



LAO PEOPLE'S DEMOCRATIC REPUBLIC
Peace Independence Democracy Unity Prosperity

(draft)

National Strategy on Climate Change of the Lao PDR

**Vision to the year 2050, Strategy and Programs of
Actions to the year 2030**

Vientiane, 11 August 2021

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Chapter I Introduction

1.1 General overview

Climate change is the greatest challenge facing our generation. It touches all segments of society and it jeopardizes the future prosperity of the global communities, including the Lao People's Democratic Republic (Lao PDR).

In Lao PDR, climate change has resulted in higher temperatures, variable rainfall, longer dry seasons and droughts, and more severe and frequent flood and drought. Droughts and flooding harm agriculture, food security, forest and land use, water resources, energy, industries, public work and transportation, urban and public health. In the past decade, for example, Typhoon Ketsana caused US\$94.2 million in damage and affected approximately 180,000 people and 30,000 households in 2009. In 2011, typhoons Haima and Nokten killed 41 people in 12 provinces and caused around US\$200 million in damage (Government of Lao PDR, 2011). Three consecutive disasters affected Lao PDR in 2018, including the Son-Tinh and Bebinca storms. The disasters damaged infrastructure, production, service, and transportation, etc., costing the economy US\$ 371.1 million, equivalent to 2.1% of the national gross domestic product (GDP). In 2018, Lao PDR ranked as the twenty-second most vulnerable country to climate change in the world.¹ This indicates that Lao PDR is extremely susceptible to climate change impacts.

Lao PDR has been aware of and committed to building resilience and mitigate to climate change. The nation ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1995, Kyoto Protocol in 2003, and the Paris Agreement in 2016. In 2010, Lao PDR released the Strategy on Climate Change of the Lao PDR, followed by the Climate Change Action Plan of Lao PDR for 2013–2020 in 2013. Lao PDR communicated its first Nationally Determined Contribution (NDC) to the UNFCCC Secretariat in 2016 and updated one in 2021. In September 2019, Lao PDR passed a Decree on Climate Change.

This strategy is an important tool for addressing climate change in Lao PDR. It updates the Strategy on Climate Change of the Lao PDR, which has been implemented since 2010. This strategy defines the national vision on climate change to the year 2050. It also outlines the national strategy and programs of action on climate change management to 2030, especially risk prevention and reduction, resilience, adaption, recovery, rebuilding from impacts, and mitigation of greenhouse gas (GHG) emissions, the main cause of climate change. These are also undertaking climate action for sustainable development, enhancing institutional coordination and cooperation, strengthening multi-stakeholder engagement, and owning climate change management, domestically, regionally, and internationally.

¹ D. Eckstein et al. 2020. *Global Climate Risk Index 2020: Who Suffers Most from Extreme Weather Events?* Bonn: Germanwatch. p. 41.

1.2 Global and Regional Climate Change, Impacts, Responses, and Challenges

1.2.1 Global Climate Change and Impacts

The global climate, especially temperature, is gradually changing. Earth has warmed 1 degree Celsius (°C) since preindustrial times. The leading causes include human-induced emissions of GHGs into the atmosphere due to extraction and consumption of fossil fuels and mineral resources, and land use change—forest destruction and degradation, production and processing of agricultural and industrial products, waste generation, and poor management.² If current global GHG emissions persist, the global mean temperature will likely reach 1.5°C above preindustrial temperatures between 2030 and 2052 and 2°C in the following decades.³

Global warming of 1.5°C and 2°C could significantly impact the global climate system, communities, and environment as follows.

- 1) **Extreme heatwaves** will hit the tropics at least once every 5 years.⁴ If global temperatures increase by 2°C, 1.7 billion more people will experience severe heat waves, and an extra 420 million people will suffer from extreme heatwaves (footnote 4). These heatwaves will cause heat-related morbidity and mortality.
- 2) **Climate change will cause increased frequency and severity of droughts, water stress, and flooding.** Up to 350.2 million people will live with droughts at 1.5°C, which increases to 410.7 million people if warming reaching 2°C (footnote 4). If the world can limit global warming to 1.5°C, 50% fewer people will suffer from water stress than under a 2°C warming scenario. Further, 70% more people will experience fluvial flooding under a 2°C warming scenario compared with 1.5°C.
- 3) **Food production and species habitats will be impacted.** Maize, rice, and wheat production will reduce. A 2°C warming scenario will see the loss of 7%–10% of the world's rangeland livestock (footnote 4). Under a 1.5°C warming scenario, 6% of insects, 4% of vertebrates, and 8% of plants will lose more than 50% of their natural habitat range (footnote 4). The number of species losing half of their habitat range more than doubles under a 2°C warming scenario (footnote 4).

1.2.2 Global and Regional Responses to Climate Change

The United Nations Framework Convention on Climate Change (UNFCCC) and Paris Agreement orchestrate global responses to climate change. The Paris Agreement adopted by the UNFCCC Parties in 2015 agreed to limit global warming to well below 2°C above preindustrial temperatures, ideally to 1.5°C. In addition, by 2020, parties to the Paris Agreement should communicate their new or updated nationally determined

² IPCC. 2018. *Global Warming of 1.5°C. An IPCC Special Report*. In press.

³ Intergovernmental Panel on Climate Change (IPCC). 2018. **Summary for Policymakers**. In V. Masson-Delmotte et al., eds. *Global Warming of 1.5°C: An IPCC Special Report*. In press. p. 4, para. A.1.

⁴ IPCC. 2018. **Impacts of 1.5°C of Global Warming on Natural and Human Systems**. In V. Masson-Delmotte et al., eds. *Global Warming of 1.5°C. An IPCC Special Report*. In press. pp. 247–250, Table 3.5.

contributions (NDCs) and their mid-century, long-term low greenhouse gas emission development strategies.⁵

⁶ In 2013, the International Civil Aviation Organization (ICAO) established a global framework for market-based measures to achieve carbon neutrality within the aviation sector.⁷ Additionally, in 2016, the ICAO has accepted the Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer. The Kigali Amendment works to phase out hydrofluorocarbons (HFCs)—most commonly used as refrigerants—between 2036 and 2047.⁸

The Sustainable Development Goals (SDGs) conceived a “blueprint to achieve a better and more sustainable future for all.”⁹ SDG 13 promotes climate action, setting targets to strengthen resilience and adaptive capacity to climate-related disasters. It also calls for governments to integrate climate change measures into policies and planning and implement the UNFCCC.

Within Southeast Asia, the Association of Southeast Asian Nations (ASEAN) has affirmed its support for the goals of the UNFCCC. On 2 November 2019, ASEAN issued a Joint Statement on Climate Change to the 25th Session of the Conference of The Parties to the United Nations Framework Convention on Climate Change.¹⁰

The next steps within the Paris Agreement’s ambition mechanism are (i) parties communicating their updated NDCs in 2020 and 2025, and (ii) the 2023 global stock take to assess global progress against the agreed temperature goals. The Paris Agreement’s Enhanced Transparency Framework (ETF) imposes reporting requirements on the government. In line with ETF requirements, Lao PDR submitted its first biennial update report in 2020¹¹ and aims to submit its second biennial update report in 2025, along with a national inventory report. The government will require support and assistance to meet its reporting requirements under the ETF, especially because reporting will inform and enhance national policy formulation and implementation.

⁵ The Paris Agreement, article 4(19), “invites” parties to formulate and communicate their “mid-century, long-term low greenhouse gas emission development strategies.” See also article 35 of Decision 1/CP.21 of the Conference of Parties dated 12 December 2015.

⁶ **Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer**, Kigali, 15 October 2016, United Nations Treaty Series, No. 26369.

⁷ **International Civil Aviation Organization Assembly Resolution A38–18**. Montreal. 24 September 2013. pp. 90–101.

⁸ **Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer**. Kigali. 15 October 2016. United Nations Treaty Series, No. 26369.

⁹ United Nations. **About the Sustainable Development Goals**.

¹⁰ ASEAN. 2019. **ASEAN Joint Statement on Climate Change to the 25th Session of the Conference of The Parties to the United Nations Framework Convention On Climate Change**. Bangkok: ASEAN.

