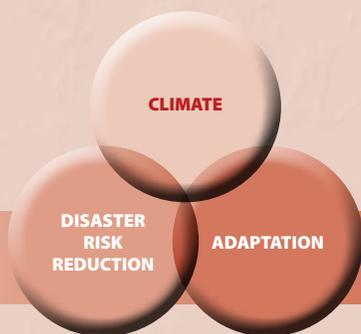


Vulnerability, Risk Reduction, and Adaptation to Climate Change

Lao P.D.R.



GFDRR
Global Facility for Disaster Reduction and Recovery

CLIMATE
INVESTMENT FUNDS



COUNTRY OVERVIEW

Lao People's Democratic Republic (PDR) is located in Southeast Asia, a region that has grown rapidly during the last three decades. Lao PDR is ranked as one of the poorest or least developed countries in the region and in the world. According to the UNDP Global Human Development Index (HDI), Lao PDR was ranked as 133rd out of 179 countries.¹

Lao PDR has a total land area of approximately 236,800 km², 80% of which is mountainous. The population in 2009 was about 6.3 million and the total gross domestic product (GDP) was US\$ 5 billion, with a GDP per capita of US\$ 940. The population growth is around 2% annually and the population density is about 27/km². 26% of people lived below the poverty line in 2010.²

Similar to its neighbor countries, the Lao PDR government has given a high priority to economic growth that enhances the welfare of its people. By late 1980s, the country had opened investments, converted to a market-oriented economy and launched a decentralization policy. This policy has stabilized macro-economic conditions and ensured a steady, sustained growth and macro-equilibrium. The average GDP growth per capita was about 7.9% in 2006.²

The agricultural and industrial sectors are contributing to almost 75% of the GDP. The service sector covers about 25% of the GDP.¹ In the past years, the country has faced widespread food insecurity with over a third of the population experiencing rice shortfalls of 2-6 months/year. Based on a 2007 country-wide National Risk and Vulnerability Assessment conducted by WFP, it is estimated that up to 46% of the rural population in Lao PDR - approximately 188,000 households, most of whom are living in lowlands - are at risk of becoming food insecure because of either loss of access to natural resources, floods, drought, or a sudden increase in food prices. This is in addition to the 2% of people who are already chronically food insecure.³

Lao PDR is vulnerable to extreme events, such as droughts and floods. These disturbances are increasing in frequency and severity, affecting food security, drinking water supply and irrigation, public health systems, environmental management and lifestyle.

PRIORITY ADAPTATION MEASURES

Key Sectors

Agriculture
Forestry
Public Health
Water Resources

According to the National Adaptation Program of Action finalized in 2009 by the Government of Lao PDR, main actions should focus on supporting capacity building and climate change mainstreaming into the local, provincial, and national planning and decision making process. The following actions have been identified as priorities in response to current and projected climate variability and change:

¹ Lao PDR's National Adaptation Program of Action, 2009.

² World Bank Data Portal

³ Lao PDR: Improving the Resilience of the Agriculture Sector in Lao PDR to Climate Change impacts Project by Global Environmental Facility (GEF).

➔ Agriculture and Forestry

- Promote secondary professions in order to improve the livelihoods of farmers affected by natural disaster induced by climate change;
- Continue the slash-and-burn eradication program as well as a permanent job creation program;
- Demonstrate implementation of some adaptation options (e.g., flood tolerant rice varieties, small-scale irrigation, land-use change, local learning, etc.);
- Strengthen capacity village forestry volunteers in forest planting, caring, and management techniques as well as the use of village forests;
- Strengthen the capacity of the national disaster management committees.

➔ Water sector

- Study, design, and build multi-use reservoirs in drought-prone areas;
- Improve systems for the sustainable use of drinking water and sanitation, with community participation in flood- and drought-prone areas;
- Survey underground water sources in drought-prone areas;
- Mapping of flood-prone areas;
- Raising awareness of water resource management;
- Improve knowledge and skills of engineers who design and build water and sanitation systems;
- Establish an early warning system for flood-prone areas and improve and expand meteorology and hydrological networks and weather monitoring systems.

➔ Health

- Research and increase prevention of epidemics and potential increase of vector-borne diseases.

CLIMATE BASELINE AND CLIMATE FUTURE**BASELINE CLIMATE**

Lao PDR's climate can be divided in two distinct seasons: a dry season from mid-October to April and a rainy season dominated by the south-west monsoon which brings high rainfall, high humidity, and high temperature between May and mid-October. Temperatures during March-May period can reach high into the 30s°C, while at higher elevations and during the dry season's cooler months of December and January, temperatures can drop as low as 15°C and below. The average annual rainfall ranges between 1,300-3,000mm¹⁴.

Three climatic zones are recognized:⁵

- ➔ The northern mountains include areas above 1,000m have a montane temperatures on average lower than 25°C and average rainfall between 1,500 and 2,000mm.

⁴ Ibid note 1.

⁵ State of the Environment Report, Lao PDR (2001) AIT-UNEP Regional Resource Centre for Asia and the Pacific (RRC.AP)

- ➔ The central region areas have higher temperatures and higher average annual rainfall (2,500-3,500mm) and the small communities living in these areas are vulnerable to droughts. The rainy season in the central region occurs between June, July, and August, while the driest periods are between January and March.
- ➔ The tropical lowland plains and floodplains in the south have an average rainfall of 1,500 to 2,000 mm. The majority of the population lives in the lowland areas, including around the Mekong River Basin. These areas are the most exposed to floods and droughts. The rainiest period is in September and October, with an average estimated rainfall of about 400 mm.

