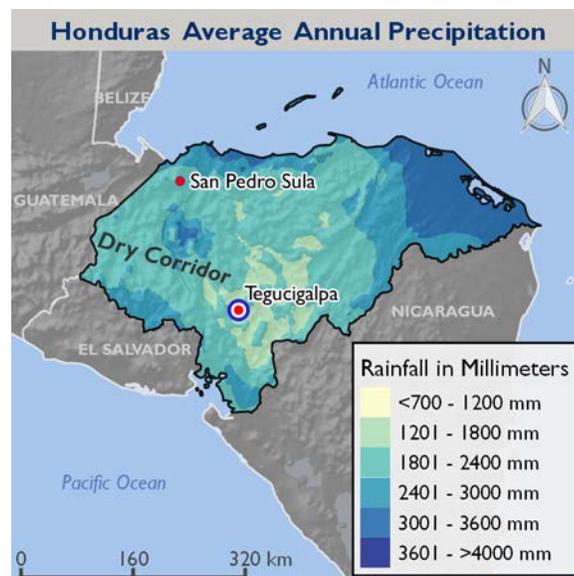


# CLIMATE CHANGE RISK PROFILE HONDURAS

## COUNTRY OVERVIEW

Honduras, one of the poorest countries in the Western Hemisphere, is vulnerable to climate change due to its high exposure to climate-related hazards (hurricanes, tropical storms, floods, droughts, landslides) that devastate crops and critical infrastructure. In 1998, Hurricane Mitch destroyed an estimated 70 percent of the country's crops and infrastructure, causing more than 10,000 deaths and \$3 billion in damage, significantly setting back Honduras' development process. The economy has diversified into industry and services, but agriculture still accounts for 14 percent of GDP. Honduras has a high rural population (more than 50 percent), of which 65 percent lives in poverty. The rural poor overwhelmingly depend on rainfed agriculture as their principle livelihood and are concentrated in the southern and western regions, known as the Dry Corridor, where food insecurity has become a recurrent issue; 58 percent of children under five suffer from chronic undernutrition. In urban areas, migration from rural areas and population growth have pushed settlements into hazard-prone zones that lack water management systems, resulting in frequent flooding and water scarcity in major cities and towns (Tegucigalpa, San Pedro Sula, La Ceiba, Choloma and Tela). Climate change will increase the frequency and severity of water scarcity and climate-related hazards, and put additional strain on the Honduran government's capacity to address ongoing development barriers, including extreme inequality, low levels of education, acute environmental degradation, and rampant crime and violence. (3, 4, 17, 21)



## CLIMATE PROJECTIONS



1°–2.5°C increase in temperatures by 2050



Increased frequency of extreme rainfall and flood events



Reduction in rainfall, with more intense, prolonged droughts

## KEY CLIMATE IMPACTS

### Agriculture



Crop loss/failure; soil erosion  
Increased pest infestation  
Rising food prices and food imports

### Water Resources



Water shortages  
Degraded water quality  
Increased flood and landslide risk

### Human Health



Loss of life and livelihoods  
Increased risk of vector-/waterborne disease and population displacement

### Ecosystems & Fisheries



Loss of forest cover, mangroves, coral reefs and fisheries and associated ecosystem services and livelihoods

### Energy



Disruption in service provision  
Reduced energy production potential

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## CLIMATE SUMMARY

The climate in Honduras is influenced by a mountainous interior that divides the country into east and west regions, with the Pacific and Caribbean lowland coastal areas on each side. The climate is hot and tropical in the coastal lowlands, with annual temperatures averaging 26°–29°C; it becomes more temperate in the highlands, where annual temperatures average 16°–24°C. Average annual precipitation is lowest in the central mountainous interior (800–2000 mm) and highest in the Caribbean coast (+2,000 mm), where rainfall is year-round. The Pacific coast and interior highlands have a dry season (summer) from November–April and a wet season (winter) from May–October that experiences a short break (1–4 weeks) in July/August (the *canícula*). The El Niño Southern Oscillation influences temperature and precipitation: for the most part, El Niño events decrease rainfall and increase temperatures, while La Niña events decrease temperatures and increase rainfall. Hurricanes periodically hit the Atlantic coast between June–November. (2, 3, 8, 13, 20)

### HISTORICAL CLIMATE

Historical climate trends since 1960 include:

- Average annual temperature increase of 0.6°C per decade, with greatest warming in the dry season.
- Increase in heavy rainfall events by 1.2 percent per decade.
- Increased number of warm days and nights.
- Inconsistent annual rainfall trends, but rainfall patterns reduced in northwest and southeast.
- Longer and warmer dry *canícula*.
- Increased frequency and intensity of El Niño/La Niña cycles.

### FUTURE CLIMATE

Projected changes in climate include:

- Increased average temperature by 1°–2.5°C by 2050 and 3°–4.3°C by 2100.
- Decreased annual rainfall of 9–14 percent by 2050 and 20–31 percent by 2100.
- Largest increases in temperature and reductions in rainfall expected from June–August and in the southwest regions.
- More prolonged, intense *canícula* and drought.
- By 2050, 13 percent increase in heavy rainfall volume, increasing flood flows by 60 percent.
- Increased frequency of extreme weather events, especially in northeast.
- Bi-coastal sea level rise of 0.4–0.86 m by 2100.

