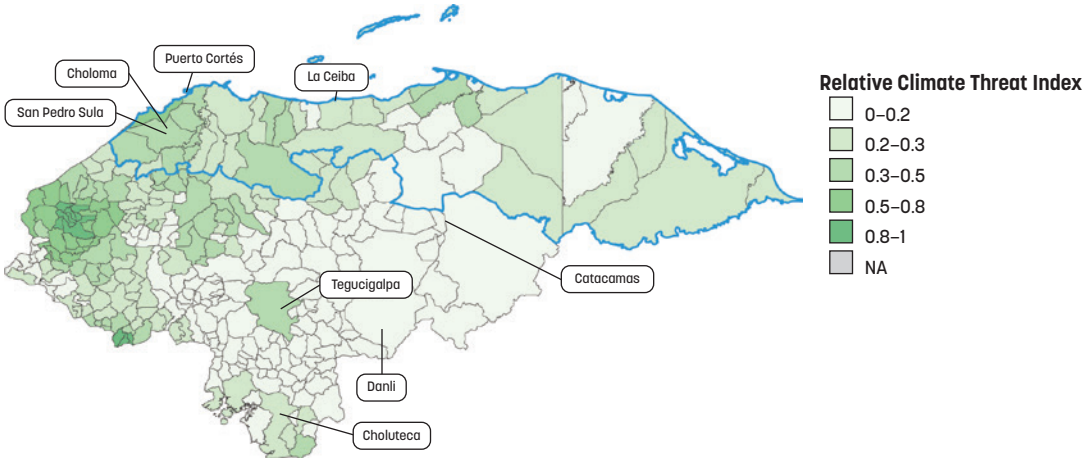
Social exclusion is also territorially concentrated in Honduras, and spatial segregation overexposes certain populations to higher climate threats from natural hazards. A relative climate threat index created with different remote and satellite data shows that the risks of natural hazards are unevenly distributed within municipalities in the Sula Valley Region, the Western Region, and the Atlantic Coast Region, with the Atlantic Coast Region being among the most vulnerable. The Atlantic Coast is also an area with a high concentration of indigenous peoples and IPADs, which make these populations vulnerable to the impacts of climate change compounded with dire socioeconomic conditions (figure 4.2, panels a and b). Furthermore, impacts from natural hazards could increase the scarcity of assets such as productive land, and exacerbate other factors that exclude IPADs from land ownership, aggravating existing land disputes and escalating land-grabbing practices in IPAD territories.

FIGURE 4.2. Overlap of Living Standards and the Relative Climate Threat Index



[139] The three dimensions are consistent with the Sendai Framework for Disaster Risk Reduction and draw loosely on the INFORM subnational model for Honduras last published in 2018 by COPECO and the National Risk Management System. This framework also resonates with the model put forth in the 2017 World Bank report that focuses on vulnerability (how much people lose when they are hit by a natural hazard), exposure (to either low-intensity or severe events), and coping capacity (the ability to recover and bounce back following a disaster). Stéphane Hallegatte et al., Unbreakable: Building the Resilience of the Poor in the Face of Natural Disasters (Washington, DC: World Bank, 2017).

[140] The Miskito are the most populous indigenous group in the region. Over 76,000 Miskito reside east of La Mosquitia, near the Nicaraguan border.



Sources: Panel a. Original calculations for this figure using data from the 2013 National Housing and Population Census. Panel b. Original calculations for this figure using data sources described in "The Climate Crisis is a Social Crisis: Social Exclusion and Climate Change in Honduras's Atlantic Region," Dartmouth Flood Observatory (1985–2020), number of floods; NASA's Global Earthquake Hazard Frequency and Distribution (1976–2002), average earthquake exposure; Hansen Global Forest Change (2000–2019), absolute loss of forest coverage; Socioeconomic Data and Application Center (SEDAC) (2018), average levels of fine particulate matter; University of Delaware-NOAA (2007–2017), average monthly temperature variation; University of Delaware-NOAA (2007–2017), average monthly precipitation variation; Global Drought Monitor (2017–2020), Standardized Precipitation-Evapotranspiration Index (SPEI); NASA's Global Landslide Catalog (2007–2017), number of landslides.
Note: Rescaled sum of risk indicators: air quality, temperature and precipitation variation, forest loss, drought, flood, earthquake, and landslide risks. A higher value represents greater risk to environmental uncertainty and natural hazards. Panel a. A higher value represents the percentage of households lacking adequate living standards, and larger circles represent higher rates of IPADs.

Severe natural hazards can also force people to migrate. Large segments of the Atlantic Region are prone to climate-driven out-migration that produce emigration clusters, including La Mosquitia and the Pech-Mayanga-Tawakha territories (on the east side of the Atlantic Region). In these areas, declining water availability and crop productivity could fuel out-migration, which in turn could further deteriorate the socioeconomic conditions of those who live there and worsen their land tenure insecurity. But even within the same region, it is important to understand the heterogenous characteristics of the population and the underlying causes of exclusion in order to better target policies. For example, La Mosquitia has clusters of residents with high social vulnerability and high levels of climate-driven out-migration. In contrast, Garifuna populations experience high social vulnerability and equal levels of exposure to natural hazards, yet they do not have high levels of climate-driven migration, perhaps because of their cultural attachment to land and place and/or the prohibitive costs associated with displacement. Thus, although policies for those who are emigrating or being displaced should focus on supporting safe movement, parallel measures for those who choose to stay need to emphasize sustainable use of land, water, and forest resources.