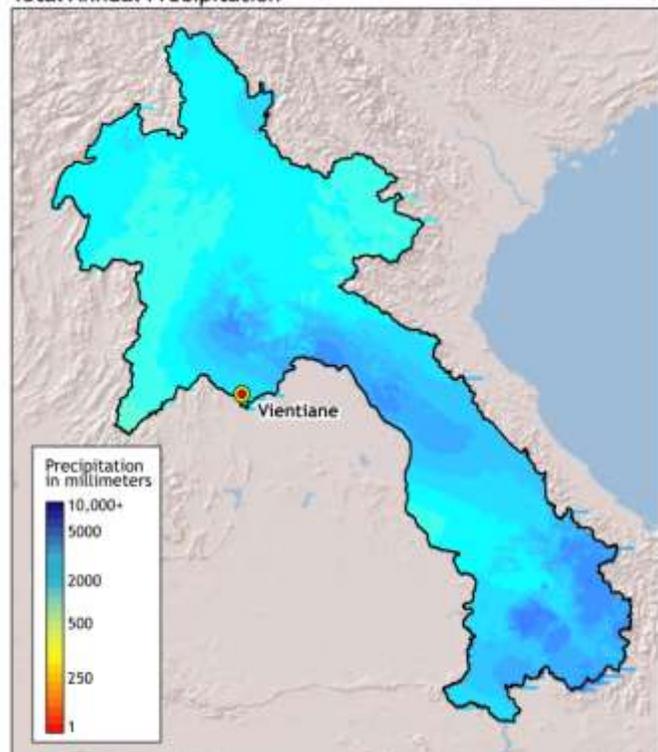
Major Climate Processes

El Niño and La Niña
Tropical Monsoons

Impacts on Climate

Regulate temperature
Regulate rainfall

Total Annual Precipitation



Mean Annual Temperature

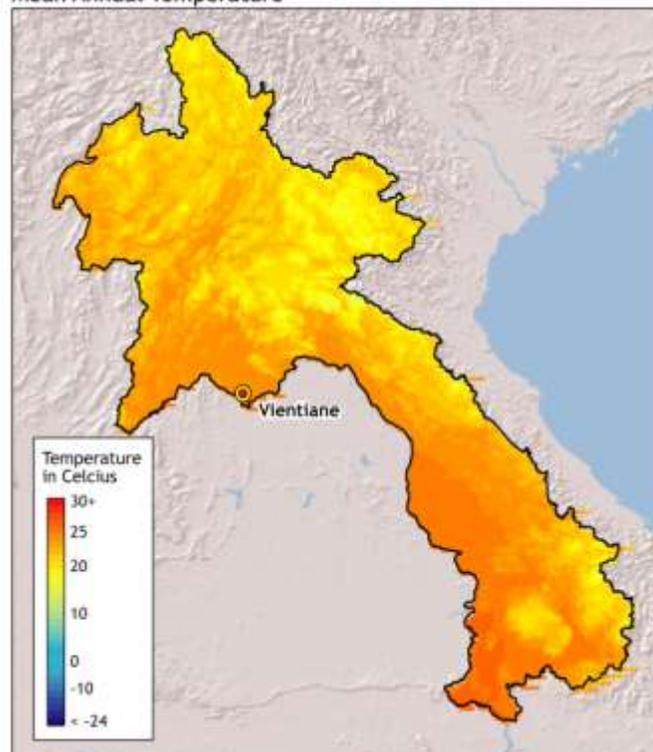


Figure 2: Mean annual precipitation and temperature across Lao PDR

Recent Climate Trends across Lao PDR can be described as follows:⁶

- ➔ Temperatures have increased on average between 0.1 to 0.3°C per decade between 1951 and 2000. The year 1998 was the highest in temperature in the past two decades with average temperatures of 30°C. This was also the driest year on record with average rainfall of 800mm.

⁶ Manton et al. (2001). Trends in extreme daily rainfall and temperature in Southeast Asia and the South Pacific.

- ➔ Rainfall has decreased between 1961 and 1998.
- ➔ The number of droughts and floods over the last three decades has increased.

CLIMATE FUTURE⁷

The climate science community sources a suite of models to inform decision makers on future climate. Among the most widely used are GCMs (Global Climate Models), RCMs (Regional Climate Models), and downscaling techniques (both empirical and statistical) and several comprehensive reviews are available on the subject. Global Climate Models (GCMs) are our primary source of information about future climate. GCMs comprise simplified but systematically rigorous interacting mathematical descriptions of important physical and chemical processes governing climate, including the role of the atmosphere, land, oceans, and biological processes. The bullet points below offer insights into a changing climate are thusly derived for Vietnam from a suite of GCMs used by the Intergovernmental Panel on Climate Change⁸: It is important to note, however, that Lao has 3 distinct climate regions that differ in terms of temperature, rainfall, and extreme event regimes. The magnitude of climate change is thus likely to vary at regional levels and the available information is limited.

At a Glance

Temperature	Warming constantly across the country although regional differences in warming are projected, with the south experiencing more rapid warming <i>Projections vary by region and by model.</i>	+1.4 to +4.3°C by 21st century
Rainfall	One analysis projects - an increase in rainfall in the eastern and in southern areas - Increase of total annual precipitation in the northern area	+10-30% +4.2%
Extremes	- <i>Runoff for the Mekong delta</i> - <i>dry season Precipitation in the Mekong delta</i> - Increase in intensity and frequency	+21% by 2030

Projected changes in Lao's climate:

- ➔ Mean annual temperatures are projected to increase by 1.4 to 4.3°C by 2100, with similar projected rates of warming for all seasons. Some studies indicate that similar warming is likely to occur across all regions, while others suggest that the country's southern climatic zone will experience smaller warming than the northern and north central zones.
- ➔ Mean annual rainfall is projected to increase, with the most significant increases expected in the wet season.
- ➔ Recent studies have used a regional model⁹ where climate change simulations were based on the increase of CO² concentrations. The predicted climate change scenarios indicate that:
 - the lower region of the Mekong River basin tends to be slightly cooler under the increased CO² concentration of 540ppm but it will be warmer (1 or 2°C) under the CO² concentration of 720ppm.

⁷ Ibid note 1.