¹¹ Government of Lao PDR. 2020. **Draft First Biennial Update Report**. Vientiane.

1.3 Lao PDR's National Circumstances

1.3.1 Geography and Climate

Lao PDR is a landlocked least developed country (LDC) sitting in the heart of mainland Southeast Asia, sharing a border with the Kingdom of Cambodia, Thailand, the Republic of the Union of Myanmar, the Socialist Republic of Vietnam, and the People's Republic of China, which is one of the world's most diverse and fastest growing regions. Lao PDR has a total land area of 236,8000 square kilometers and about 70% of the country is mountainous and in the Annamite Mountain Range. The plains are mainly in the Mekong Basin, which covers around 35% of Lao PDR territory. Lao PDR has a tropical climate influenced by monsoon wind from the southwest, bringing high rainfall and humidity. The climate is divided into two main seasons, the rainy season (May to September) and the dry season (October to April). The average annual rainfall is 1,900 millimeters, but about 80% falls in the rainy season. Temperatures vary between the north and south. Northern regions average 20°C, while southern regions average 25°C–27°C.¹²

1.3.2 Natural Resources and Environment

Land. Based on the master land use plan and land use objectives, Lao PDR's land is divided into 8 categories: (i) agricultural land, (ii) forestland, (iii) water and wetland, (iv) industrial, (v) communication, (vi) cultural, (vii) defense and security and (viii) construction land. By 2030, Lao PDR has targeted to increase forestland and forest cover to 70% of the total land area. The remaining 30% of land area will be allocated to development, including agricultural land (19%) and settlements, construction, and other land (11%). However, arable land is about 3.8 million hectares (about 16% of the country area). About 5.24% of the country area is susceptible to landslides and erosions.

Forest resources. In 2015, forest land is the dominant land type. Forest covered 58.0% of the total land area. In addition, there was potential forest, which covered an additional 26.7%.¹³ The other land categories comprised (i) cropland (10.9%), (ii) other vegetated areas (1.6%), (iii) water and swamps (1.5%), (iv) urban land (0.3%), and (v) other land (1.0%). Around 14% of the national forests (6.8 million ha) are declared conservation and protection forests. In the 1970s, forests covered up to 70% of the country but decreased due to forest conversion, logging, and harvesting. Forest loss was about 1.1% per year between 2005 and 2015. Forests are immensely important to the people of Lao PDR. Up to 80% of the population relied on forest resources in their daily lives.^{14,15}

¹² National Statistical Bureau. 2015. *Statistical Yearbook 2015*. Vientiane.

¹³ Forest cover has dropped from 70% of the total land area in the 1970s to about 58% in 2015 due to forest conversion and timber exploitation.

¹⁴ Government of Lao PDR. 2005. *Forestry Strategy to the Year 2020*. Vientiane.

¹⁵ Ketphanh S., Foppes J., et al. 2012. *Economic Valuation of Dry Dipterocarp Forest Ecosystem Services in Lao PDR: Preliminary lessons learned. Presentation to FIP scoping mission Vientiane, Department of Forestry.*

Water resources. The total annual surface water resources are estimated at 377.3 billion cubic meters, averaging 55,000 cubic meters per citizen per year.¹⁶ About 95% of the national territory sits in the Mekong River Basin and contributes 35% of its flow. Water withdrawals totaled 4.26 billion cubic meters, accounting for 1.3% of the total freshwater resources. Of the water withdrawn, the agriculture sector (irrigation and livestock) consumed 93%, followed by the industrial sector (4%) and municipalities (3%) (footnote 16).

National hydropower development potential is around 26,000 megawatts (MW).¹⁷ There were 78 power plants with an installed capacity of 9,972 MW in 2019, with hydropower plants accounting for approximately 80% of overall generation capacity.¹⁸ Power exports have contributed to recent national economic growth, representing 26% of all exports in 2017.¹⁹ Despite the hydropower potential, climate change threatens the stability of power generation, impacting energy security and energy exports.²⁰ The financially viable hydropower potential is also expected to reach its maximum by 2030 (footnote 19), and its share of total generation is forecast to drop to around 77% by 2040 (footnote 17).

Since 2015, Lao PDR has generated 14% of all electricity consumed domestically from lignite coal, increasing national carbon emissions.²¹ Electricity generation from coal could reach 22% of the total energy mix by 2040, with carbon dioxide emissions increasing by four times the 2015 level under a business-as-usual scenario (footnote 17).

Mineral resources. The key and actively mined minerals include gold, copper, coal, limestone, potash, iron, silver, lead, sapphire, and tin. The coal mine at Hongsa extracts 14.8 million tons of lignite annually, with 12.8 million tons (86%) going to the nearby 1,878 MW power plant (footnote 18). Cement plants and construction projects consume around 4 million tons of limestone annually. The mining sector accounted for about 10% of the national GDP in 2018, driven by the exploitation of gold, coal, limestone, and gypsum.²²

Renewable energy. Apart from hydropower, Lao PDR has significant potential to generate energy from other renewable energy, including solar, biomass, biogas, thermal, and wind. Wind could potentially generate 2,068 MW and 889 kilotonne of oil equivalent (ktoe) of heat. Biomass has the potential to generate electricity of 938 MW and 227 ktoe. Solar power might be able to generate 511 MW of electricity and 218 ktoe of heat. Biogas might generate 313 MW and 444 ktoe of heat. Solid, thermal, and wind have the potential to produce electricity of about 216 MW, 59 MW, and 40 MW,

¹⁶ FAO. 2011. *Lao People's Democratic Republic: Irrigation in Southern and Eastern Asia in Figures—AQUASTAT Survey—2011*. Rome. pp. 4–5

¹⁷ Government of Lao PDR and Economic Research Institute for ASEAN and East Asia (ERIA). 2020. *Lao PDR Energy Outlook 2020*. Jakarta: ERIA. p. 3.

¹⁸ Ministry of Energy and Mines. 2019. *The Implementation of Energy and Mines Sector in 2019, and Plan for 2020*. Vientiane.

¹⁹ OECD. 2018. *Economic Outlook for Southeast Asia, China and India 2019: Towards Smart Urban Transportation*. Paris. p. 205.

²⁰ ADB. 2020. *Asian Development Outlook 2020: What Drives Innovation in Asia?* Manila. p. 276.

²¹ Footnote 19; and footnote 17, p. xi.

²² ADB. *Lao People's Democratic Republic, Key Indicators* (accessed 12 October 2020).

respectively. In 2015, total energy production in Lao PDR was 4,765 ktoe. Of which, 3,122 ktoe was domestically consumed and the remainder was exported. About 46% of the energy was from biomass, especially fuelwood and charcoal. Fuel oils, coal, and electricity shared 29%, 13%, and 12%, respectively. Of which, electricity was mainly from renewable energy. The energy demand by 2025 is expected to be 4,930 ktoe, and Lao PDR has aimed to increase the share of renewable energy to 30% by 2025.

Biodiversity: Lao PDR is one of the countries that are rich in biodiversity. There are about 166 species of reptiles and amphibians, 600 species of birds, 90 species of bat, 247 species of mammals. Fishes, especially in Mekong River are about 500 species. In addition, there are 8,000-11,000 species of flower plants. These plants are important sources of food and medicine for Lao people, particularly those in rural area. In addition, there are agro-biodiversity that plays a crucial role in the national and local economy. Around 67% of the Lao population live in rural area and largely depends on forest resources. About 40% of the poor's income is derived from NTFPs.