Low coping capacity at the community and individual levels also stems from limited assets, particularly land tenure insecurity, and high levels of crime and violence. In rural areas, IPAD communities are vulnerable to land tenure insecurity—due to historical inequalities, land-grabbing practices, and conflicting legal frameworks—that reduces their resilience and coping capacity. With a large percentage of IPADs lacking land tenure security, disputes could increase as fertile and arable lands become scarcer, limiting IPADs' resilience even more. This could be further exacerbated by the lack of citizen engagement mechanisms for climate-related decision-making and the vacuum in regulations to ensure the free, prior, and informed consent of indigenous peoples.

Despite these challenges, IPADs have a critical role to play in ensuring that the country can fulfill its climate change commitments, and have developed a range of grassroots coping capacities that can be strengthened and scaled up. These coping mechanisms range from environmental and conservation practices to networks of support built around grassroots organizations, remittances, and collective mechanisms to rebuild and recover after shocks. This progress in participatory mechanisms, although localized, warrants more direct support to scale up some of these initiatives as part of a national strategic plan to mitigate and adapt to climate change. Decision makers can learn from IPADs' knowledge and practices to design better adaptation and mitigation policies—from their use and management of forest

resources to techniques for improving crop production and protecting biodiversity. Furthermore, to scale up these initiatives, communities must play an active role in the protection of natural resources and a voice in climate policy-related decisions.

This points to the need for a strategic plan to ensure the inclusion of rural and ethno-racial groups in climate change adaptation and mitigation policies, one that focuses on improving their success and strengthening the resilience of these groups. The Honduran legal framework, both in its Climate Change Law and in its NDC, recognizes the importance of social equity and the participation of women, youth, children, and IPADs, and this recognition can be used as a foundation to build such a strategic plan.

The first step will be strengthening the institutional framework and umbrella policies to ensure inclusion. This will involve tackling the statistical invisibility of these groups and accelerating timeframes. It will also mean assigning an adequate budget to responsible agencies for the NDC social inclusion commitments, highlighting their urgency, and establishing adequate channels for the active participation of IPADs in decision-making, including through the finalization of regulations to ensure the free, prior, and informed consent of indigenous peoples. Since the Honduran government is currently engaged in the process of providing greater prominence to social inclusion aspects, it is paramount to ensure that institutional responsibilities, goals, and timeframes are clear, with adequate incentives for interinstitutional collaboration across different tiers and with stakeholder coordination.

Additionally, given the heightened vulnerability of women, youth, children, indigenous peoples, and IPADs to the effects of climate change, an action plan must incorporate strategies to help them to build resilience through three main levers: a) enhancing and protecting land and cultural endowments, including by promoting community-led early-warning systems and participatory floodplain mapping, and by establishing the institutional framework for the sustainable use of resources in line with IPADs' development priorities; b) ensuring livelihood diversification and a just transition through a targeted trust fund to offset the side-effects of LULUCF and agriculture policies, livelihood diversification toward greener jobs through community-driven models, and identification of unlivable hot spots to support safe migration; and c) promoting locally led investments in lagging areas by identifying existing investment gaps through spatial analysis, and building on local organizations such CODELs to promote locally led climate action.

5. Development and Policy Priorities

Main messages

- Umbrella policies and actions should be pursued in parallel with sectoral policy reforms and investments to accelerate climate action and reduce the vulnerability of the poorest.
- Strengthening Honduras's institutional and policy framework and improving its capacity for planning and implementation are short-term, cross-sectoral recommendations. They involve integrating NDC priorities into institutional plans and budget planning and allocation, improving capacities, upgrading monitoring systems, and developing further analyses to better understand Honduras's progress in achieving NDC commitments, including in the areas of policy effectiveness and readiness.
- Developing a proactive and strategic fiscal policy is urgently needed to build resilience to the impacts of climate change while balancing DRM, reconstruction, and adaptation with other development needs. This will involve developing the Climate Change Financing Strategy committed to in the NDC, implementing a more proactive fiscal policy for DRM, and enhancing the financial sector's role in managing climate-related risks.
- Adaptation and mitigation policies need to consider the differentiated impacts of climate change on excluded groups, as well as explore the opportunities of locally led climate action. The CCDR team recommends targeting actions to reduce the vulnerability of, and impacts to, excluded groups in a phased manner, starting with the establishment of the systems needed to implement the social inclusion commitments in the updated NDC, strengthening locally led investments in lagging regions, and enhancing adaptive social protection systems.
- Sectoral policy priorities include promoting agriculture productivity and resilience and sustainable landscape practices, fostering low-carbon and climate-resilient transport systems, and developing reforms to improve the sustainability of electricity generation and promote investments in hydropower and energy efficiency.

This CCDR prioritizes policies that are highly aligned with Honduras's development objectives and could have a significant impact on the country's resilience and development. These effects could occur through institutional capacity strengthening or adaptation and mitigation measures that have the capacity to generate co-benefits; that are in the areas where reforms are most urgent yet are feasible over the medium term; and where more private sector participation is possible. The CCDR recognizes the importance of incorporating social inclusion as an overarching theme and cross-cutting issue to ensure that the differentiated needs of vulnerable groups are considered, particularly those of ethno-racial minorities.