## SECTOR IMPACTS AND VULNERABILITIES

### AGRICULTURE

Agriculture employs nearly 40 percent of the labor force in Honduras and major food crops (maize, beans, rice, sorghum) are rainfed, making agricultural livelihoods and food security highly dependent on stable climatic conditions. Higher temperatures and reduced rainfall are projected to decrease yields of maize (by 12 percent) and beans (by 32 percent) by 2050 compared to 2000. Higher temperatures will reduce the area suitable for growing coffee (the main foreign exchange earner), requiring producers to cultivate at higher elevations (from ~600 to 1,000 m), increasing land degradation and deforestation in previously uncultivated areas. The impacts of climate variability are already significant in Honduras: coffee production declined 23 percent in 2012/13 due to a coffee rust outbreak fueled by more variable climate, changing moisture conditions and higher temperatures; and two years of consecutive drought starting in 2014 led to a loss of 96 percent of maize yields and 87 percent of

Climate Stressors and Climate Risks AGRICULTURE	
Stressors	Risks
Increased temperatures and evapotranspiration	Yield losses of major crops, especially in the lowlands and southwestern Dry Corridor
	Increased incidence of crop pests and disease, such as coffee rust
Reduced rainfall	Failure of rainfed crops and increased need for irrigation
Increased frequency of intense rainfall and extreme weather	Reduced soil productivity from water stress, runoff, nutrient leaching and erosion
	Loss of crop suitability at lower altitudes, especially for coffee
More intense and prolonged drought	Increased food prices, food insecurity and migration flows

beans in the Dry Corridor. This triggered acute food insecurity, malnutrition and mass migration to poorly prepared urban areas. (3, 4, 14, 18)

## WATER RESOURCES

Despite having abundant water resources, access to water is an issue in many areas of Honduras. Surface water accounts for 90 percent of the water supply and water quality is affected by high levels of deforestation and pollution from agricultural runoff and mining operations. Groundwater is an important source as well, used by communities in the interior highlands and coastal urban towns. With few storage facilities, water scarcity will worsen as increased temperatures and decreased rainfall accentuate the drought cycle, reduce surface flows and lower groundwater levels, particularly in the Dry Corridor. In urban areas, water service and delivery deteriorated in recent years due to rapid urbanization and inadequate investments in water and sanitation. Along the coast, aquifers are threatened by rising sea levels, compounding existing aquifer problems such as limited land planning and lack of governance. Climate variability

## ECOSYSTEMS AND FISHERIES

Climate change threatens critical systems such as mangroves, coral reefs, cloud forests, rainforests and fisheries, all of which are critical to livelihoods. These systems are already stressed by overfishing and extensive deforestation and degradation from mining, logging, fuel wood collection and forest conversion. Changes in temperature and precipitation may exceed the adaptive capacity of these systems, with serious implications for the carbon cycle, water availability and quality, and coastal fisheries. Since 2013, almost a quarter of forests in the country have been lost to a bark beetle outbreak; the outbreak is attributed to a prolonged drought brought on by El Niño. Cloud forests could completely disappear in western Honduras, while some projections suggest that the Mesoamerican Barrier Reef (the world's second largest coral reef) could collapse by mid-century, partly due to warming ocean waters. Reduced rainfall and water availability

## ENERGY

Honduras has doubled access to its electrical grid since 1990 and 40 percent of electricity generation is renewable, derived primarily from hydropower plants. Climate change could undermine the goal of increasing renewable energy to 60 percent by 2022, as reduced rainfall, prolonged droughts and increased evaporation reduce inflows to hydro-electric systems. Projections for the Lempa River Basin, a major source for hydropower production, show a 20 percent reduction in inflows to major

Climate Stressors and Climate Risks WATER RESOURCES	
Stressors	Risks
Increased temperatures and evaporation	Reduced river flows and groundwater recharge, reducing seasonal supply
Decreased precipitation	Water shortages and disrupted provision of water supplies
Increased frequency of intense rainfall and extreme weather	Increased incidence of floods and landslides, degrading watershed health and reducing water quality
	Reduced water quality and storage capacity due to increased runoff, soil erosion and sedimentation of reservoirs
Sea level rise	Saltwater intrusion of coastal aquifers

is likely to exacerbate the year-round water shortages and rationing that already occur in Tegucigalpa, where the main water system now operates at a 55 percent deficit. (5, 15, 19)