1.3.3 Socio-economic development

Lao PDR has sustained substantial economic growth of around 6%–7% over the last decade, primarily due to mining, hydropower, and timber exports.²³ Minerals (34%) and electricity (21%) comprised 55% of total exports in 2016.²⁴ National GDP was \$18.13 billion in 2018, with per capita GDP being \$2,585 compared with \$621 in 2006.²⁵ The services sector is the economic powerhouse within the Lao PDR economy, contributing 46.8% of total GDP in 2018, followed by the industrial sector with 35.5%.²⁶ Combined with the agriculture and fishery sectors, the forestry sector contributed 15.28% of the GDP.²⁷

Despite recent economic growth, economic vulnerability is relatively high. The infrastructure and production sectors rely on natural resources, which are vulnerable to climate change and disasters, weakening the economy. Almost a quarter of the population lives below the poverty line and the country's economy is the third smallest in Southeast Asia.²⁸ Hence, Lao PDR did not graduate from LDC status by 2020, as planned in the Eighth National Socioeconomic Development Plan, 2016–2020 (NSEDPlan). In 2020, Lao PDR faced the dual threats of climate change and the coronavirus disease (COVID-19). COVID-19 dampened Lao PDR's economic growth forecast for 2020 to -2.5%, with growth expected to rebound to 4.5%.²⁹ Climate change also threatens Lao PDR's capacity to achieve continued economic growth and

²³ The World Bank. *The World Bank in Lao PDR*; and ADB. 2017. *Country Partnership Strategy: Lao People's Democratic Republic, 2017–2020*. Manila. p. 2.

²⁴ ADB. 2017. *Country Partnership Strategy: Lao People's Democratic Republic, 2017–2020*. Manila. p. 3.

²⁵ Government of Lao PDR, Lao Statistics Bureau. *Gross Domestic Product* (accessed 10 June 2020); and footnote **Error! Bookmark not defined.** p. 2.

²⁶ ADB. *Lao People's Democratic Republic, Key Indicators*.

²⁷ World Bank. *Agriculture, Forestry, and Fishing Value Added (% of GDP) - Lao PDR* (accessed 27 August 2020).

²⁸ Footnote 24, p. iv; and footnote **Error! Bookmark not defined.** p. 2.

²⁹ ADB. *Economic Indicators for Lao PDR* (accessed 25 March 2021).

sustainable development. Flooding and drought throughout 2018 and 2019 cost the economy around \$750 million and affected agriculture, hydroelectric generation, and transport.³⁰

Lao PDR's future economic development remains dependent upon natural resources exploitation (mining, hydropower, and timber), services, and industry. During 2020–2022, Lao PDR expects growth in its agricultural and industrial sectors.³¹

Lao PDR has a young population. The median age of its 7.27 million people is 24.4 years. Around 65% of Lao people live in rural areas and 70% of the total population works in the agricultural sector (footnote 26). Women play an essential role in the agricultural sector. They managed (solely or jointly) almost 70% of farms during 2010–2011.³²

Electrification rates are high in Lao PDR, being almost 98% in 2018.³³ However, more work is needed on access to clean water and sanitation. In 2017, around 75%–78% of the population had access to safe drinking water and sanitation, with access rates by primary schools and health facilities being only 48% and 25%, respectively, in 2019.³⁴ Poor access to safe drinking water and sanitation contributes to high infant mortality (38 deaths per 1,000 live births) and mortality under five (47 deaths per 1,000 live births).³⁵

The government also continues to work on education outcomes. Lao PDR met its goal of universal access to primary education for girls and boys in 2017. However, around 70% of children aged 5 do not participate in early childhood education, causing approximately 22% of children to withdraw from primary education, and about 10% remain illiterate.³⁶ Despite the challenges faced, Lao PDR is now ranked in the medium human development category, positioning Lao PDR 140 out of 189 countries and territories in the human development index.³⁷

The government is drafting the 9th Five-Year National Socio-economic Development Plans (NSED9) 2020–2025, which provides the national vision for development directions and targets. NSED9 will prioritize political stability, poverty reduction, and economic prosperity with continuous, inclusive, and sustainable growth in order to graduate from LDC status by 2020, and become an upper-middle-income country. It also planned to achieve various SDGs, such as zero poverty and climate change resilience by 2030, while maintaining a green economy and sustainable development.

³⁰ ADB. 2020. *Asian Development Outlook 2020: What Drives Innovation in Asia?* Manila. p. xxi.

³¹ ADB. 2020. *Asian Development Outlook 2020: What Drives Innovation in Asia?* Manila. p. 277.

³² UNEP and IUCN. 2018. *Gender and Environment Statistics: Unlocking Information for Action and Measuring the SDGs*. Nairobi: UN Environment. p. 116, Figure 5.

³³ World Bank. *Access to Electricity (% of Population)—Lao PDR* (accessed 14 October 2020).

³⁴ ASEAN. 2019. *ASEAN Statistical Yearbook 2019*. Jakarta. p. 23; and World Bank. 2019. *Water Supply, Sanitation, and Hygiene for Improved Nutrition*. News release. 3 April.

³⁵ ASEAN. 2019. *ASEAN Statistical Yearbook 2019*. Jakarta. p. 17.

³⁶ UNICEF. *Programme: Education—Challenges*.

³⁷ United Nations Development Programme. 2019. *Human Development Report 2019: Lao People's Democratic Republic*. New York. p. 2.

1.4 Climate Change, Impacts and Response in Lao PDR

1.4.1 Changing Climate and Impacts on Socioeconomics of Lao PDR

In 2018, Lao PDR had a national average air temperature of 30.38°C.³⁸ Average air temperatures in the northern region are generally cooler, with an average of 28.41°C in 2018, while the central and southern regions averaged 31.38°C (footnote 36). Lao PDR's temperatures warmed during 1976–2005, and there were 10-year interval changes. The mean annual temperature has consistently increased at a rate of 0.022 °C per year. The average maximum temperature has risen by 0.017°C per year and the average minimum temperature by 0.023°C per year.

The report on historical climate change, climate vulnerability and climate change projection for Lao PDR (2016) projects that the average temperature in Lao PDR will increase. During 2021–2050, average maximum air temperatures are expected to increase by 1.03°C–1.29°C compared with preindustrial temperatures. Minimum temperatures will also increase by 1.09°C–1.36°C. During 2070–2099, The average maximum temperatures might rise by 2.05°C–2.56°C compared with preindustrial temperatures, with minimum temperatures increasing by 2.04°C–2.47°C.

The mean annual rainfall ranged from 1,896mm to 2,085mm during 1976–2005. It has increased approximately 1.46mm per year over a 3-decade period and varied in each decade. The mean annual rainfall was over the average (+/-7%), and in some years, it increased and dropped about 20%.

The rainfall would substantially change, especially in the rainy and dry seasons. During 2021–2050, annual precipitation would decrease from February to May for the RCP 4.5 scenarios and projections showed reductions in annual rainfall ranged from 5%–14%. The rainfall would change or slightly increase June–September but could sharply increase from 11%–46% during July–December.³⁹

While the nation has historically produced limited GHG emissions (around 57,000 GgCO₂eq in 2000, 24,000 Gg CO₂eq in 2014 and estimated to be 82,000 GgCO₂eq in 2020 and 104.000 GgCO₂eq in 2030), it is highly vulnerable to climate change.

Droughts and floods are expected to damage agriculture, irrigation systems, and roads and bridges, and impair crop production (footnote 24). These impacts threaten food security and mean that more than half of Lao PDR's population is exceptionally vulnerable to climate change impacts. Flooding in recent years has significantly affected rice harvest targets. In 2017, Lao PDR lost around 30,000 hectares (about 130,000 tonnes) of rice from flooding, drought, and locust outbreaks.⁴⁰ Disasters in 2018 from two tropical storms and a breach in the Xe pien-Xe Nam Noy Dam caused severe losses of life, assets, and the environment. The disaster destroyed more than

³⁸ Government of Lao PDR, National Statistical Bureau (NBS). 2018. **Statistical Yearbook 2018**. Vientiane. p. 71.

³⁹ MONRE. 2016. Report on the Historical Climate Change, Climate Vulnerability and Climate Change Projection for Lao PDR. Department of Climate Change. Vientiane

⁴⁰ *Vientiane Times*. 2018. **Flooding Threatens Rice Harvest Target in Laos**. 31 July.