Although additional planning and analysis is required to prioritize and make more informed decisions about the available policies, including estimating their expected impacts and investment needs, this CCDR maintains that Honduras could achieve a more resilient and green future by pursuing the policy priorities outlined below. The recommendations in this chapter are not exhaustive, and additional recommendations and details are included in a number of deep-dive reports that are available on request.

5.1. Priority A: Robust Institutional and Policy Framework and Improved Capacities for Planning and Implementation

The priorities and policies outlined in this CCDR all require a broad institutional framework and implementation capacity for them to become a reality. In that sense, this CCDR found that, although there have been significant advances in the policy and legal framework, these are still not well integrated

with one another, nor with the operational plans of the implementing agencies, nor with budget allocations. Furthermore, improved capacity and robust monitoring systems are needed to implement and track the progress of plans and objectives. Recommended policies in this priority area include the following:

» **Consolidate the policy framework and improve capacities for NDC implementation.** Establishing and operationalizing the supporting legal, policy, and institutional framework are key to facilitating the adequate, timely implementation of NDC commitments. NDC implementation could benefit from clarifying the responsibilities and objectives for the leading agencies and institutions in each sector related to NDC commitments, and from establishing specific institutional units dedicated to climate change. It is also critical to improve the identification, design, and transparency of information about mitigation measures in Honduras, and linking them to existing sectoral strategies (forests, energy, and so forth). This could be supported by strengthening the policy framework to include the objectives and measures of the PNA, NDC, and other strategies in agencies' strategic institutional plans and budgets.

  In addition, completing the development of key climate change planning instruments such as the National Plan of Decarbonization and the National Program for Adaptation (NAPA), as well as operationalizing existing laws such as the Water Act, will consolidate the national climate change agenda and the needed governance. The revision of the policy framework focused on the sustainable use of natural resources, and the consolidation of climate change planning instruments, also provide opportunities to consider and integrate IPADs' development priorities.

» **Assess Honduras's progress in achieving NDC commitments, including the area of policy effectiveness and readiness.** Further analyses are needed to better understand whether existing and recently introduced policy measures are adequate and operationalizable to achieve NDC commitments. These analytical insights could help articulate where improvement is needed. The assessment could focus on whether a) the suggested targets and goals are supported by practical policy measures and investments; and b) Honduras is on track in the implementation of policy measures and targets to achieve its NDC commitments.

5.2. Priority B: Proactive and Strategic Fiscal Policy

With limited fiscal resources, a critical fiscal policy need is to balance DRM, reconstruction, and adaptation with other development needs. The financing needs for disaster response, adaptation, and other urgent development priorities will likely exceed Honduras's current fiscal capacity, so a comprehensive financing strategy is needed. It is recommended that Honduras implement a more proactive fiscal policy (instead of a reactive policy based on *ad hoc* reallocations within the budget in response to a just-occurred disaster) that could combine adaptation investment with financial strategy to quickly finance additional expenditure for reconstruction, relief, and transfers to vulnerable populations impacted by natural hazards. This approach could support Honduras's disaster resilience and partially alleviate the fiscal tradeoffs through a) disaster risk financing instruments (for example, insurance, reserve funds); b) tax revenue mobilization measures including through carbon taxation; and c) external climate financing in the short term, to the extent that it helps to improve debt sustainability by reducing the country's susceptibility to shocks. Fiscal buffers and reforms that reduce the exposure of public budgets to climate shocks should be explored, as well as regulations and incentives for private sector investments in resilience. Reductions in natural hazard-induced volatility would positively affect debt sustainability and could thus unlock additional fiscal space.

The design of the fiscal strategy should be based on a careful prioritization across all development objectives, capacity constraints, and sustainability considerations (macroeconomic, fiscal, social, and environmental). Prioritization could be guided by efficiency, gap, and cost-benefit analysis, along with the analysis of distributional effects, to promote an efficient, growth-enhancing and just adaptation to a changed climate. These analyses, together with the quantifying of climate investment and financing needs, could help evaluate alternative adaptation, mitigation, and DRF strategies and to make more informed decisions about the available instruments. Adaptation investments should be selected based on their potential co-benefits, such as alleviating poverty or enhancing development, because many aspects of economic development

further facilitate adaptation to climate change (for example, better education and health, or more efficient use of water).[141] Mitigation investments should be focused on synergic opportunities with adaptation and development. Important parts of this approach include the development of the Climate Change Finance Strategy and the implementation of the DRF Management Strategy, including assessing the investment needs of the NDC's commitments and the liability costs of natural hazards, and integrating them into the planning of the medium-term budget. Further analysis should be carried out to assess the potential climate change-driven losses, contingent liabilities, and adaptation needs arising from the key economic sectors, particularly the agriculture sector. Given the government's fiscal constraints, a more involved role of the private sector and better investment management tools could support the climate change agenda.

Further recommended policies under this priority area include the following:

» **Develop and operationalize the Climate Change Financing Strategy committed to in the NDC.** Developing this strategy could include an estimate of the costs needed to implement the measures established both in the updated NDC and PNA, as well as funding allocations to municipal governments and other local institutions to address the climate change agenda at the local level. The estimation of the costs and impacts of adaptation and mitigation policies would benefit from considering the differentiated impacts and potential side effects on poor households and vulnerable communities, particularly IPADs, considering their reliance on LULUCF and the agricultural sector. Operationalizing the strategy will entail adjusting and prioritizing budget lines and allocations in alignment with the updated NDC, and revising the budget tagging methodology as well as the methodology to review public investment on climate change, to facilitate reporting on the use of the funds and the results achieved. The Climate Change Financing Strategy could also consider establishing incentives for private sector investment and identifying strategies to enhance access to climate finance.