⁸ Unless otherwise noted, projections have been taken from the World Bank Climate Change Knowledge Portal: <http://sdwebx.worldbank.org/climateportal/>

⁹ The climate change model used is a Conformal Cubic Atmospheric Model (CCAM), which is the second-generation regional climate model developed specifically for the Australasian region by the CSIRO Division of Atmospheric Research in Australia

- the change in annual hot and cool days¹⁰ could be significant, with the number of days considered 'hot' under present climate increase by 2-3 weeks and the cool days⁷ decrease by 2-3 weeks.
 - Potential increases in rainfall are projected to be +10-30% in particular in the eastern and southern part of Lao PDR.
- ➔ Additional modeling exercises¹¹ suggest that:
- the annual increase in precipitation by 2080-2099 might be 4.2% in particular in the north of the country, and
 - Project an overall increase in the number of wet days across the southern area of the Mekong River.
 - Mean annual temperatures are expected to increase by 2.6°C by the end of the century.
 - All models reveal an increase in magnitude and frequency of extreme events.
- ➔ For the Mekong Delta specifically, recent studies undertaken by CSIRO to 2030 project the following changes¹²:
- A basin wide temperature increase of 0.79°C, with greater increases for colder catchments in the north of the basin.
 - An annual precipitation increase of 0.2m, equivalent to 15.3%, predominantly from increased wet season precipitation.
 - An increase in dry season precipitation in northern catchments and a decrease in dry season precipitation in southern catchments, including most of the LMB.
 - An increase in total annual runoff of 21% which will maintain or improve annual water availability in all catchments, however with pockets of high levels of water stress remaining during the dry season in some areas such as north-eastern Thailand and Tonle Sap.
 - An increase in flooding in all parts of the basin, with the greatest impact in downstream catchments on the mainstream of the Mekong River.

Figure 3 shows the projected changes in rainfall and temperature values for the 2040-2059 period from those of the historical values of 1980-1999 in the southern tip of the country within the Mekong Basin. Most Global Circulation Models (GCMs) for temperature are more consistent showing an increase in temperature between 0.6°C and 2°C in the Mekong Basin areas. Between October and March, the projected rainfall might tend to decrease, leading to more severe drought periods, with implications for agriculture and irrigated land. On the other hand, the projected increase in rainfall between April and September might cause flooding and increase the threat of food insecurity and deaths.

¹⁰'Hot days' are defined as the number of days with a maximum temperature over 33°C, and 'cool days' are defined as days with a minimum temperature under 15°C.

¹¹ Kiem et al., 2008.

¹² Eastham, J., Mpelasoka, F., Mainuddin, M., Ticehurst, C., Dyce, P., Hodgson, G., Ali, A. and M. Kirby (2008) Mekong River Basin Water Resources Assessment: Impacts of Climate Change. CSIRO: Water for a Healthy Country National Research Flagship.

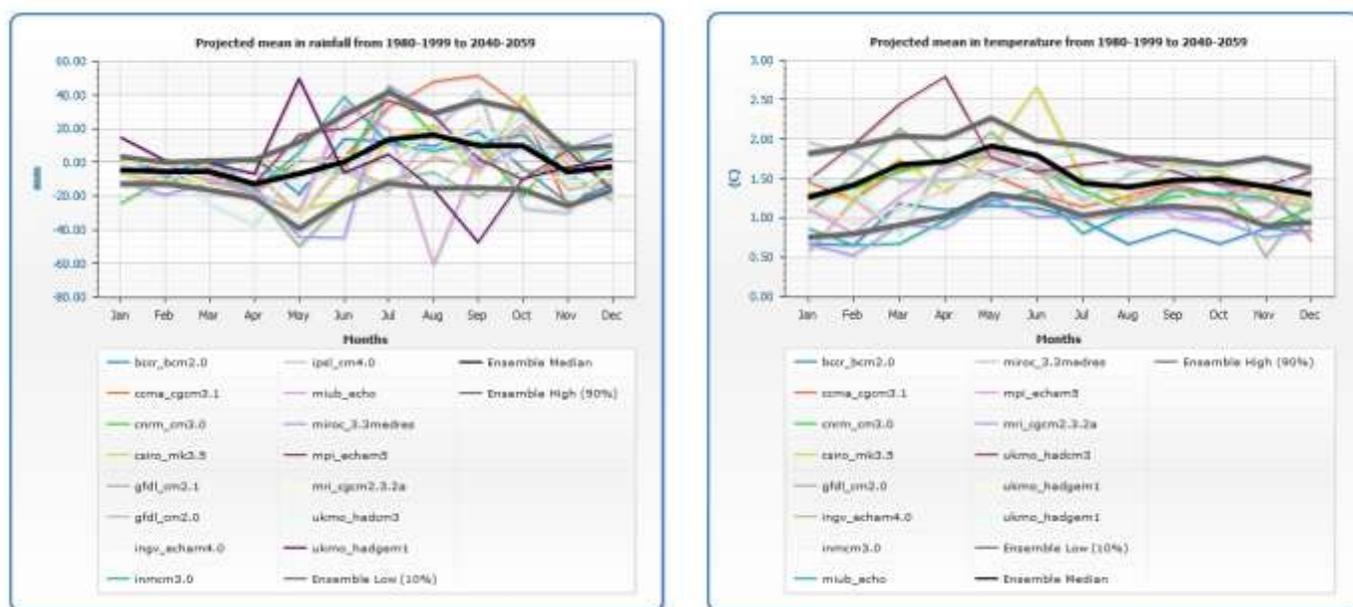


Figure 3: Projected changes in mean rainfall and temperature for 2040-2059 in the Mekong Basin (south Lao PDR), as compared to data from 1980-1999¹³

CLIMATE CHANGE IMPACTS ON NATURAL HAZARD VULNERABILITY

AT A GLANCE

Lao PDR has a low capacity to adapt to climate change because of its poor socioeconomic development. From 1970 to 2010, 33 natural hazard events (mostly floods and droughts) have been registered, affecting almost 9 million people and causing economic damages of over US\$ 400 million.¹⁴ According to a recent (2009) vulnerability mapping exercise conducted for South East Asia, the areas of Phongsali, Houaphan, and Louang Namtha are considered hotspots for the impacts of multiple hazards, including floods, droughts, landslides, and sea-level rise.¹⁵