100,000 hectares of rice fields, about 12% of the nation's total planted rice⁴¹, leading to a 20% drop in rice production compared with the 2017 output, and affected around 750,000 people. Total loss and damages were 3,166.9 billion Lao kips (\$371 million), roughly 2.1% of projected GDP.⁴²

1.4.2 National Response to Changing Climate

In line with the objectives of the UNFCCC, the Paris Agreement, and national socioeconomic development policies, Lao PDR has implemented and improved its capacity to respond to climate change as well as the implementation of the climate change strategy 2010. The key actions include improving response readiness as well as developing policies and improving organizations, networks, cooperation, human resources, education and awareness, research and information, and financial mechanisms. Importantly, Lao PDR has implemented climate change adaptation and mitigation programs and projects in key sectors at both national and local levels, as follows.

1) Legal Framework, Strategy, and Plans on Climate Change

Decree on Climate Change approved in 2019 creates the legal and institutional framework necessary to build low-emission, climate-resilient growth in Lao PDR. The decree mandates the Ministry of Environment and Natural Resources (MONRE) to lead national climate change responses in coordination with all ministries with functional responsibilities in the national responses to climate change. The decree establishes (i) a climate change data and information management system to foster national coordination on climate planning and action, (ii) vulnerability assessment and mapping processes to support national adaptation action, and (iii) a framework for enhancing carbon sinks and preparing a national greenhouse gas strategy.

2) Climate Change Strategies and Plans

In line with the UNFCCC, Lao PDR prepared: (i) a National Adaptation Programme of Action to Climate Change 2009 (NAPA),⁴³ (ii) a Climate Change Strategy in 2009, (iii) a Climate Change Strategy Action Plan in 2013, (iv) Nationally Determined Contributions in 2015 and 2020, and (v) a Technology Action Plan (TAP) for Climate Change Mitigation and Adaptation in agriculture, forestry and water resources in 2018.

The NAPA identified adaptation objectives and priorities for the agriculture, forestry, water resource, and health sectors during 2010–2020. Many of these priorities remain critical, such as (i) early warning systems, (ii) programs to boost the resilience of crop varieties and animal species to climate change, and (iii) ensuring sustainable use of water resources. The government plans to release an updated NAPA in 2022.

⁴¹ Xinhua. 2018. *Wet Season Rice Production Down in Laos Due to Flood*. 9 November.

⁴² Government of Lao PDR. 2019. *Post-Disaster Needs Assessment: 2018 Floods, Lao PDR*. Vientiane.

⁴³ Government of Lao PDR. 2009. *National Adaptation Programme of Action to Climate Change 2009*. Vientiane.

The government has also embedded climate priorities in other national and sectoral strategies and plans, such as NSEDP8, the national green growth strategy, the public health strategy, the agriculture and forestry sector strategy.

13) HGs Inventory and Mitigation

Lao PDR submitted its first and second national communications (FNC and SNC) on climate change to the UNFCCC in 2000 and 2013 and its first biennial update report (BUR) in 2020. During 1990–2000, Lao PDR shifted from a net carbon sink to a net carbon emitter. Whereas the country was a net sink of 104,570 gigagrams of CO₂ equivalent (GgCO₂eq) in 1990, its net emissions were 41,764 GgCO₂eq in 2000.⁴⁴ The land use, land-use change, and forestry (LULUCF) sector contributed 97.5%⁴⁵ of total emissions in 2000, with the energy and industrial sectors composing the balance (footnote 44). Net emissions were 24,099.98 GgCO₂eq by 2014.

To reduce emissions and increase carbon sinks, Lao PDR has implemented mitigation measures defined in the National Communication, Strategies, and Action Plans. More than ten mitigation projects had been implemented since 2009. The majority of the initiatives were emissions reduction in the forestry (REDD+),⁴⁶ energy, and transport sectors.

4) Climate Change Adaption and Resilience

Given Lao PDR's vulnerability to climate change, adaptation and resilience are the national priority to prevent, limit, reduce risks and impacts, and recover from climate change loss and damage.

Apart from vulnerability assessment and adaption planning, Lao PDR has implemented more than 30 climate change and adaptation projects in several sectors since 2009. The significant adaptation actions implemented by sectors are as follows.

Agriculture and Forestry Sector. Crop varieties (rice and vegetables) that are resilient to floods and drought are being researched and developed. In addition, climate-smart agriculture techniques have been piloted, such as direct seeding, use of greenhouse, water management practice using water harvesting techniques, agro-climate information service, enhancing agribusiness value chain by improving the resilience of agricultural infrastructure, crop diversification, and commercialization.

REDD+ preparedness and piloting have been implemented through the country. In addition, participatory sustainable forest management, and planting of fast-growing trees variety are being promoted to stabilize soil erosion in risk-prone areas. The revised forestry strategy seeks to enhance climate adaptation and mitigation co-benefits.

⁴⁴ Government of Lao PDR. 2013. **Second National Communication on Climate Change**. Vientiane. p. 33. In 2000, total emissions were 43,811 GgCO₂eq less 2,047 GgCO₂eq of removals.

⁴⁶ REDD+ refers to reducing emissions from deforestation and forest degradation in developing countries, and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks in developing countries.

Water Resources Sector. The revised law on water and water resources was approved, along with a law on meteorology and hydrology, regulations, and guidelines for integrated water resources, floods, and drought warning system and risk management, climate resilience infrastructure, and aquatic biodiversity. Climate risk and vulnerability assessment was conducted for two important wetland sites with interventions promoted to increase the resilience of vulnerable communities in and around the wetland sites. Furthermore, climate change adaption plans for the Mekong Basin were also developed and implemented to leverage climate resilience in the water resources sector in cooperation with other Mekong Basin countries.

Public Work and Transport Sector. Climate resilience has been mainstreamed into this sector's policies, especially urban development strategy to 2030. On the ground, riverbank protection and drainage systems in major cities along the Mekong River were built to prevent and regulate flooding. The government is increasingly promoting the use of ecosystem-based approaches to enhance the climate resilience of infrastructure (roads, bridges, buildings) and urban areas. Furthermore, this sector allocates a budget for maintenance and building back from disaster on a yearly basis.

Public Health Sector. Key achievement of this sector included the development and endorsement of the Strategy on Climate Change and Health Adaptation 2018 – 2025 and Action Plan 2018 – 2020; train-the-trainer programs on climate change and health impacts in 7 provinces; and the development and dissemination of information, education, and communication materials related to climate change and health impacts to public. In addition, rural water supply and sanitation projects considered climate and disaster risk in the development, while it was also designed to support climate change adaption.

Energy and Mines Sector. Hydropower and mining projects are vulnerable to extreme climate events. Risk reduction measures include sectoral vulnerability assessments, development of resilience action plans in 2018 and 2020, development of the Dam Safety Guidelines in 2018, and a call for hydropower companies to prepare and implement emergency action plans. In addition, a multipurpose hydropower scheme is being promoted to enhance flood and drought resilience for infrastructure and surrounding communities, while ensuring effective water resources management and power generation.

Education and Awareness Raising. In 2018, the National Strategy on Education and Awareness on the Environment and Climate Change (2018 – 2025) and Vision to 2030 was approved and implemented. The Faculty of Environmental Science, Water Resources, and Forestry of the National University of Laos includes climate change subjects in their curriculum. Further, public awareness-raising on climate change by sectors and projects are implemented periodically. Suggest cross referencing the DM law and DRR strategy as part of building resilience.

1.4.3 Barriers and Challenges on Climate Change Management

There are several barriers and challenges facing Lao PDR to fulfill climate change management vision and goals set out in the National Strategy on Climate Change 2010 as well as the sectoral objectives. The key barriers and challenges are: (i) limited information and knowledge on climate change, vulnerable and impacts, adaptation and mitigation technologies in sectors including communities and ecosystems; (ii) ineffective climate change mainstreaming and cross-sectoral coordination; (iii) lack of effective and sustainable financial resources and mechanism to implement actions and measures in all sectors and areas; (iv) limited institutional and staff capacity, ineffective management tools, including a robust policy framework; (v) limited and ineffective promotion of an effective climate change management and best practices, and (vi) lack of an effective system for measurement, reporting, verification (MRV).