Climate Stressors and Climate Risks ECOSYSTEMS AND FISHERIES	
Stressors	Risks
Increased temperatures	Reduced capacity of forests and fisheries to provide ecosystem services and support livelihoods
Reduced rainfall	Expansion of arid areas; loss of rainforests and cloud forests
Increased severe weather events	Increased risk of pests and diseases (e.g., the bark beetle)
	Reduced fish yields/productivity
Sea level rise	Loss of reef and mangrove habitat, which supports fisheries and tourism, dissipates wave energy and reduces erosion
Ocean acidification	Increased shoreline erosion, resulting in habitat loss for nesting sea turtles and birds

threaten inland aquaculture and increase the risk of parasitism and disease, while ocean acidification and rising sea surface temperatures threaten already stressed marine fisheries. (6, 9, 10, 15, 16)

Climate Stressors and Climate Risks ENERGY	
Stressors	Risks
Increased temperatures	Increased energy demand, reduced hydropower production
Reduced annual precipitation	Increased incidence of power outages and economic loss
	Severe weather damage and disruption to energy supply networks

reservoirs with the potential to reduce hydropower capacity up to 53 percent by 2070. (3, 4, 12)

## HUMAN HEALTH

Climate changes threaten to reverse the significant progress Honduras has made in the health sector by reducing water quality and availability, enhancing conditions for the proliferation of vector- and waterborne diseases, and aggravating food security and malnutrition. An estimated 1.5 million Hondurans go hungry at some point each year, an indicator likely to worsen with food production impacted by climate change. Higher temperatures expand the range for some vector-borne diseases like zika; drought exacerbates infectious disease outbreaks, as hygiene/hand washing is compromised to conserve water, and increases vector breeding grounds, as water supplies become intermittent and must be stored near homes. The government declared a state of emergency in 2010

## POLICY CONTEXT

### INSTITUTIONAL FRAMEWORK

Since signing the UNFCCC in 1992, Honduras has established a Climate Change National Office (DNCC) within the Secretariat of Natural Resources and Environment (SERNA) in 2010. The 2010 National Climate Change Strategy (ENCC), developed by SERNA, outlines strategic objectives and guidelines for implementation of national adaptation and mitigation and is aligned with the Country Vision and National Plan. SERNA is the national focal point for the UNFCCC, while the DNCC is responsible for delivery of national-level action on adaptation with participation of members from the Climate Change Inter-Institutional Committee (CCIC). The CCIC is a direct advisor to the President on climate change. (3, 13)

Climate Stressors and Climate Risks HUMAN HEALTH	
Stressors	Risks
Increased temperatures	Increased food insecurity and malnutrition
Decreased precipitation	Reduced water availability for hygiene, increasing spread of infectious disease
Increased incidence of droughts, floods, landslides and severe weather	Higher incidence of vector-borne diseases due to favorable breeding and survival conditions
	Increased weather-related mortality and exposure to disaster events that reduce access to health care and water supplies

and 2013 due to severe outbreaks of dengue in urban areas and in 2016 due to zika, with cases concentrated in areas lacking water, sanitation and adequate rainwater drainage. (1, 11, 17, 18)

### NATIONAL STRATEGIES AND PLANS

- [Initial National Communication](#) (2000)
- [Second National Communication](#) (2012)
- [National Climate Change Strategy](#) (2010)
- [Strategic Government Plan](#) (2014–2018)
- [Country Vision](#) (2010–2038)
- [Climate Change Law](#) (2014)
- [National Action Plan Against Desertification and Drought](#) (2014–2022)
- [National Strategy for Food and Nutrition Security](#) (2010–2022)
- [National Climate Change Adaptation Strategy for Agricultural Sector](#) (2014–2024)

## KEY RESOURCES

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- Map source: [WorldClim Global Climate Data](#) and Hijmans, R.J. et al. 2005. [Very high resolution interpolated climate surfaces for global land areas.](#) *International Journal of Climatology* 25: 1965–1978.

## SELECTED ONGOING EXPERIENCES

The table below includes current or recently implemented programs related to climate change adaptation in Honduras.

Selected Program	Amount	Donor	Year	Implementer
Addressing Climate Change Risks on Water Resources in Honduras: Increased Systemic Resilience and Reduced Vulnerability of the Urban Poor	\$5.6 million	UNDP	2011–2016	Secretariat of Natural Resources and Environment (SERNA)
Corredor Seco Food Security Project	\$1.04 million	Global Agriculture and Food Security Program	2015–2021	Honduran Strategic Investment Office (Invest-H)
Honduras Third National Communication (3NC) and First Biennial Update Report (FBUR)	\$22 million	GEF	2014–2016	UNDP, SERNA
Competitiveness and Sustainable Rural Development Project in the South Western Border Corridor (PROLENCA-GEF)	\$27.9 million	GEF	2015–2017	Ministry of Agriculture and Livestock (SAG)
Access to Markets	\$24.3 million	USAID	2014–2019	Fintrac Inc.
Addressing Climate Change Risks on Water Resources in Honduras	\$5.6 million	UNDP	2011–2016	SERNA
Gobernanza en Ecosistemas, Medios de Vida y Agua	\$23.7 million	USAID	2016–2020	DAI
Dry Corridor Alliance (ACS)	\$35 million	USAID and GOH	2015–2020	Honduran Strategic Investment Office (Invest-H)