» **Operationalize Honduras's DRF Management Strategy.** This would entail quantifying the losses from natural hazards in key economic sectors, especially agriculture and contingent liabilities arising, in order to define the layers and the financial instruments according to the timeline of funding needs. It would also entail carrying out a gap analysis and financial cost-benefit analysis of a set of alternative DRF strategies to determine which would reduce potential financing gaps in the most cost-efficient way. Finally, it is critical to improve the financial sustainability of the electricity sector to leave fiscal space for adaptation, resilience, and renewable sources of energy (more details in priority E).

» **Enhance the financial sector's role in managing climate-related risks.** This should be focused on the following:

  - Mitigating physical risks stemming from hurricanes, floods, and droughts
  - Improving current practices by creating *ex ante* principles that guide loan restructuring and regulatory forbearance programs
  - Developing a comprehensive DRF framework, which may include public DRF instruments as well as private insurance markets
  - Incentivizing the financial sectors' contribution to greening the economy by supporting low-emission sectors that also pose less transition risks
  - Enabling the adoption of international standards and best practices associated with social and environment performance standards in the financial sector, including emissions reporting standards and carbon accounting protocols for loans and investment portfolios
  - Addressing remaining data gaps to improve the granular assessment of climate risk exposures

[141] See, for instance, Muyeye Chambwera, Geoffrey Heal, Carolina Dubeux, Stéphane Hallegatte, Liza Leclerc, Anil Markandya, Bruce A. McCarl, et al., "Economics of Adaptation," in Climate Change 2014: Impacts, Adaptation, and Vulnerability: Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, eds. C.B. Field, V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, et al. (Cambridge: Cambridge University Press, 2014), 945–77.

5.3. Priority C: Ensure the Poorest and Most Vulnerable are Included and Protected

Climate change will continue to disproportionally affect the poorest and most vulnerable in Honduras. It is therefore important that the government target actions to reduce the vulnerability of, and impacts to, excluded groups. First, this could involve establishing the systems to implement the social inclusion commitments of the Climate Change Law and its NDC. Both the Climate Change Law and the NDC recognize and establish actions to ensure social equity and the inclusion of vulnerable groups, including indigenous peoples, yet implementation has lagged behind. Second, given the heightened vulnerability, a poverty alleviation and social inclusion strategy needs to incorporate actions to build resilience through four main levers: a) enhancing and protecting land security; b) ensuring diversification of income opportunities for rural and marginalized populations and a just transition, particularly for LULUCF and agricultural policies; c) promoting targeted, locally led investments in lagging areas; and d) ensuring that adaptation policies and investments have progressive features, with policies targeted to vulnerable households, particularly transfers that are needed to counteract income losses in the event of a natural hazard, including through the development of an adaptive social protection (ASP) system.[142] The CCDR proposes the following policies to achieve this:

» **Umbrella policies to establish the systems to comply with social inclusion commitments.** Strengthening the capacity of institutions to implement social inclusion policies related to the climate change agenda is foundational to the achievement of the social inclusion commitments established in the NDC. This involves allocating adequate budgets to relevant institutions and improving collaboration and coordination with local governments. In addition, it is recommended that the government assess the timeframes of NDC's social inclusion commitments and activities[143] (for example, assess whether earlier targets should be set in line with the urgency of addressing the vulnerabilities of IPADs to natural hazards) and detail the activities and strategies needed for their implementation. Detailing the implementation mechanisms will also require establishing adequate channels for the participation of IPADs in decision-making spaces in the climate change agenda (with incentives to ensure women's participation), finalizing the regulations to ensure the free, prior, and informed consent of indigenous peoples, and creating mechanisms to support transferring traditional knowledge on climate solutions to broader segments of the IPAD communities and other rural communities.

  It is also important to improve information for monitoring implementation, and to tackle the statistical demographic invisibility of ethno-racial minorities. It is therefore recommended that the government ensure that there is disaggregated data and adequate sampling of remote areas in upcoming censuses and household surveys.

» **Land security and cultural endowments.** A critical aspect of adaptation policies is to increase the land tenure security of vulnerable groups and households. With respect to IPADs, enhancing efforts to recognize their communal lands, ensure their land tenure security, and establish systems to avoid land-grabbing practices will help increase the resilience of IPADs to climate change while supporting climate efforts in other key sectors such as water, agriculture, and forests.

» **Livelihood diversification and just transition.** It is essential to promote investments that facilitate diversification toward greener jobs through community-driven mechanisms that reach lagging regions such as Gracias a Dios. It is also recommended that the government identify geographical hotspots that will become unlivable by 2030 and 2050, potentially triggering migration and displacement, and establish a policy and accompanying regulations to support safe migration.