1.5 Rationales and Needs for Updating the Climate Change Strategy

There are various reasons (both domestic and international) for Lao PDR to update its climate change strategy, identified below.

Since Lao PDR prepared its 2010 Climate Change Strategy, there have been significant changes in the national law, circumstances, and development targets. Lao PDR has updated the Environment Protection Law in 2012, Natural Resources and Environment Strategy to the year 2030 in 2015; adopted the sustainable development goals (SDGs); and committed to the Paris Agreement in 2016, National Green Growth Strategy in 2018, and Decree on Climate Change in 2019; and plans to graduate from a least developed country to a developing country by 2024 and a low-middle income country in 2030. In line with global climate change goals, Lao PDR also seeks to achieve net-zero emissions by 2050. In the meantime, other relevant laws have been developed or updated. Those included development of Law on Meteorology and Hydrology in 2017, update of the Law on Water Resources in 2017 and the Strategy to the year 2030 in 2019, Forest Law in 2019, Land Law in 2019 and Master Plan on Land Use in 2018, and Law on Disaster Management in 2019.

A review of the first strategy on climate change endorsed in 2010 found that the strategy has gaps and constraints that should be addressed to establish more effective climate action. The 2010 strategy (i) lacked a timeframe for vision, goals, and programs; (ii) lacked a monitoring and evaluation (M&E) system; (iii) included climate change adaption in 7 sectors only; (iv) contained unclear mechanisms for climate financing, including financial access and resources mobilization; (v) included some activities that are inappropriate, costly, or hard to be implemented such as reduction methane from coal mining, rice paddy, enteric fermentation. In addition, it might not be relevant and able to effectively support the existing and future national and regional policies and plans such as SDGs, green growth strategy and decree on climate change. This strategy addressed the issues and gaps mentioned above.

Climate change is rather complex, and it is hard to timely and accurately forecast its changes and impacts. GHGs, temperature, precipitation, heatwave, floods, drought,

and extreme events are increasing its frequency of occurrence and impacts. The Paris Agreement obliges parties to communicate climate pledges every 5 years (nationally determined contributions) along with mid-century, long-term low greenhouse gas emission development strategies. The agreement seeks to limit global warming to well below 2°C above preindustrial temperatures, preferably closer to 1.5°C. As for Lao PDR, the Government has drafted the 10th NSEDP to elaborate its actions for SDGs, including climate and disaster response actions.

Based on reasons, problems and factors mentioned above, Lao PDR sees the value in updating its climate change strategy, creating a vision to 2050 and action plan to 2030, ensuring that the climate change strategy aligns with the NSEDP, sustainable and green growth development, sectoral climate plans, and Decree on Climate Change, the Paris Agreement, regional and international integration. The year 2030 presents a critical milestone globally. The global community including Lao PDR will reassess and update the SDGs in 2030. The first 10 years of the Paris Agreement will reveal whether the world is on track to meet the accord's temperature goal.

Chapter II Vision to the Year 2050 and Strategy to 2030

2.1 Vision

By 2050, Lao PDR will aim for net-zero emissions and to be capable of preventing, adapting to, reducing the risk of, and building back better from climate change impacts in effective and timely manner. Achievement of this vision will lead to reduced loss of life, health, property, environment, biodiversity, infrastructure, and improved regional and international integration, and contribution to green growth and sustainable development.

2.2 Goals and Targets

This strategy sets goals and targets to 2030 to ensure progress toward the vision by aiming to (i) strengthen its capacity in all areas, dimensions and aspects including legal framework, institutions, technologies, human and financial resources, economics, cooperation and coordination, research, exchange of information, education, and awareness to be able to cope with climate change, fulfil responsibilities to the national and UNFCCC including COP's requirements, and (ii) fulfil the following targets.

- 1) Mainstream, coordinate, and implement climate change mitigation and adaptation actions via national, sectoral and local policies, strategies, programs and projects;
- 2) Enhance the resilience and adaptive capacity of communities, production systems and business value chains, infrastructure, ecosystems and environment to reduce climate change vulnerability, risk and climate change induced disaster;

- 3) Reduce economic loss and damage from climate related disasters to less than 0.25% of GDP by 2025 and less than 0.2% of GDP by 2030;
- 4) Minimize the population to be affected by climate related disaster to less than 160,000 by 2025 and less than 120,000 by 2030;
- 5) Become a low emission country and reduce emissions to less than 0.6 t/cap/yr. by 2025 and <1.2 t/cap/yr. by 2030;
- 6) Fulfil mitigation and adaptation targets defined in updated NDCs and other relevant sectoral plans, strategies, and targets.

2.3 Guiding Principles

The development and implementation of this strategy is guided by the climate change management defined in the Decree on Climate Change and other relevant principles, as follows.

- (i) **Relevance and needs:** Ensure relevance, alignment and response to the national sustainable socioeconomic, green growth development, capacity, circumstance and potentials, needs, and regional and international requirements on climate change;
- (ii) **Climate change mainstreaming:** Ensure climate change is mainstreamed or integrated as a core element of all policies, strategies, programs, development and investment projects, and enterprises in all sectors and levels of the government, private sector and other organizations;
- (iii) **Cooperation, coordination, and partnership:** Expand and strengthen domestic and international integration, coordination, cooperation, partnership and networking with public and private sector, communities, development partners and other organizations in an effective, responsible, harmony and mutual benefit manner;
- (iv) **Enabling environment:** Create an enabling environment for policy framework, social dialogue and public participation, financial and technical including scientific data and knowledge preparedness, and readiness and accessibility to promote and leverage climate change management;
- (v) **Institutional and staff capacity:** Strengthen the institutional and staff capacity of the public and private sectors, technical institutions, and local communities to ensure climate change management is relevant, effective, and efficient and achieves the sustainable development goals;
- (vi) **Focus, strategic, adaptive and participatory problem solutions, and mutual benefit:** Enhance development and implementation of climate action and solutions that are focused, strategic, adaptive or flexible, participatory, cost-effective, efficient, and market-oriented, co-and mutual benefiting and maximizing benefits for sectors and communities.
- (vii) **Appropriate financial instruments:** Promote and enhance capacity to access external financial resources and support; to ensure timely budgetary allocation, and to develop financial tools and mechanisms that enable climate change management in effective and efficient manner.

- (viii) **Public education, awareness, and participation:** Promote and strengthen climate-change-related public education, dialogues, access to information and knowledge, and awareness raising; and encourage general public to take responsibility, participate, and contribute to climate change management.
- (ix) **Climate management is relevant, supports and or get supported by environmental protection, biodiversity conservation, sustainability and circular economy principles and code of practice:** the development and implementation of climate change actions shall employ best practices and technologies, take precaution, consider proportionality of the issue at hand, harmony with environment, integrity, uphold the principles of polluter pays, sanctions against offenders, and reward outstanding performers in appropriate and effective manner;
- (x) **Responsibility and ownership:** The Ministry of Natural Resources and Environment (MONRE), especially the Department of Climate Change (DCC), will lead the implementation and coordination with relevant sectors to implement this strategy in effective and efficient manner. The relevant sectors, communities, individuals, entities, and organizations should take ownership and perform climate change management in accordance with its roles and responsibilities, especially those defined in the Decree on Climate Change.

2.4 Strategy to 2030

Strategy 1: Enhance Prevention, Adaptation, and Resilience to Climate Change Impacts

This strategy is expected to contribute to achieve goal and targets 1, 2, 3, 4 and 6. The strategic actions are:

1. Develop and enhance the capacity for management of data and reporting system on climate change, and the end-to-end early warning systems including strengthening capacity on climate change monitoring, assessment, reporting, communication, and response planning;
2. Study, develop, and provide policy and technical advisory services in relation to climate change to build capacity across sectors at all levels and function as an advocacy for climate readiness;
3. Develop, deploy and transfer modern and appropriate technologies and practices, including ecosystem-based adaptation, for preventing, adapting to, building resilience and building back better from climate change impacts;
4. Strengthen organizational capacity and human resources including the number and capacity of personnel, to ensure that policies, plans and actions for climate change adaptation and resilience are developed and implemented in an effective, efficient and sustainable manner;
5. Promote and enhance climate change education, awareness raising, and access to information to increase knowledge and awareness of safety practices; reduce ignorance, risky behavior and unsafe practices, focusing in vulnerable and risky group;

6. Promote and enhance the enforcement of laws, policies, and related administrative orders to ensure effective, efficient and sustainable prevention, adaptation, resilience and building back from climate change impacts;
7. Enhance regional cooperation and networking on climate change adaptation and resilience;
8. Develop and enhance the resilience of infrastructure, production systems and value chains, enterprises, services, and communities and ecosystems to climate change.

