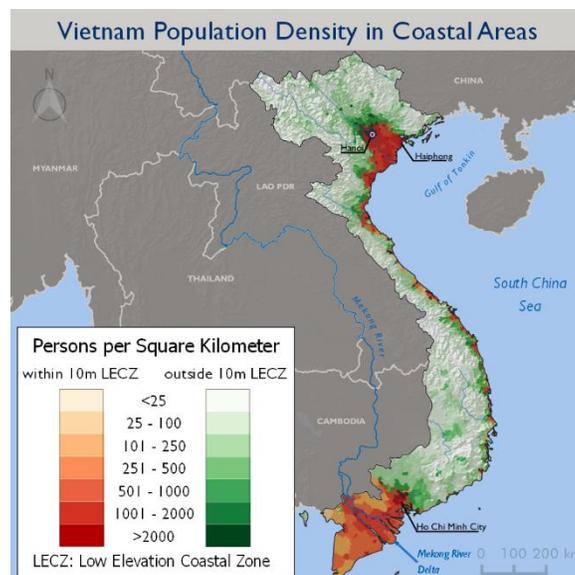




CLIMATE CHANGE RISK PROFILE VIETNAM

COUNTRY OVERVIEW

Located on the tropical typhoon belt, Vietnam is considered one of the most hazard-prone countries in the world. Typhoons, floods, droughts and landslides are recurrent and combined claimed 9,500 lives and were responsible for losses equal to 1.5 percent of annual GDP between 2001 and 2010. This situation is compounded by a host of non-climate factors such as high population density, high levels of poverty concentrated in coastal areas vulnerable to extreme events, and extensive low-lying land highly susceptible to flooding. Investments in poverty reduction over the past 20 years were successful: today less than 15 percent of households live below the poverty line. Nevertheless, the country's poorer populations are now concentrated in mostly rural areas with precarious housing and social infrastructure, low-lying roads, and high dependence on climate-sensitive livelihoods such as fishing and rainfed agriculture. Growing industrial and service sectors have reduced the relative contribution of agriculture, forestry and fishing to GDP, but these sectors still collectively contribute 21 percent of GDP and employ over 47 percent of the country's labor force. (3, 6, 7, 8, 9)



CLIMATE PROJECTIONS



1°– 2°C increase in temperatures by 2050



Increased intensity of extreme weather events, including droughts, typhoons and floods



28–33 cm rise in sea levels by 2050

KEY CLIMATE IMPACTS

Agriculture

Damage to crops
Loss of arable lands
Shifting production zones



Water Resources

Degraded water quality
Reduced flows and groundwater levels
Destruction of water infrastructure



Fisheries

Shift in distribution of species
Habitat destruction and degradation
Loss of livelihoods; increased migration



Infrastructure

Damage to infrastructure
Reduced mobility of goods and services



Coastal Ecosystems

Damage to and destruction of coastal and marine habitats



Energy

Reduced energy production potential
Disruption in service provision



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CLIMATE SUMMARY

Vietnam's climate is broadly characterized as tropical, with rainy seasons corresponding to monsoon circulations. In the northern part of the country, annual temperatures range from 22°–27.5°C in the summer and 15°–20°C in the winter, while temperatures in the south hover between 26°–29°C year-round. Annual rainfall ranges from 700–5,000 mm, with northern and windward mountain areas receiving more than the south. Monsoons bring heavy rainfall in the north and south from May–October, and in central regions from September–January. Vietnam experiences high interannual rainfall variability, and both floods and droughts can occur in the span of a single year. The coastal region, particularly south-central, is subject to frequent droughts. The country's long coastline is exposed to typhoons, which make landfall an average of 6–8 times per year and are accompanied by heavy rains and flooding, high tides and increased storm surges. (6, 7, 9)

HISTORICAL CLIMATE

Climate trends observed since 1960 include:

- Increased annual mean temperatures (+0.5°C), with rate of increase more rapid in the dry season and in the south.
- Significant increases in the number of “hot” days and nights throughout the year.
- Decrease in annual rainfall totals in the north and an increase in the south.
- Rising sea levels of 0.39 cm per year at Vung Tau station (south), but decreasing sea levels at Hon Dau (north) and Son Tra (central).
- Overall increase in the frequency and intensity of typhoons by 0.43 events per decade, but reduced frequency in the East Sea.
- Southward shift in typhoon tracks coupled with changes in the peak timing of landfall.