» **Locally led investments in lagging regions.** Community-driven development approaches and locally led climate action aim to ensure that adaptation and mitigation projects are proposed by the communities themselves and are therefore aligned with their needs and aspirations. Locally led investments are critically needed in the Atlantic Region, which is facing severe underinvestment. As a first step, it is recommended that the government conduct a public expenditure review to understand the historical prioritization of

[142] ASP brings together social protection, social inclusion and sustainability, disaster risk management, and climate change adaptation to leverage their respective contributions and ensure that social protection interventions are well-positioned to build resilience, reduce vulnerability, and mitigate the negative impacts of the poorest and most vulnerable to co-variate shocks, including those related to climate risks.

[143] Such activities are grouped under Objective 11, Social Inclusion, of the Honduras NDC strategy, https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Honduras%20First/NDC%20de%20Honduras_%20Primera%20Actualizaci%C3%B3n.pdf.

spending through territory-based and ethno-racial indicators and establish a methodology to incorporate social inclusion indicators and criteria to prioritize investments to lagging regions. Second, it is critical to map key local institutions, such as CODELs, and strengthen their capacity.

It will also be important to review investment criteria and information to redirect investment to lagging regions. Geographic targeting using updated poverty maps and climate risks can help direct investments that support climate change adaptation, including social protection transfers, to municipalities that have high poverty rates and exposure to natural hazards. Municipalities affected by low coping capacity could be prioritized as well. Investments directed to high-priority municipalities could include prevention and response to natural hazards building on participatory approaches, such as community-led, early-warning systems or participatory floodplain mappings. Adaptation policies also need to increase access to reliable infrastructure and assets.

» **Adaptive social protection.** An efficient (targeted), effective (adequate), and adaptive (responsive) social protection system is also needed to protect vulnerable households from the negative impacts of natural hazards. The design, implementation, and fiscal costs of a targeted transfer need to be carefully considered. Likewise, increasing access to other social protection mechanisms, particularly well-thought-out insurance, is important to increase the resilience of households. The government could continue the positive advances in programs and delivery systems, including through strengthening the CCT program and digital payment methods. It will also be critical to embed financing for ASP in the Climate Change Financing Strategy, improve identification and data by increasing the registry of potentially affected in vulnerable areas, and develop formal arrangements for closer coordination among institutions that are in charge of social protection and DRM during emergencies. Further analytical work could support the design of components needed to fully protect vulnerable households.

5.4. Priority D: Promote Agriculture Productivity, Resilience and Sustainable Landscape Practices with a Cross-Sectoral, Territory-Based Approach

Improving the productivity and resilience of the agriculture sector in Honduras would serve as an important example of good development policy that is at the same time good climate policy. Building up the sector's resilience and productivity would directly improve the resilience and incomes of the most vulnerable households, and would also reduce the need for expanding crop and pasture areas, for example, through cutting down forests.[144] The introduction of CSA technology and methods would also help reduce emissions from agriculture and livestock practices. The government already has initiatives, plans, and successful experiences that can be expanded. The CCDR proposes the following policies to achieve this:

» **Climate-smart agriculture.** Mainstreaming CSA technologies and practices in agricultural and livestock production can help increase productivity while considering differentiated needs by farm size (commercial agriculture versus family agriculture). Digital agriculture can also be a powerful driver of climate adaptation and mitigation, contributing to the improved productivity of agriculture systems, as well as broader access to training and technical assistance on CSA by small and often remote producers. CSA interventions will need to be supported by efforts to address land tenure insecurity, especially for IPAD communities. The establishment of CSA will also need to be supported by improvements in agro-logistics infrastructure and services as well as investments in digital connectivity. To boost private participation in the development of green value chains and spur the adoption of CSA, the government will need to pilot and scale up incentives for private green investments. The experience of the COMRURAL program provides a successful example.[145]

[144] As a caveat, the opposite risk is that agriculture and livestock become so profitable that producers might intensify deforestation in order to reap additional income. Considering the cost of many CSA technologies, this eventuality seems unlikely today, and data from ongoing World Bank projects in the Latin America and the Caribbean Region are in fact showing a net increase in native vegetation in beneficiary farms that are adopting CSA. However, if factors such as the global demand for food and international food prices continue to rise, macroeconomic conditions and individual incentives could change in future. In this sense, the continual engagement of the government of Honduras in overseeing, supporting, and educating producers will be key to avoiding such negative eventualities.

[145] Some of the strategies included forging alliances with private commercial banks and microfinance institutions to provide financing for climate-smart business plans. Measures are also being introduced to de-risk investment for financial institutions, such as providing partial credit guarantees through a public guarantee fund, and improving the creditworthiness of beneficiaries through solid technical assistance.

» **Agriculture subsidies.** In the short term, existing subsidies and support to farmers or specific businesses could be refocused on producing positive environmental and social externalities (for example, conditioned on the adoption of CSA practices or directed to family farms). In the long term, subsidies and support to individual farmers should be shifted to finance public goods and services that can build up resilience and productivity, including R&D.

» **Increasing capacities, research, and information systems in the agriculture sector.** Institutional strengthening of the Ministry of Agriculture and Livestock, including improving capacities related to climate change adaptation and mitigation, will be instrumental in consolidating the agriculture sector's long-term vision, public policies, and programs around climate change. Gaps in local R&D capacity can be addressed through international collaborations with leading research centers that can support the creation of national capacity in the long term.[146] Increasing capacities will also entail strengthening agricultural extension services, which will ensure that adequate training and technical assistance reach smallholders and vulnerable producers, including IPADs, at the grassroots level. Developing a national agricultural information system that incorporates climate and other nonmarket ecosystem goods and services could provide a stronger base for more integrated action among sectors that affect agriculture and land use. In addition, developing national accounting systems that incorporate climate and other nonmarket goods and services could help integrate the external costs of unsustainable food systems into decision-making.