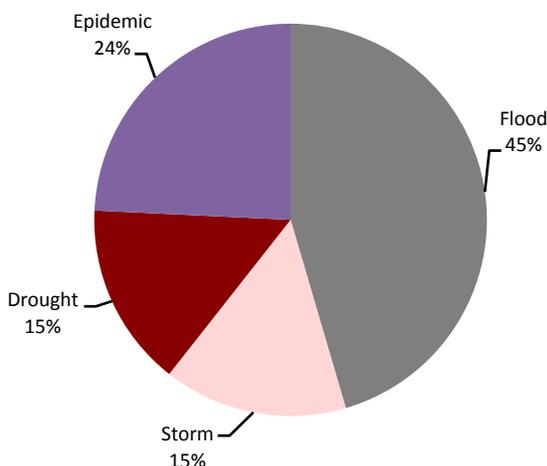


Figure 4: Impact of natural hazards by type

¹³ World Bank Climate Change Data portal

¹⁴ EM-DAT: The OFDA/CRED International Disaster Database

¹⁵ Yusuf and Francisco, 2009: Climate Vulnerability Mapping of South-East Asia.

These hazards are either geological or hydro-meteorological in nature and include earthquakes, tsunamis, volcanic eruptions, floods, landslides, droughts, and forest fires (Figures 4, 5 and 6).^{16,17} Climate change will also decrease food security as production patterns change due to shifts in rainfall, evaporation, run-off water, and soil moisture.

➔ **Droughts:** Lao PDR is very vulnerable to droughts. Five droughts have affected the country over the past 40 years. One of the most severe was in 1977 affecting almost three and a half million people. A later drought in 1998 affected 750,000 people.¹⁸ According to data and statistic from the LAO Department of Meteorology and Hydrology, drought conditions from 1995 to 2005 were characterized by higher and irregular increase in temperature.¹⁹ On a more regular basis, localized droughts severely affect both rice production and household food security. It is estimated that around 188,000 households in Lao PDR are at risk of food insecurity caused by drought. These vulnerable households are located primarily in Khammuane, Savannakhet, Saravane, Champasack, Xayabury and Vientiane provinces.

➔ **Floods:** The areas of Lao PDR most vulnerable to flooding are the plain areas along the Mekong River in the central and southern parts. Fifteen floods have occurred in Lao PDR from 1970 to 2010. In 1992 a heavy flood caused economic damages of over US\$ 21 million.²⁰ The areas of rain-fed rice fields destroyed by flooding were 65,937 ha in 1995, 67,500 ha in 1996, 42,900 ha in 2000, 42,223 ha in 2001, and 57,300 ha in 2005.²¹ In addition, in 2005 and 2006, the damages inflicted by floods on the irrigation system caused more than US\$ 5 million worth of damage.

➔ **Epidemics:** Eight epidemic events have taken place in the past four decades. Disease outbreaks such as smallpox, malaria, diarrhea, dysentery, dengue fever and cholera have been registered. In 1994, a major cholera outbreak killed 500 people and affected 8,000. These epidemics have been associated with recurrent floods and droughts affecting the country over the past years.²²

➔ **Storms, typhoons, and southwest monsoons:** Five storms or tropical cyclones have reached and affected the country over the last two decades. These storms as well as the impacts from southwest monsoons have affected over one and a half million people and caused damages of over US\$ 400,000. The most severe storm took place in 1995 and caused 26 deaths.²³

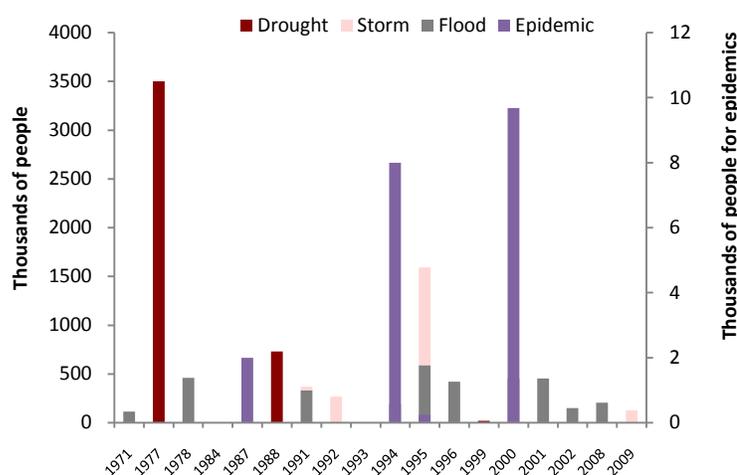


Figure 5: Number of people affected by the top 4 natural hazards

¹⁶ Ibid.

¹⁷ EM-DAT: The OFDA/CRED International Disaster Database

¹⁸ Ibid note 9.

¹⁹ Ibid note 1.

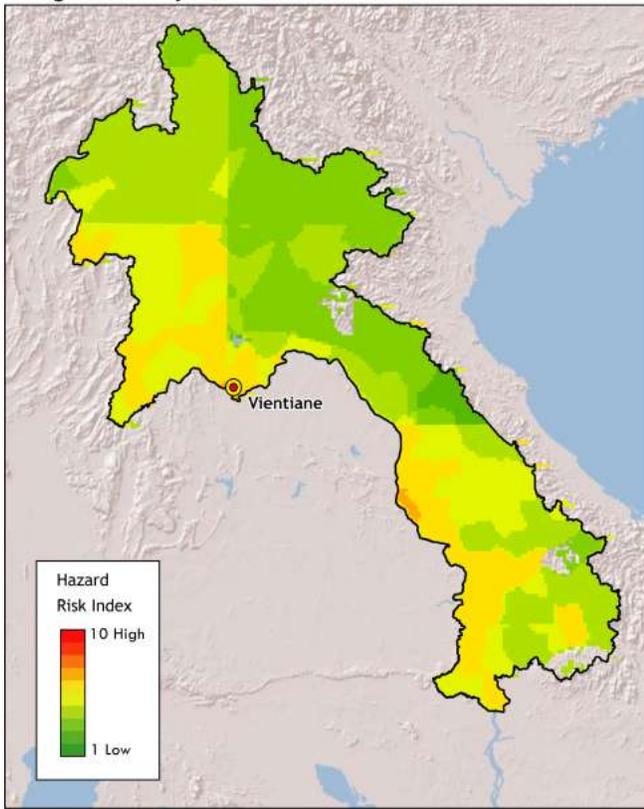
²⁰ Ibid note 9.