FUTURE CLIMATE

By 2050 projections indicate:

- Increases in annual mean temperatures of 1°–2°C by 2050.
- A 180 percent increase in the number of heat waves.
- Increases in annual rainfall across all regions by 2–7 percent, with more extreme precipitation variability between the dry and rainy season.
- By 2090, increases of 2–14 percent in the proportion of total rainfall falling during heavy events, particularly in northern regions, with increased risk of landslides in mountain areas.
- Rising sea levels of 28–33 cm.

SECTOR IMPACTS AND VULNERABILITIES

AGRICULTURE PRODUCTION

Rainfed rice production, vital for the country in terms of food security, employment and foreign exchange, is inherently a climate-sensitive activity. Grown by nearly 80 percent of Vietnamese farmers on roughly 45 percent of the country's agricultural land, the rice crop is vulnerable to more variable rainfall patterns, inundation and waterlogging, and landslides.

Research suggests production losses due to these risks could total 9.1 million tons annually by 2050.

Other important crops are also vulnerable, with projected annual losses for sugarcane estimated at 3.7 million tons, maize at 1.1 million tons and cassava at 1.9 million tons. Rising sea levels threaten low-lying coastal zones and the Mekong and the Red River Deltas. The Mekong Delta currently produces 13 percent (62 million tons) of the world's rice, and projections suggest that 590,000 ha of these lands are at risk from inundation, translating into production losses of 2.7 million metric tons per year. Sea level rise also threatens major tributaries

Climate Stressors and Climate Risks AGRICULTURE PRODUCTION	
Stressors	Risks
Increased temperatures	Reduced crop productivity from loss of arable land due to waterlogging, inundation and saline intrusion
	Shifting of production zones to higher elevations; by 2100, tropical crops may be found at elevations of 550 m
Increased frequency/intensity of extreme events	Shift in growing cycle – shorter seasons or delayed planting
	Increased risk of landslides
Sea level rise	Increased reproduction and spread of harmful pests (e.g., rice-feeding ear-cutting caterpillars)

of the Mekong River, even those as far as 10 km inland, from increased salinization. This can negatively affect water and soil quality, lowering crop yields and reducing overall productivity levels.

(2, 8, 9, 10)

WATER RESOURCES

Vietnam's abundant water resources include more than 2,000 rivers spread across eight basins. However, these resources are unevenly distributed, underutilized due to constraints in storage capacity, and will be further constrained by climate change. Climate-induced water shortages have already altered river flows and groundwater levels – the Mekong River is at its lowest recorded levels in a century and the worst drought in 90 years occurred in 2016. This has reduced water availability for irrigation systems, downstream river basins and hydropower reservoirs. (2, 6, 9)

FISHERIES

Climate change threatens Vietnam's fisheries sector, which accounts for 12 percent of total exports and is a source of livelihood for 4 million people. Higher temperatures can inhibit fish growth and survival rates and induce a northern migration to cooler waters. Currents closer to the coastline are warming faster, causing fish to migrate out of the range of artisanal fishing boats. Aquaculture production is concentrated in the Mekong River Delta, where sea level rise and associated surges are causing harmful saline intrusion into brackish and freshwater hatcheries. (6, 9)