Strategy 2: Enhance Climate Change Mitigation

This strategy advocates the effective and efficient deployment of actions, technologies, and opportunities to avoid and reduce GHG emissions and increase carbon capture and storage and sequestration by ecosystems, leading to the achievement of the goal and target 4.

The strategic actions are:

1. Enhance GHG inventory and system for measurement, reporting, verification (MRV system);
2. Promote energy and resources savings and efficiency in all sectors and levels;
3. Promote the development and consumption of clean, environmentally friendly, low emission and renewable energy in priority sectors and levels;
4. Promote the development and deployment of clean, environmentally friendly, low emissions, carbon capture and storage technologies in all promising sectors and levels;
5. Protect and enhance carbon sequestration by ecosystems, especially by forests, wetlands, and soil;
6. Promote circular economy, enhance standardized management of materials, products, processing, and waste disposal aligning with environmental management standards in promising sectors and levels;
7. Promote low emission urban planning, infrastructure, transportation, non-motorized transportation operations;
8. Enhance low-emission waste management, including promoting the 3Rs of waste management (reduce, reuse, and recycle) and waste-to-energy; and
9. Strengthen implementation and enforcement of mitigation policies and measures for reduction and increase GHG sinks, and MRV in promising sectors and levels.

Strategy 3: Create Enabling Environment, Enhance Mainstreaming and Readiness for Climate Change Management

This strategy address barriers and support achieving strategies 1 and 2 as well as to build overall capacity and preparedness to enable climate actions. The following actions are expected to be implemented in an effective, efficient, and sustainable manner.

1. Mainstream climate change goals and actions in all sectors and levels;
2. Enhance development and implementation of the legal framework, policies, plans, and climate finance and create an enabling environment for climate change management;
3. Enhance local and international cooperation, cooperation and networking on climate change management;
4. Enhance the development and implementation of climate change adaptation and mitigation readiness programs and projects;
5. Develop and implement a climate change data, information, M&E and reporting system at national and local levels.

Chapter III Climate Change Priority Programs and Projects to 2030

There are nine main programs to support the implementation of the three strategies mentioned above as follows.

Program 1: Develop and Strengthen Capacity for Climate Change Data and Information, Monitoring and Advisory, and Early Warning Systems

Program 1 is mainly to support strategy 1. The priority projects or actions under this program are summarized in the Table 1 below.

Table 1 Priority Projects and Actions on Climate Change Monitoring, Advisory and Early Warning Systems

Projects or Actions	Timeframe
1. Develop and strengthen capacity for management of the climate change data and information system, statistics. The climate change impacts data and statistics can be disaggregated by sector, community, occupation, gender, age, disabilities, and sexual orientation, etc.	2021-2030
2. Develop and strengthen capacity for management of a system for observing, monitoring, and forecasting/predicting GHG emissions, climate change, and assessment of vulnerability including mapping and profiling climate hazards (floods, drought, heat waves, etc.)	2021-2030
3. Develop and strengthen capacity for operation of climate advisory system/platform	2022-2030
4. Develop and strengthen capacity for operation of end-to-end early warning systems, including downscaling and nowcasting, communication, warnings, response plan and standard operation procedures that link national to local levels, specific sector and hazards, and cover all areas at risk of or impacted by climate change	2022-2030
5. Strengthen capacity on state of climate change reporting	2021-2030

Program 2: Enhance Adaptation, Resilience and Building Back Capacity of Infrastructure, Production Systems and Value Chains, Enterprises, Services, Communities, Ecosystems and Sectors at Risk and Impacted by Climate Change

This program 2 also aims to support strategy 1. The priority projects or actions under this program are in Table 2.

Table 2 Priority Projects and Actions on Climate Change Adaptation and Resilience

Projects or Actions	Description
1. Agriculture sector	
1) Enhance studies and assessments vulnerability, risks and of impacts of climate change and adaptation options in agriculture and food security sector	2021-2023
2) Develop and expand sector specific early warning system (EWS) such as agro-met system	2021-2030
3) Enhance institution and capacity on the implementation of the adaption action plans, information dissemination, knowledge transfer, technical advisory services and support to increase preparedness and adaptation capacity of the agriculture sector, especially farmers and agro-businesses at risk of climate change	2021-2030
4) Enhance technology development and transfer for adaptation and resilience to climate change impacts as well as multi and specific hazards, such as climate resilient and smart technologies, climate sensitive agricultural practices, crop diversification, conservation, ecosystem-based and ecologically friendly agriculture	2021-2030
5) Promote research, development, and promotion of climate resilient farming systems, livestock and crops including genetics and varieties/cultivars, focusing on agricultural production for food security, livelihood improvement	2021-2030
6) Develop and enhance resilience of agricultural infrastructure and facilities for production, processing and storage to climate change and disasters	2021-2030
7) Enhance prevention, monitoring, and early warning on weeds, pest, insects and livestock disease outbreak related to climate change	2021-2030
8) Identify, develop and manage water sources and supply systems to ensure water supply for agriculture	2021-2030

Projects or Actions	Description
9) Develop and enhance institutional capacity and farmer organizations for the implementation of adaption, emergency response, post-disaster recovery and rehabilitation plans in agriculture sector	2021-2030
10) Studies and promote resilient agribusiness and value chains related to climate change	2021-2030
11) Develop and enforce climate oriented agricultural legal framework and policies	2021-2030
2. Water resources sector	
1) Conduct studies and assessments of impacts of climate change on water resources as well as vulnerability and risks of the water resources sectors and sub-sectors such as wetland, aquatic biodiversity, ecosystem, habitat, water quality and quantity, water supply and sanitation at the national and basin levels. and raise awareness on climate change impacts and vulnerabilities to cover all vulnerable areas, sectors, communities and groups of people	2021-2023
2) Develop, improve and expand hydrological change and hazard forecast, monitoring and early warning system	2021-2030
3) Develop and implement climate change adaptation strategies and plans to improve resilience in water resources sector in conjunction with effective and integrated management of river basins, watershed, catchments, ponds and reservoirs, wetland and aquatic biodiversity, maintenance of ecosystem services, water quality, security and access for all sectors and people, early warning system and infrastructure.	2021-2030
4) Enhance law enforcement and implementation of adaptation measures to prevent and reduce infringements that cause loss and damage to adaptation infrastructure, facilities, ecosystems and address water resources use conflicts	2021-2030
3. Forest and land use change	
1) Conduct assessments and monitoring of climate change impacts on forest resources as well as vulnerability and risks of the forest resources sectors and sub-sectors including ecosystems, biodiversity and land use	2021-2023
2) Study, develop and implement forest and land use sector adaptation plans	2021-2030
3) Enhance development and deployment technologies and practices such as ecosystem-based adaptation, land use change and landscaping, sustainable forest and non-timber forest products management, protection, restoration and expansion of forest, forest ecosystems services and forest enterprise, forest land tenure, governance and local knowledge for adaptation	2021-2030
4. Public work, transport and communication sector	
1) Conduct studies and assessments of climate change impacts, vulnerability and risks on public work and transport sector, especially roads, bridges, buildings, ports, riverbanks, drainage system and communication infrastructure	2021-2023