²¹ LAO PDR Department of Planning, Ministry of Agriculture and Forestry, 2005.

²² Ibid note 6.

²³ Ibid note 6.

Drought Mortality Risks and Distribution



Flood Mortality Risks and Distribution

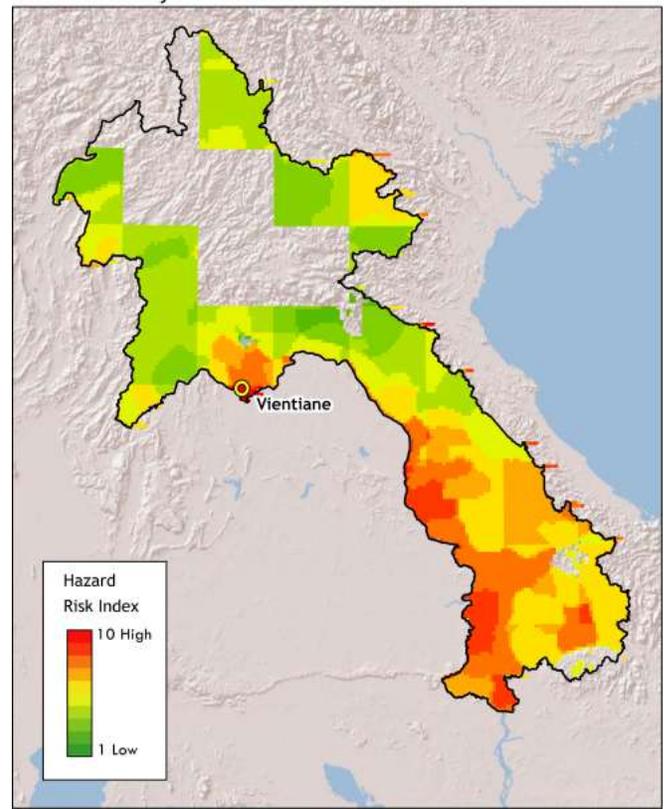


Figure 6: Drought mortality risk (left) and flood mortality risk (right)

Implications for DRM

- ➔ The increase in floods is expected to have implications for the agricultural lands along the Mekong River and its tributaries
- ➔ An increase in temperatures, along with a decrease in rainfall during the dry season, might lead to longer and severe droughts. Climate change and the increase in frequency and in magnitude of these events are expected to make more people food insecure, in particular in the rural areas.²⁴
- ➔ Rising temperatures will increase the incidence and range of pests and, when combined with decreased rainfall and increased demand, higher temperatures will also present new challenges related to water storage or transfer mechanisms.
- ➔ Climate change might threaten and lead to a loss in agricultural production (in particular rice) affecting the country's economy and food security.
- ➔ The impacts of climate change will increase migration and displacement due to an increased rate of natural disasters and poverty.

²⁴ Ministry of Environment, 2007. National Action Plan Addressing Climate Change.

SECTORAL CLIMATE RISK REDUCTION RECOMMENDATIONS

The following impacts, as well as policy and program options, are summarized in Lao PDR's NAPA and other country documents as listed in the references.

AGRICULTURE

Agriculture and forestry account for 47% of GDP and provide more than 80% of total employment. Agricultural output rose steadily over the past decade, with an average annual growth of 4.3%. In the country, about 620,000 households depend on agriculture for their livelihoods, and more than 80% of the farms practice subsistence farming. Farms have an average size of less than 2 ha.²⁵

The majority of agricultural fields are concentrated in the areas along the Mekong River and its tributaries. In fact, the soils in the North tend to be heavily leached and acidic with low water retention capacity and generally low fertility. In the central and in the Mekong Basin areas the soils are less acidic, with relatively good water retention and drainage capacity.

The main crops in the country are maize, vegetable and industrial crops such as rice.²⁶ Rice is the foundation of the farming system in the country, accounting for 85% of total crop production and 39% of agricultural GDP. The area planted to rice represents more than 80% of the nation's cropped land.⁷

Climate hazards such as flooding and droughts can be very destructive, not only altering the landscape, fauna, flora and vegetation, but also destroying public infrastructure, property, productive land, agricultural assets and upcoming harvests. Climate change and the increase in frequency and magnitude of these events are expected to make more people food insecure, in particular in the rural areas.^{3 27} Rising temperatures will increase the incidence and range of pests and, when combined with decreased rainfall and increased demand, higher temperatures will also present new challenges related to water storage or transfer mechanisms.

Moreover, the newly present market forces, mainly through external investors and tourism, have started to re-structure agricultural production toward larger-scale monocultures that make the country more vulnerable to climate-related risks.

Table 1: Projected changes in rain-fed rice across Lao PDR under several management and future scenarios²⁸

Crop	Baseline Yield (1961 - 1990)	Future Projected Yield	Change %	Options
Rice	5519	5619	1.81	High Input, 2020s
Rice	5519	5707	3.41	High Input, 2050s
Rice	5519	4917	-10.91	High Input, 2080s
Rice	2082	1654	-20.56	Low Input, 2080s

²⁵ Dr. Monthathip Chanphengxay, Conservation Agriculture in Lao PDR, Conservation Dynamic and Challenges

²⁶ Ibid note 4.

²⁷ Ministry of Environment, 2007. National Action Plan Addressing Climate Change.