COASTAL ECOSYSTEMS

Important ecosystems such as coral reefs, sea grasses and mangroves are increasingly stressed due to climate change. Higher temperatures bleach corals and encourage new coral diseases; a recent survey of coral reef colonies off the coast of Vietnam revealed that coral coverage decreased by about 87 percent at Ang Tham and by 97 percent at Cong Do. Sea level rise accelerates erosion and storm surges wash away mangrove swamps; such was the case with mangrove forests east of Ca Mau, where many species lost their natural habitat. (6, 8, 9)

INFRASTRUCTURE

The majority of the country's roads are located in low-lying areas, which are vulnerable to typhoon damage, rising seas and increased storm surges. Coastal infrastructure damage from typhoons already creates a heavy economic burden (\$6 billion in damages over the last 20 years) and recent estimates suggest an investment of \$10.5 billion is required to protect the same road networks from the impacts of climate change. The country's major urban centers of Ho Chi Minh and Haiphong are located along the coast, leaving them vulnerable to rising sea levels and flooding events. (6, 7, 9, 11)

Climate Stressors and Climate Risks WATER RESOURCES	
Stressors	Risks
Increased temperatures	Increase in evaporation, reducing water availability
	Significant decrease in groundwater table due to decrease in groundwater recharge during dry season
Increased frequency/intensity of extreme events	Destruction of water infrastructure
Sea level rise	Saline intrusion into groundwater, reducing quality

Climate Stressors and Climate Risks FISHERIES	
Stressors	Risks
Increased sea surface temperatures	Altered physiology of fish (e.g., faster growth but more vulnerable to disease)
	Shift in distribution and composition of species; migration to colder waters
Increased frequency/intensity of extreme events	Increased salinity, leading to fish mortality and migration
Sea level rise	Loss of livelihoods; increased migration to urban centers

Climate Stressors and Climate Risks COASTAL ECOSYSTEMS	
Stressors	Risks
Increased sea surface temperatures	Increased coral bleaching and mortality
	Increased coastal erosion; destruction of coastal and marine habitats
Increased frequency/intensity of extreme events	Inundation of wetlands and marine conservation areas
Sea level rise	Increased exposure of coastal and inland mangrove and ecosystems to storm surges

Climate Stressors and Climate Risks INFRASTRUCTURE	
Stressors	Risks
Increased temperatures	Destruction of coastal assets; increased cost of maintaining coastal infrastructure
Increased frequency/intensity of extreme events	Damage to roads, disrupting the movement of people and goods
Sea level rise	Increased flooding risk to major cities

ENERGY

Increasing temperatures are already altering the demand for energy use for air conditioning, industrial cooling and agricultural drainage pumps, which will continue to put pressure on the country's energy supplies in the future. At the same time, rising temperatures have reduced hydropower production potential by altering river flows and runoff dynamics. Other energy sources such as natural gas are also vulnerable to increased temperatures. Studies suggest an increase of 1°C in temperature could reduce gas power energy output by 0.5 percent. (6, 7, 9)

Climate Stressors and Climate Risks ENERGY	
Stressors	Risks
Increased temperatures	Increased energy demand coupled with decreased energy production
	Disruption of energy supply networks
Increased rainfall variability	Limited hydropower development prospects

POLICY CONTEXT

INSTITUTIONAL FRAMEWORK

The Ministry of Natural Resources and Environment (MONRE) oversees all climate change-related actions and is the focal point to the United Nations Framework Convention on Climate Change (UNFCCC). Under MONRE, the Department of Meteorology, Hydrology and Climate Change coordinates climate change-related activities, while the Department of Legal Affairs advises on climate change-related legislation. The National Committee on Climate Change was established as an advisory agency for the Prime Minister and proposes strategic solutions, mobilizes and coordinates resources to respond to climate change, and is a key institutional body for overseeing climate change policy. Political will to address climate change is reflected in Article 68 of the Constitution (2013) as well as in the Communist Party's Resolution on Active Response to Climate Change, Improvement of Natural Resource Management and Environmental Protection, which was issued the same year. (2, 3)