Projects or Actions	Description
2) Develop and implement regulations, standards, strategies and plans on adaptation and investment in the public work, infrastructure, transport and communication sector	2021-2030
3) Strengthen institutional and staff capacity on climate change adaptation and resilience in the public work and transport sector including urban planning and development, building adaptive capacity of urban and rural residents in informal settlements	2021-2030
4) Enhance research, development and transfer of technologies to enhance resilience and adaptive capacity of infrastructure in all sectors	2021-2030
5) Develop climate smart logistics system, infrastructure, integrated urban and rural development for climate change adaptation, response and post disaster recovery, including riverbank, water supply, prevention and regulation of floods	2021-2030
5. Energy and mines sector	
1) Conduct assessments of climate change impacts and hazard mapping for energy and mines sector, especially the hydropower, solar energy, wind power, and mining projects	2021-2023
2) Develop and enhance implementation, M&E and reporting of the implementation of regulations, standards, measures and plans for climate change adaptation, resilience and impacts in the the energy and mines sector	2021-2030
3) Strengthen capacity and enhance enforcement of climate change and disaster adaptation and resilience measures in the sector including energy and mining projects	2021-2030
4) Information, culture and tourism sector	
1) Conduct studies and assessments of climate change impacts on the information, culture, and tourism sectors as well as vulnerability and risks including hazard mapping of tourism and ecotourism resources such as natural, cultural and historical heritage and tourism sites, products, business, and services	2021-2023
2) Strengthen capacity of the sector and promote communication, dissemination of information and awareness raising on climate change adaption	2021-2030
3) Develop, implement, M&E and report the implementation of climate change adaptation policies, plans and impacts in the information, culture, and tourism sector	2022-2030
5) Rural development and settlement	
1) Conduct studies and assessments of climate change impacts on and vulnerability of settlements and rural development, including residents in informal settlements	2021-2023
2) Enhance institutional capacity, develop, implement, M&E and reporting the implementation of climate adaptation plans for rural development, settlement and poverty reduction	2021-2030
3) Identify, plan, and relocate communities that settle in climate and disaster risky areas	2021-2030
6) Public health sector	2021-2030
1) Conduct studies and assessments of climate change impacts on health sector as well as vulnerability, risks and hazard mapping	2021-2023

Projects or Actions	Description
of the infrastructure, health service, hygiene and sanitation, nutrition and disease outbreak	
2) Develop and implement monitoring and response plan to tackle climate related disease outbreak including malaria, diarrhea, and sickness	2021-2030
3) Enhance and develop climate and disaster resilient and adaptation of water supply systems, hygiene, sanitation and nutrient	2021-2030
4) Enhance institutional capacity, develop, implement, M&E and reporting the implementation of climate change adaptation plan and surveillance systems for public health sector	2021-2030
7) Education sector	
1) Conduct studies and assessments of climate change impacts, vulnerability, risks and capacity needs in education sector	2021-2030
2) Develop, implement, M&E and reporting the implementation of climate change adoptions and disaster response plans	2021-2030
8) Cross-cutting sector	
1) Conduct climate change impacts and capacity needs assessments for vulnerable groups including women, child, disabled people, the poor, residents in informal settlements, etc.	2021-2030
2) Develop, implement M&E and reporting the implementation of climate change adaption plans and program to enhance adaptation readiness and the capacity of vulnerable groups	2021-2030

Program 3: Strengthen Capacity for GHG Inventory and MRV

This program 3 mainly supports strategy 2. It aims to enhance capacity of public, private sector, organizations, and projects to improve completeness, accuracy, transparency of a GHG inventory and MRV, which is vital for mitigation planning. The priority projects or actions under this program is in Table 3.

Table 3 Priority Projects and Actions on GHG Inventory and MRV

Projects or Actions	Timeframe
1. Strengthen capacity and promote research and the development of data and emission factors in key sectors such as agriculture, forestry and other land use, industries, waste, energy and transport	2022-2030
2. Develop and strengthen capacity for the management of a data and information system for GHG inventory	2022-2030
3. Strengthen capacity and conduct the national GHG inventory and system for measurement, reporting, and verification (MRV)	2021-2030
4. Strengthen capacity and promote GHG inventory and MRV at city, program, project, facility, and organization level	2021-2030

Projects or Actions	Timeframe
5. Establish and enhance capacity for management of the system for measurement, reporting, and verification (MRV)	2021-2030

Program 4: Enhance Capacity for Climate Change Mitigation

This program 4 also supports strategy 2. Medium- and long-term mitigation actions during 2021–2030 are summarized in Table 4 below.

Table 4 The Priority Projects and Actions on Climate Change Mitigation

Projects or Actions	Timeframe
1. Strengthen energy and resources conservation, efficiency and savings	
1) Promote development and expansion of energy saving cooking stoves	2021-2030
2) Promote energy saving and efficiency building design and appliances	2022-2030
3) Improve and develop urban and road network, transport, and logistics system to reduce traffic congestion	2021-2030
4) Promote development and use of electric vehicles	2021-2030
5) Improve and develop infrastructure and facilities for cycling and walking	2021-2030
6) Promote and enhance resource efficiency in wood and non-timber forest product processing and uses	2021-2030
7) Strengthen capacity for monitoring of Sulfur hexafluoride (SF6) in electrical system	2022-2030
8) Enhance marketing, promotion, awareness raising and implementation of policies on energy and resources conservation, efficiency and savings	2021-2030
9) Study and improve energy and resources pricing that promote energy and resources saving	2022-2030
2. Study, pilot and create models to promote diffusion of a promising low-emission and environmentally friendly technologies	
1) Conduct studies and develop technology action plan on promising low-emission and environmentally friendly technologies in all sectors	2022-2030
2) Enhance and promote electric vehicle transportation	2022-2030
3) Promote low carbon rapid transit transportation and logistics	
4) Conduct studies biogas-based for replacement of fossil-based vehicles	2022-2030
5) Enhance research and development, and promotion of biofuels	2022-2030
6) Enhance low-emission and environmentally friendly practices in agriculture sector such as smart and precise farming, feeds-feeding and livestock manure management,	2021-2030

Projects or Actions	Timeframe
7) Promote transfer of solid waste-to-energy technology, landfill gas and wastewater treatment plant	2021-2030
8) Improve wastewater treatment and use of gas as energy	2022-2030
9) Promote circular economy for resources efficiency and mitigation	2021-2030
3. Promote and enhance development and use of renewable energy	
1) Promote and enhance development and use of solar, wind, bioenergy, biomass, and solid waste to energy	2022-2030
4. Promote development and deployment of capture and storage technologies in key sectors	
1) Study, pilot and promote deployment of capture and storage technologies in the large industry	2022-2030
5. Protect and enhance carbon sequestration of ecosystems	
1) Study, identify and promote protection and development of the forests and agricultural land and ecosystems carbon and nitrogen sequestration and storage	2022-2030
2) Promote combatting deforestation and forest degradation	2022-2030
3) Enhance forest restoration and rehabilitation	2022-2030
4) Strengthen sustainable forest and non-timber forest product management that co-benefit climate change adaptation	2022-2030
5) Identify, protect and restore wetland, forest and agricultural soil carbon	2022-2030
6) Protect and expand green areas and landscapes in cities and other settlements	2022-2030
7) Enhance conservation and ecological agricultural practices that co-benefit climate change adaptation	
6. Promote and enhance standardized management of products, processing, and disposal	
1) Enhance research, piloting and promotion of development of environmental standards (ISO 14000 series) in aviation and the large industries which required by the national laws and regulation and international convention and agreements	2022-2030
7. Enhance low emissions waste management, including promoting the 3Rs of waste management (reduce, reuse, and recycle) and waste-to-energy	
1) Upgrade and develop higher standard landfill systems through the countries	2021-2030
2) Upgrade and develop higher standard wastewater drainage and treatment systems in the main cities and secondary towns	2021-2030

Program 5: Strengthen Capacity and Enhance Climate Change Education and Awareness

This program 5 supports all strategies 1, 2 and 3. Its ultimate objective is to ensure the readiness of the education sector for development of human resources, and ensure public are accessible to information and knowledgeable, awareness of, safe and contribution to management of climate change and disasters. The priority projects and actions under this program are summarized in the Table 5 below.