²⁸ World Bank Climate Change Data Portal – Agricultural Model Generated by IIASA

Adaptation efforts in agriculture and livestock should include:

- ➔ Mainstreaming climate change in policies, strategies, and plans;
- ➔ Changing cropping patterns;
- ➔ Enhancing conservation agriculture;
- ➔ Developing and implementing new water saving techniques;
- ➔ Improving water management and flood control;
- ➔ Country-specific, sector-based research on macro and village level;
- ➔ Improving farmers' knowledge about proper use of weather information in carrying out agricultural activities to avoid risks of climate change;
- ➔ Improving information on climate variability and seasonal climate forecasting to reduce production risk.

FORESTRY

Lao PDR is the most densely forested country in mainland Southeast Asia, with forests covering 41% of the total area.²⁹ However, in the past decades the forest cover has been reduced to less than 40%, with an average annual loss of about 134,000 ha due to an increase in population, economic growth, excessive logging, and change in land-use.³⁰

Forests are significant for Lao PDR – as much as 80% of the population relies on the forests for income, food, shelter, herbal medicine, and other resources.³¹ Forests are the source of timber and non-timber products that are critical income and livelihood resources for rural communities. Forests also harbor most of the country's biodiversity, which is of global importance.

Climate change might threaten further this ecosystem. The increase in temperatures might enhance the frequency of forest fires and the pest and disease infestations in the forests. The increase in magnitude and frequency of extreme events such as flooding is expected to cause soil erosion, degradation of watershed, and massive landslides. Changes in precipitation patterns might affect the survival of seedlings and saplings. Some endemic flora and fauna have already disappeared from the country.

Adaptation efforts in forestry should include:

- ➔ Reforestation, afforestation, improved forest management;
- ➔ Establishment of early warning system;
- ➔ Use of appropriate silvicultural practices;
- ➔ Awareness-raising regarding forest fire prevention among communities;
- ➔ Monitoring of degraded forests. Developing agro-forestry systems for watershed protection and erosion-reduction in steep areas;

²⁹ Project Information document Sustainable Forestry for Rural Development II project (2008). World Bank

³⁰ Forest Sector Lao PDR www.gms-eoc.org/.../APPENDIX_3_LAO-ForestryNaturalResources.pdf

³¹ Ibid note 8

- ➔ Development of small reservoirs in upland areas in order to provide water for wildlife/aquatic animals and plants during the dry season.

HEALTH

Cholera, diarrheal diseases, dengue fever, and malaria outbreaks have affected the country in the past decades. In 1994, a cholera outbreak killed 500 people. Nearly 85% of villages claim malaria as their major health problem. The infant mortality rate was around 75 per 1,000 and the adult mortality rate was around 324 per 1,000 in 2006.³² Child malnutrition rates remain high at 43%.³³

Over the past years, Lao PDR has seen an increasing number of patients with diseases due to the inadequacies of the health system and people's lack of access to quality health care. The high disease incidence also reflects failures in the provisioning of basic social services, including access to safe drinking water and appropriate environmental sanitation.⁴

The increase in outbreaks of vector-borne infectious diseases has been linked to climate change. The rise in temperatures has led to the spread of malaria, while extreme events such as droughts and floods have led to malnutrition, in particular in children under 5 years old. Air pollution (for example from forest fires) caused an increase in respiratory diseases.

Adaptation efforts in health should include:

- ➔ Rebuilding and maintaining public health infrastructure;
- ➔ Enhancing short-range and long-range forecasting and warning systems and improved surveillance (e.g., risk indicators, infectious disease outbreaks, etc.);
- ➔ Implementation of activities aimed at reducing the health and social impact of climate-related disasters;
- ➔ Development of food safety measures that take into account new conditions caused by climate change;
- ➔ Disaster preparedness (climate-proofed housing design, etc.);
- ➔ Enhanced infectious disease control programs (vaccines, vector control, case detection, and treatment);
- ➔ Public awareness campaign on pest and disease outbreaks in wildlife caused by natural disasters.

WATER RESOURCES

Lao PDR is rich in water resources, mainly good quality fresh water. Water resources in the country are used in several sectors and activities such as irrigation, hydro-power, navigation, fisheries, urban water supply, and rural water supply.

The total of annual water flow in Lao PDR is estimated at 270 billion m³, equivalent to 35% of the average annual flow of the whole Mekong Basin. 80% of the distribution of the flow of the rivers is

³² Country Profile by World Health Organization (WHO), 2010.

³³ Ibid note 4.

during the rainy season. The annual national supply of renewable fresh water is 270 billion m³, or about 600,000 m³ per person, while current demand is only 259 m³/person. 60% of urban population and 51 % of rural population has access to clean water.³⁴

Water usage is predominantly agricultural (82%), followed by industrial (10%), and domestic (8%). In addition, water is used for hydro-power; the country has the potential to produce 23,000 megawatts of electricity. Currently, only 5% of that capacity has been exploited. Groundwater is and will probably remain the main source of potential rural and small town water supply, especially in the areas located far from surface water sources.³⁵

In the past years there have been some problems related to waste and polluted water in major urban areas. In addition, there has been water pollution from agricultural and industrial sectors, including mineral exploitation.

Climate change might increase the risk of flooding for the Mekong River and its tributaries and increase the basin runoff with 21%.³⁶ The increase in droughts and high temperatures is expected to lead to water scarcity in dry seasons with implications for the rural areas.

Adaptation efforts in water resources should include:

- ➔ Strengthen water sector institutions;
- ➔ Improve water management;
- ➔ Invest in water monitoring and information systems as a basis for more efficient and equitable use of water resources in all sectors;
- ➔ Improve flood control facilities, such as pumping stations, and to protect existing irrigation systems;
- ➔ Create multi-purpose reservoirs, dams, and water-impounding systems;
- ➔ Develop integrated management plans for river basin and water catchment areas;
- ➔ Rehabilitate damaged irrigation and drainage facilities.