NATIONAL STRATEGIES AND PLANS

Vietnam has a plethora of national policies, strategies and plans that address climate change and natural disaster. Key ones include:

- [Second National Communication](#) (2010)
- [National Strategy on Climate Change](#) (2011)
- [National Target Programme to Respond to Climate Change](#) (2008)
- [Action Plan Framework for Adaptation and Mitigation of Climate Change of the Agriculture and Rural Development Sector 2008–2020](#) (2008)
- [National Action Plan on Climate Change 2012–2020](#) (2012) sets national climate objectives through 65 programs, as well as a framework for development of a climate change law
- [Climate Change Adaptation and Low Emission Development Strategy](#) (2013)

KEY RESOURCES

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 6. Socialist Republic of Vietnam 2010. [Viet Nam's Second National Communication to the UNFCCC](#).
 7. Socialist Republic of Vietnam. 2011. [National Strategy on Climate Change Socialist Republic of Vietnam](#), 2014.
 8. World Bank. 2010. [Economics of Climate Change Adaptation, Vietnam](#).
 9. World Bank Global Facility for Disaster Risk Reduction and Recovery. 2011. [Vietnam Climate Risk and Adaptation Country Profile](#).
 10. Pham, Diep. 2016. [Drought Killing Vietnam's Rice Crops Compounds Mekong Water Crisis](#).
 11. Chinowsky, Paul S. 2015. [Road Infrastructure and Climate Change in Vietnam](#). *Sustainability* (7).
- Map modified from [CIESIN – Columbia University](#). 2007. *Elevation Data*: U.S. Geological Survey. 1 kilometer Shuttle Radar Topography Mission Elevation Data. *Population Density*: CIESIN - Columbia University. 2015. *Gridded Population of the World*, Version 4.

SELECTED ONGOING EXPERIENCES

Selected Program	Amount	Donor	Year	Implementer
Climate Resilient Infrastructure in Northern Mountain Province of Vietnam	\$148 million	Asian Development Bank, GEF	2012–2016	Ministry of Agriculture and Rural Development; Provincial People's Committees; Ministry of Construction
Promoting Climate Resilience in Vietnam's Cities	\$82 million	Asian Development Bank, GEF	2015–2019	Ministry of Natural Resources and Environment
Red River Delta Adaptation and Youth	\$0.9 million	USAID	2015–2018	Center for Marinelife Conservation and Community Development
Vietnam Forests and Deltas Program	\$26.5 million	USAID	2014–2018	Winrock International
Strengthening Capacity and Institutional Reform for Green Growth and Sustainable Development in Vietnam	\$4.1 million	USAID, UNDP	2014–2018	UNDP
Community-Based Disaster Risk Management	\$4.3 million	USAID	2015–2017	American Red Cross
Disaster Risk Reduction - Enhanced Capacity of the Vietnam Red Cross	\$0.5 million	USAID	2015–2017	Vietnam Red Cross
Vietnam Clean Energy Program	\$9 million	USAID	2012–2017	Winrock International
Vietnam Low Emission Energy Program	\$9.4 million	USAID	2015–2020	Deloitte Consulting
Climate Resilient and Sustainable Urban Development Program	\$2.5 million	USAID, Nordic Development Fund	2015–2019	Asian Development Bank
USAID Green Annamites	\$24 million	USAID	2016–2020	Ecodit
Climate Change and Green Growth Project	\$90 million	World Bank	2016–present	Ministry of Natural Resources and Environment
Integrated Coastal Management Programme	Not listed	GIZ, AusAid/DFAT	2011–2017	Ministry of Agriculture and Rural Development
Viet Nam Urban Environment and Climate Change Adaptation Project	\$104 million	Asian Development Bank	2015–2023	Provincial People's Committee of Quang Nam Province; Provincial People's Committee of Quang Binh Province
Innovative and Climate Resilience Housing in the Mekong Delta	\$0.5 million	Nordic Development Fund	2014–2016	Ministry of Construction