» **Improving water management and water use efficiency.** Improving water efficiency in the agriculture sector is a high priority and could be achieved through a) better maintenance of irrigation canals involving water user organizations; and b) piloting customized water efficiency measures in large commercial farms. Furthermore, dams for irrigation and water storage could serve multiple purposes: increasing resilience to natural hazards, adaptation to climate change, and hydropower (see priority F). To support these actions and manage climate impacts effectively, it is critical for the government to strengthen water governance using a territory-based approach, starting by operationalizing the key institutions identified in the Water Act, including the Water Authority; providing them with the tools and resources needed to manage the sector, both human and financial; and generating the needed information for management, particularly regarding water sources under stress.

» **Improved management of forest ecosystems.** Given the important role that forests play in mitigation and adaptation commitments in the country, it is necessary to strengthen actions to restore, sustainably manage, and protect these ecosystems. To identify specific activities that support forest protection and restoration, it is recommended that the government develop implementation pathways for NDC measures in the forest sector. Furthermore, improved data and information in the forest sector could support an integrated landscape approach as well as the implementation of NDC commitments in the sector. Efforts could focus on improving a) the methodology to estimate forests' contribution to GDP, considering accounting and valuation of ecosystem services; b) estimations for the LULUCF sector in the national GHG inventory; and c) indicators of restoration efforts and the participation of women and IPADs (vital for monitoring NDC commitments).

5.5. Priority E: Low-Carbon, Climate-Resilient Transport Systems

Opportunities in the transport sector focus both on strategic adaptation and mitigation actions. For adaptation, increasing the resilience of rural roads would serve multiple objectives to create synergies between climate and development. These policies would improve access to markets for agriculture products and improve human capital through access to education and medical facilities, especially for highly excluded rural populations. Mitigation measures in the transport sector aim to foster low-carbon development in the sector and facilitate implementation of NDC commitments. Specific policies include the following:

» **Increase the resilience of rural roads.** This will entail, as a priority, improving the drainage of rural roads on the flood-prone Atlantic coast and protecting targeted stretches of roads from landslides nationwide. These improvements should be complemented with policies that do the following:

[146] Examples include the International Center for Tropical Agriculture (CIAT, based in Colombia) and the International Maize and Wheat Improvement Center (CIMMYT, based in Mexico).

- Integrate long-term planning and maintenance criteria with rural road adaptation, including climate change and DRM considerations in each phase of rural road infrastructure.

- Empower women by employing them in rural road works. Rural road works can be an excellent income-generating opportunity for the local population, particularly for women, who typically have few alternatives to agriculture. This approach has been successful in the Latin America and the Caribbean Region, challenging traditional gender norms and advancing gender equality.[147]

- Incorporate nature-based solutions to protect road infrastructure assets. These could include slope stabilization by planting vegetation, coastal protection with enrockment and mangrove restoration, and efficient drainage systems. These solutions could reduce the risk of flooding, coastal erosion, and landslide impacts on roads while restoring natural eco-systems, among other co-benefits.

- Mainstream performance-based incentives for maintenance and rehabilitation for rural roads. Proactive, regular maintenance helps reduce deterioration and keeps the road from becoming neglected over long periods, reducing costs in the long term. Additionally, performance-based contracts have been proven to improve the efficiency and sustainability of asset preservation works.[148]

» **Develop low-carbon pathways for transport that follow the avoid-shift-improve framework.** Prioritizing strategies for low-carbon development in the transport sector could provide a phased approach for implementation and allow the targeting of resources to priorities that are feasible to implement and provide significant co-benefits such as improved public health, reduced road accidents, reduced traffic congestion, and reduced road damage. With the demand for motorized transportation expected to grow significantly in Honduras in the coming decades, low-carbon development pathways for transport could consider the following:[149]

  - Avoid: first, look at strategies to reduce the overall needs for travel, both in freight and in passenger travel.

  - Shift: second, promote a shift toward more energy-efficient transport modes.

  - Improve: third, improve the efficiency of vehicles through better technology or alternative fuels.

» **Emission standards for new vehicles.** Policies to regulate emission standards for new vehicles are "low-hanging fruit" because they are relatively cheap to implement as well as effective at reducing emissions and fossil fuel usage.

» **Strengthening policy and regulatory framework for EVs.** Accelerating the adoption of EVs will require introducing legislation to further develop the regulatory framework and market incentives.

» **Investments in urban transport infrastructure.** Accelerated investment in urban transport infrastructure could help mitigate GHG emissions and provide significant co-benefits in the form of improved public health, reduced road accidents, reduced traffic congestion, and reduced road damage, among other benefits. Recommended investments include introducing BRT services in the largest metropolitan areas, Tegucigalpa and San Pedro Sula, as well as infrastructure for bicycling in all of the country's urban areas.

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[147] Ursula Casabonne, Bexi Mota, and Miriam Mueller, Roads to Agency: Effects of Enhancing Women's Participation in Rural Roads Projects on Women's Agency: A Comparative Assessment of Rural Transport Projects in Argentina, Nicaragua, and Peru, Working Paper 99173 (Washington, DC: World Bank Group, 2015).