Ongoing Efforts- At a Glance

- Climate Impact and Adaptation Sectoral Strategy for Rural Infrastructure in Lao PDR, Asian Development Bank (ADB)
- Improving the Resilience of the Agriculture Sector in LAO PDR to Climate Change Impacts, UNDP and GEF
- Capacity Enhancement for Coping with Climate Change : Lao People's Dem Rep, ADB and the Nordic Development Fund
- Climate Change Enabling Activity (Additional Financing for Capacity Building in Priority Areas),UNDP

³⁴ State of Water Environmental Issues by Water Environment Partnership in Asia (WEPA)

³⁵ Ibid note 11.

³⁶ www.unep.org/.../Assessments%20capacity%20gaps%20&%20needs_visuals.pdf

- National Adaptation Program of Action, UNDP
- Nam Theun 2 Hydro-electric (NT2) project, the World Bank
- Flood Vulnerability Assessment and Mapping Projects (FVAMP), Mekong River Commission
- Community Based Disaster Preparedness program (2007-2011), Lao Red Cross

GFDRR Interventions

Project Title	Partner ³⁷
Capacity building of Hydmet agency for early warning and weather forecast systems	DMH, WREA, NDMO
Develop DRM components within Sector Wide Approach (SWAp) in Education, Health, and Transport Sectors	Various, MOE, MOH, MPWT, NDMO
Incorporating DRM component in Mekong Water Resources Management Project	Various, MRC, ADB, WREA
Incorporating DRM component in Khammouane Province Development Project and Second Province Development Project	Various
Emerging Urban Risks—identifying and assessing emerging urban risks for Vientiane Capital	JICA, MPWT, NDMO
Issue paper on disaster risk financing (agriculture insurance, private sector participation, etc.)	MAF, MRD, NDMO
Strengthening Capacity for Post Disaster Reconstruction and Recovery in Laos	World Bank
Vulnerability and Poverty Reduction — incorporating DRR into village KBP and district planning. Activities include reduction of poverty of the most vulnerable households and communities within 4 target KBP in Yommalath district.	MLSW/NDMO, PDMC -WVL

EXISTING ADAPTATION FRAMEWORK/STRATEGY/POLICY AND INSTITUTIONAL SET-UP

NAPA is one of the many environmental management projects that are directly linked with all national development strategies and policies, including the National Action Plan (NAP) to Combat Drought and Desertification, Eight National Priority Programs, National Growth and Poverty Eradication Strategy (2004), and the 5th National Socio-Economic Development Plan (NSED) 2006-2010. NAPA identifies strategies that focus primarily on improving the livelihoods of communities that have low adaptive capacity and are vulnerable to many kinds of climate change hazards, gradually minimizing the impacts of climate change by improving food security, ensuring the sustainable use and management of natural resources, and building the capacity of relevant staff. The Government has developed and established several programs, plans, and institutions to improve disaster risk management and to reduce the vulnerability of the country to natural hazards, in particular droughts and floods.

- ➔ **NAPA:** The National Plan of Action was initiated in 2004 and submitted to the UNFCCC in 2009. It contains a total of 45 projects, 12 of them classified as urgent and immediate adaptation options, for a total resource requirement of US\$ 85 million.³⁸

³⁷ DMH: Department of Meteorology and Hydrology
WREA: Water Resources and Environment Administration
NDMO: National Disaster Management Office
MOE: Ministry of Education
MOH: Ministry of Health
MPWT: Ministry of Public Works and Transportation
MRC: Mekong River Commission
JICA: Japanese International Cooperation Agency
MAF: Ministry of Agriculture and Forestry
MRD: Ministry of Rural Development.

- ➔ **PRSP**: The Poverty Reduction Strategy Paper was adopted in 2001.³⁹
- ➔ **HFA**: The Hyogo Framework for Action was adopted by the Government of Lao PDR in 2005.⁴⁰
- ➔ **NDMC**: The National Disaster Management Committee was established in 1999. It is the highest body with responsibilities for developing policies and coordinating disaster risk management activities in the country.⁴¹
- ➔ **SPDRM**¹⁶: The Strategic Plan on Disaster Risk Management was adopted in 2003 and encompasses three periods: 2003-2005, 2005-2010, and 2010-2020. It aims to share disaster risk management responsibilities between community and government and emphasizes sustainable development through disaster risk reduction (DRR).
- ➔ **Strategy on Climate Change Lao PDR** was approved in March 2010.
- ➔ **PDMC**¹⁶: The Provincial Disaster Management Committees.
- ➔ **NESDP**¹⁶: The Sixth National Socio-Economic Development Plan (2006-2010) integrates disaster risk management.
- ➔ **NGPES**¹⁶: The National Growth and Poverty Eradication Strategy.
- ➔ **CAS**⁴²: The Country Assistance Strategy was endorsed by the World Bank's Board of Executive Directors in 2005. It has been designed to support the NGPES as key drivers of future growth as well as better targeting of social outcomes and reductions in vulnerability.
- ➔ **CCA**⁴³: The Common Country Assessment was launched by the Government in 2000 and analyzes and identifies development issues for the country to meet the Millennium Development Goals. A new CCA was prepared in 2005.

INSTITUTIONAL AND POLICY GAPS⁴⁴

- ➔ Lack of clearly defined leaders for disaster risk management in particular at local and community level.
- ➔ Lack of financial and human resources in the National Disaster Management Office.
- ➔ Lack of strong non-governmental movement that can assist the country in mobilizing local ownership.
- ➔ Lack of defined roles and responsibilities among the ministers for DRR.
- ➔ Low levels of public awareness of climate change issues. This includes awareness of general information, causes and impacts, and mechanisms for mitigating and adapting to climate change. General understanding of climate change issues and global warming in Lao PDR is still low.

³⁸ Ibid note 1.

³⁹ The Poverty Reduction strategy paper, 2001.

⁴⁰ The Hyogo Framework for Action, 2005.

⁴¹ Disaster Risk Management programs for priority Countries East Asia and Pacific – Lao PDR, Global Facility for Disaster Reduction and Recovery (GFDRR), 2009.