[148] Eric Lancelot, Performance Based Contracts in the Road Sector: Towards Improved Efficiency in the Management of Maintenance and Rehabilitation: Brazil's Experience, transport paper TP-31 (Washington, DC: World Bank, 2010).

[149] Global Environment Facility (GEF), Global Programme to Support Countries with the Shift to Electric Mobility, https://www.thegef.org/sites/default/files/documents/10270_CEO_Endorsement_Request_1.pdf.

5.6. Priority F: Reforms to Improve Sustainability of Electricity Generation and Investments in Hydropower and Energy Efficiency

Increasing the coverage, reliability, and efficiency of electricity is a key development objective of the country. To close the energy access gap while reducing GHG emissions, it is key that Honduras fosters renewable sources and clean technology. Because Honduras is a net fossil-fuel importer, fostering renewable sources and clean technology would not only support reducing GHG emissions, but likely represent long-term savings and reduce the country's vulnerability to price shocks generated by fossil fuels volatility. In particular, it is critical to prioritize improving the financial and technical sustainability of the electricity sector to create fiscal space for these new investments and improve the effectiveness of energy-efficiency measures. This would also improve the competitiveness of the market and attract private investments. In terms of renewable investments, hydroelectric power plants that can support the resilience objectives of water efficiency, irrigation, and flood containment—and that can be done with the participation of local communities—should be prioritized for their synergies with climate change adaptation. Selected policies include:

» **Addressing issues in the electricity sector to reduce fiscal risks and free up fiscal space.** Addressing sustainability issues will involve taking measures to improve sector governance while continuing to implement the 2019 Tariff Regulations and realigning existing subsidy programs to target vulnerable households. Additional measures could include working with independent system operators, the regulatory commission, and power purchase agreements (PPAs) and implementing a loss-reduction program for electricity distribution that will address the high nontechnical losses in the system. However, in view of the sectoral complexities, targeted in-depth analysis in addition to the CCDR should be carried out to identify specific measures that are also aligned with government priorities.

» **Cost-effective measures in energy efficiency.** The country could immediately start developing the legal, regulatory, and institutional framework needed to promote energy efficiency across all consumer segments, prioritizing them based on cost-benefit analyses and existing analysis of options. Among these, initial cost-effective measures could include implementing an energy-efficiency program for public buildings, public street lighting, and public utilities (for example, water) and addressing wasteful consumption from non-disconnectable public customers. Future analytical work could also identify behavioral change interventions for the Honduran context that could further improve the consumption habits of the population.

» **Synergic investments in renewable energy.** Honduras could continue efforts to transition to renewable energies, recognizing the synergic potential of hydroelectric dams and taking advantage of it by doing the following:

  - Encourage all future power generation investments to follow from a least-cost generation plan based on power system modeling that includes the full societal costs of all generation options and recognizes the value of being resilient amid price shocks from imported fuels;

  - Put regulations in place that ensure competitive procurement, including the auctioning of variable renewable energy sources (solar and wind) to minimize the costs of renewable power generation;

  - Study the feasibility of implementing multipurpose projects in El Tablón, los Llanitos and Jicatuyo, consider adjustments required to the design of these dams to make sure they are climate-resilient by incorporating updated hydrological models, and take appropriate measures to manage sedimentation;

  - Identify replacement plans for aging dams, as well as reservoir recovery, combined with integrated management of the surrounding watersheds and landscapes to ensure the integrity of the infrastructure; and

  - Ensure that these projects are designed with adequate environmental and social risk management so they can yield significant progress in local community development.

5.7. Balancing Short-Term Needs and Long-Term Climate Objectives

Investments focused on any specific sector will inevitably reduce the resources available to other sectors and country priorities. Focusing on agriculture, climate resilience, water management, transport, and electricity will potentially affect budgets for other important development sectors such as health, education, and social assistance. Nevertheless, when correctly prioritized using Honduras's development objectives, adaptation and mitigation policy is simultaneously good development policy and not just a set of environmental and climate objectives.

Sequencing activities will be important for developing a strategic approach to enhancing climate action. To optimize the available capacities and resources, the CCDR recommends focusing on cross-sectoral recommendations in the short term that allow the creation of an enabling environment for sectoral recommendations in the medium and long term. Thus, it is recommended that the government embrace a parallel approach of enabling factors A, B and C, on the one hand, while gradually approaching adaptation and mitigation policies and investments under sectoral priorities D, E and F. A potential sequencing of sectoral policies based on urgency is proposed, and is in alignment with priorities agreed by the Honduran government and the World Bank. At the same time, it will be important to build additional information and analysis that allow for a better understanding of the potential direct and indirect benefits of these policies, the potential for cost saving in the future, and the investment needs.

Although committing fiscal space within an existing budget envelope could be effective in reducing the risk from natural hazards, doing so implies that those resources cannot be put to other development objectives. However, this CCDR highlights the benefits of a proactive fiscal policy that dedicates additional resources to DRM and combines a layered DRF strategy with budgetary provisions for adaptation investment. This requires fiscal space which, in the medium term, could be created through additional revenue generation. In the short term, some additional debt financing could be justifiable. This approach would ensure that the other key development objectives can be properly budgeted for without having to rely on *ad hoc* budget reallocations to finance emergency spending when climate events strike.

Further, a carbon pricing policy, by itself, could have groups that face losses. Carbon charges should therefore be designed with complementary policies, such as on infrastructure, social protection, public transport, health, and education, that offer broader co-benefits to the society and co-benefits for the climate, while considering the public and political appetite. Further analytical work should guide the design of the carbon pricing policy.

CCDR Sectoral Priorities*	Related Objectives in the Plan for Reconstruction and Sustainable Development	Policies	Urgency and Enabling Conditions	Implementation/ timeframe
Priority D: Promote agriculture productivity and resilience, and sustainable landscape practices, using a cross-sectoral and territory-based approach	***Reactivation of Agriculture Sector:*** Promote rapid recovery of the damage to the agricultural sector and promote its reactivation, with improvements in competitiveness and productivity in a sustainable manner, in order to improve the incomes of rural families and help them overcome poverty ***More Coverage and Quality in Water and Sanitation:*** Rehabilitate and rebuild drinking water and basic sanitation systems, as well as irrigation and flood protection systems, for the benefit of the population, particularly the poorest sectors of rural areas and marginalized urban areas. ***Environment, Risk Management, and Climate Change:*** Define a broad framework for environment, climate change, and risk management so that the country is less vulnerable and more resilient in the face of extreme natural phenomena, and in an inclusive and participatory manner, especially at the local and regional levels.	Climate-smart agriculture	High—the agriculture sector is highly important to the economy and vulnerable to climate change. Experience exists in implementation of projects in Honduras and is highly aligned with CPF objectives.	Short term 2022–2027
		Agriculture subsidies	High—the agriculture sector is highly important to the economy and vulnerable to climate change. In the short term, existing subsidies and support to farmers or specific businesses could be refocused on producing positive environmental and social externalities.	Short term 2022–2027
		Increasing capacities, research, and information systems in the agriculture sector	High—increasing capacities will create the enabling conditions for additional measures and investments in the sector.	Short term 2022–2027
		Improving water management and water use efficiency	High—improving irrigation and water storage capacity to increase resilience in the face of droughts. The policy is highly aligned with CPF objectives.	Short term 2022–2027
		Improved management of forest ecosystems	High—forests play a crucial role in mitigation and adaptation commitments in the country. However, improving information and developing further analysis is needed to support evidence-based decision-making and strengthen the enabling environment.	Medium term 2022–2030

Priority E: Low-carbon and climate-resilient transport systems	***Better Infrastructure and Transport:*** Achieve the rehabilitation of ground transport and move toward the construction of a resilient and modern road network, which contributes to the economic objectives of the country, with the reduction of costs and travel times of passengers and cargo. ***Environment, Risk Management and Climate Change:*** Define a broad framework on the environment, climate change, and risk management, so that the country is less vulnerable and more resilient to extreme natural phenomena, in an inclusive and participatory manner, especially at the local and regional levels.	Transport resilience for rural roads	High—decreasing the exposure of the transport network to natural hazards will reduce impacts on the connectivity and accessibility of rural areas and will create significant development benefits. The policy is highly aligned with CPF objectives.	Short term 2022–2027
		Develop low-carbon pathways for transport in Honduras following the avoid-shift-improve framework	High—prioritizing mitigation strategies could inform a phased approach for implementation by identifying priorities that are feasible to implement and provide significant co-benefits in the short, medium, and long term. Implementing this priority could inform the implementation of other mitigation priorities in the sector.	Short term 2022–2027
		Emission standards for new vehicles	Medium—This policy could be informed by the prioritization of mitigation strategies in the transport sector.	Medium term 2022–2030
		Strengthening policy and regulatory framework for EVs	Medium—This policy could be informed by the prioritization of mitigation strategies in the transport sector.	Medium term 2022–2030
		Investments in urban transport infrastructure	Medium—This policy could be informed by the prioritization of mitigation strategies in the transport sector.	Medium term 2022–2030
Priority F: Reforms to improve the sustainability of electricity generation and investments in hydropower and energy efficiency	***Better Coverage and Efficiency of Electricity:*** Rehabilitate the public electricity system infrastructure, with a vision of efficiency and financial sustainability, which contributes to the socioeconomic development of the country. ***Environment, Risk Management, and Climate Change:*** Define a broad framework for environment, climate change, and risk management so that the country is less vulnerable and more resilient to extreme natural phenomena, and in an inclusive and participatory manner, especially at the local and regional levels.	Addressing issues in the electricity distribution sector to reduce fiscal risks and free up fiscal space	High—addressing sustainability issues in the electricity sector will facilitate additional policies and investments, including in renewable energies.	Short term 2022–2027
		Synergic investments in hydropower	Medium—Advancing efforts to promote renewable energy is highly relevant. However, the electricity sector requires far-reaching reforms to address current financial and technical sustainability issues. The policy is aligned with CPF objectives.	Long term 2022–2030
		Cost-effective measures in energy efficiency	High—The country could immediately start developing the legal, regulatory, and institutional framework needed to promote energy efficiency measures. The policy is aligned with CPF objectives.	Short term 2022–2027

Note: The sequencing was established considering the urgency of action, as well as enabling environment for implementation, mainly focused on existing World Bank portfolio and alignment with the CPF FY23–FY27, which was the product of consultations with the government of Honduras. CCDR = Country Climate and Development Report; CPF = Country Partnership Framework; CSA = climate-smart agriculture; EVs = electric vehicles.
* Full descriptions of the priorities can be found in chapter 5.