⁴² World Bank Country Assistance Strategy, 2009.

⁴³ Common Country Assessment for Lao PDR, 2006 http://www.undp.org/asia/country_programme/CCA/CCA-LaoPDR2006.pdf

⁴⁴ National progress report on the implementation of the Hyogo Framework for Action (2009-2011) – Lao PDR, 2010.

- ➔ Weak implementation of the strategic plan on disaster risk reduction and integration of the plan into project and program framework of DRR stakeholders.

RESEARCH, DATA, AND INFORMATION GAPS

Lao PDR's location and economy make the country particularly susceptible to the effects of climate change and extreme events. Lao PDR has made significant steps to address disaster risk management and the increasing threat of future climate change. Lao has limited access to accurate information/data and in-depth studies, and historically, it has not had a specific agency responsible for dealing with climate change and early warning and surveillance, making the task of developing short- and long-term response or risk-management strategies extremely difficult. Existing information challenges are outlined below.

RESEARCH GAPS⁴⁵

- ➔ Lack of hazards risk assessment at local level and in extremely inaccessible areas, where the risks are usually high.
- ➔ Lack of standardized research methods for DRR studies due to limited capacity and availability of good research institutes in the country.
- ➔ Need to survey underground water sources in drought prone areas.
- ➔ Need to research select seeds of plant species suitable for flood- and drought-prone areas.
- ➔ Need to develop timely and accurate reporting system for epidemic diseases.

DATA AND INFORMATION GAPS⁴⁶

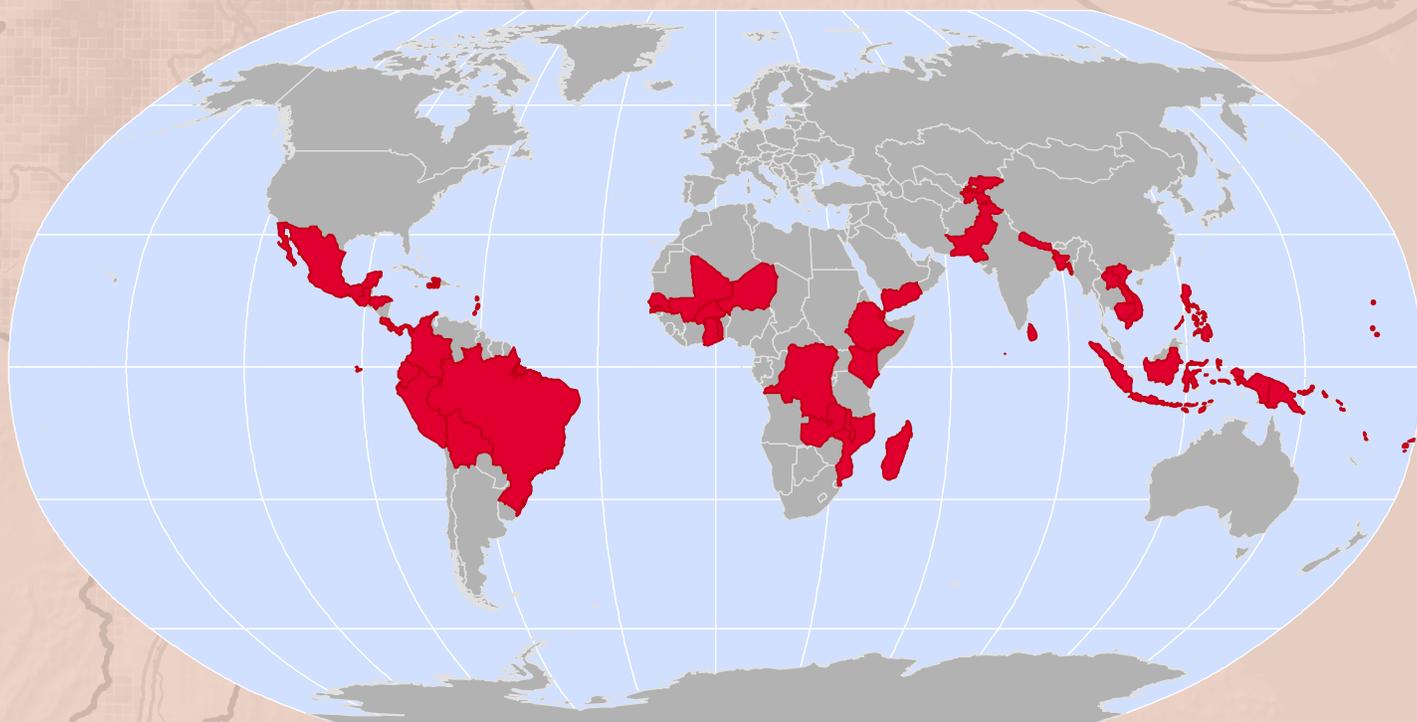
- ➔ Lack of capacity building among government institutions and communities. Lack of understanding the adaptive capacity of households/farmers, including socio-economic status.
- ➔ Lack of analysis and predictions at national level.
- ➔ Lack of statistical analysis of historical climate and hydrology.
- ➔ Lack of early warning system at local level. An early warning system should be established for flood-prone areas meteorology and hydrology networks and weather monitoring systems should be improved.

⁴⁵ Ibid notes 12 and 19.

⁴⁶ Ibid notes 12 and 19.

Climate Risk and Adaptation Country Profile

This Country Profile (<http://countryadaptationprofiles.gfdr.org>) is part of a series of 49 priority country briefs developed by the Global Facility for Disaster Reduction and Recovery (GFDRR) and the Global Support Program of the Climate Investment Funds (CIF). The profile synthesizes most relevant data and information for Disaster Risk Reduction and Adaptation to Climate Change and is designed as a quick reference source for development practitioners to better integrate climate resilience in development planning and operations. Sources on climate and climate-related information are linked through the country profile's online dashboard, which is periodically updated to reflect the most recent publicly available climate analysis.



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