Table 5 Strengthen Capacity and Enhance Climate Change Education and Awareness

Priority Projects or Actions	Timeframe
1. Conduct climate change vulnerability and capacity needs assessments for education sector	2022-2023
2. Develop and implement climate change adaption and response plans and programs for education sector	2022-2023, and continue to 2030
3. Improve organization and centers for climate change education and research	2021-2025, and continue to 2030
4. Improve and operate climate change curriculum for both formal and non-formal education at all levels	2021-2026, and continue to 2030
5. Develop and implement capacity building programs for teachers to teach climate change curriculum	2021-2030
6. Enhance capacity of media, development and implementation of climate change awareness and campaign	2021-2023, and continue to 2030.
7. Develop materials (guidelines, manuals, handbooks, etc.) and methods for effective communication, campaign and awareness raising	2020-2025
8. Enhance development, implementation, M&E and reporting of climate change awareness and campaign plans and programs	2021-2023, and continue to 2030.

Program 6: Strengthen Capacity and Promote Climate Change Adaption and Mitigation Technology Development, Deployment and Transfer

This program also supports all strategies 1, 2, and 3 and is to enhance access to and deployment of appropriate technologies for both adaptation and mitigation. The priority projects or actions under this program are listed in the Table 6 below.

Table 6 Strengthen Capacity and Promote Climate Change Adaption and Mitigation Technology Development, Deployment and Transfer

Priority Projects or Actions	Timeframe
1) Study, develop and update climate change mitigation and adaptation technology profile, review and update technology	2022-2023

Priority Projects or Actions	Timeframe
needs assessment and action plan for climate change mitigation and adaptation	
2) Enhance collaboration with development partners and private sector to study, pilot and diffusion of climate change mitigation and adaptation technologies	2020-2030
3) Study, identify and promote local knowledge on climate change mitigation and adaptation	2022-2030

Program 7: Strengthen Capacity and Promote Climate Finance

This program is to secure and sustain financial resources to support implementation of strategies 1, 2 and 3. The priority projects or actions under this program are listed in the Table 7 below.

Table 7 Strengthen Capacity and Promote Climate Finance

Priority Projects or Actions	Timeframe
1. Develop regulation and strengthen capacity for management of climate change management fund	2021–2023, and continue implementation to 2030
2. Carry out an assessment of financial needs and resources for climate change management	2021–2023
3. Develop and implement climate finance and resource mobilization strategy/plan and mechanisms for access to financial support and credits	2021–2024, and continue implementation to 2030
4. Study, promote development and deployment including piloting and initiatives of an appropriate subsidy, green bond/credit, insurance mechanism for climate change management including building from climate change related disasters	2022-2025, and continue implementation to 2030
5. Develop and strengthen capacity for MRV of climate finance	2021-2023, and continue implementation to 2030

Program 8: Improve Climate Change Mainstreaming, Enabling Environment and Readiness

This program is to ensure that climate change is mainstreamed in national, local, and sectoral policies and plans. In addition, it promotes creating enabling environment and readiness for climate change management. The priority projects or actions under this program are outlined in the Table 8 below.

Table 8 Improve Climate Change Mainstreaming, Enabling Environment and Readiness

Priority Projects or Actions	Timeframe
1) Enhance mainstreaming of climate change in national, local and sectoral policies, strategies, plans and projects and create enabling environment for implementation	2021-2030
2) Create and operate a platform, forum and dialog for consultation and exchange on climate change management	2022-2030

Program 9: Strengthen Capacity on Climate Change Management and Governance

This program will be implemented to promote research and technology development for climate change adaptation and mitigation to 2030 and supports all strategies 1, 2, and 3 (Table 9).

Table 9 Priority Projects and Actions for Strengthening Capacity on Climate Change Management and Governance

Projects or Actions	Timeframe
1. Enhance the national, local and sectoral institutional capacity and development, implementation, M&E and reporting the implementation of policies, regulations and plans on climate change	2022-2030
2. Strengthen multi-level governance, cooperation and coordination among climate change and relevant stakeholders/sectors	2022-2030
3. Strengthen climate change research and development	2021-2023
4. Update the decree on climate change and develop regulations and guidelines	2023-2024, and continue implementation to 2030

Chapter IV Measures for Implementation, Monitoring and Evaluation, and Reporting

4.1 Implementation

The Ministry of Natural Resources and Environment (MONRE), especially the Department of Climate Change (DCC), will lead the implementation of this strategy. Following the endorsement of the strategy, MONRE, especially the DCC, will (i) disseminate and communicate the strategy; and (ii) develop detailed

implementation programs, projects, and work plans, which shall include technical and financial support required, and (iii) closely work with and support all ministries and levels of government to prepare their climate action plans or mainstream climate change management into their strategies and plans, including institutional arrangement and personnel for implementation.

4.2 Monitoring and Evaluating the National Climate Change Responses

4.2.1 National System for Measuring, Reporting, and Verification

Lao PDR needs to assess and report on progress against national climate goals nationally. A measurement, reporting, and verification (MRV) system will be created in 2022 in accordance with the UNFCCC and Paris Agreement and requirements for measuring, reporting on, and verifying progress with climate goals.⁴⁷

MONRE will also put in place the system that track and MRV the implementation progress and impact made on emissions reductions, climate change adaptation and resilience including financial supports and or investment under this strategies and others such as:

- The NSEDP 9 and 10, national SDGs, the Green Growth Strategy, and the National Strategy on Disaster Risk Reduction 2021–2030;
- The strategies, plans and projects across government ministries, local governments, private sector and other organizations.

4.2.2 National Climate Change Strategy Review

Annual and Mid-term Review of National Climate Change Strategy

Assessing national effectiveness and progress with implementing climate change mitigation and adaptation in Lao PDR is fundamental to monitoring and evaluation. MONRE will prepare short annual progress report summarizing the implementation progress of this strategy, commencing December 2021. In December 2025, MONRE will publish a mid-term review of the strategy.

Final review of NCCS

A final review of this strategy will be undertaken by 2029. The evaluation will inform the development of a national climate change strategy in the future. In undertaking the review, MONRE will work closely with the Ministry of Planning and Investment and consult with sectors, provincial administration, nongovernmental stakeholders, and international partners. The final review will assess the efficacy of the implementation of this strategy. It will also consider:

- Progress against sectoral climate change plans;

⁴⁷ See **Paris Agreement**, 12 December 2015, Paris, United Nations Treaty Series, No. 541113. art. 13. This strategy also takes into account the guidance provided in S. Barakat, et al. 2017. **A Guide to Transparency Under the UNFCCC and the Paris Agreement**. London: IIED.

- Inter-ministerial collaboration;
- The national MRV framework; and
- Scope for the next national climate change strategy.

Reference

Legislations:

1. Decree on Climate Change, no. 321/Gov, dated 18 September 2019;
2. Law on Environmental Protection (Amended), no. 014/NA, dated 18 December 2012;
3. Law Meteorology and Hydrology, no. 36/NA, dated 13 November 2017;
4. Law on Land, (Amended), no. 14/NA, dated 21 June 2019;
5. Law on Water and Water Resources, no. 010/NA, dated 11 May 2017;
6. Law on Forestry, no. 64/NA, dated 13 June 2019;
7. Law on Disaster Management, no. 15/NA, dated 24 June 2019.

International Agreements:

- 1) United Nations Framework on Climate Change (UNFCCC), 1994;
- 2) United Nations Convention on Biodiversity (UNCBD), 1993;
- 3) United Nations Convention to Combat Desertification, (UNCCD), 1996;
- 4) Kyoto Protocol, 2003;
- 5) Paris Agreement, 2015;
- 6) Sustainable Development Goals (SDGs), 2015;
- 7) Vienna Convention for the Protection of the Ozone Layer, 1989; or/and Amended Version (Kigali Amendment) on gradually reduce the consumption and production of hydrofluorocarbons (HFCs), 2016;
- 8) Agreement A38–18 and Agreement A40–18 of the International Civil Aviation Organization on Environment and Climate Change, (2013);
- 9) ASEAN Joint Agreement on Climate Change, 2019.

Policies, Strategies and Programs:

- 1) The 8th Lao National Socio-Economic Development Plan, 2016-2020;
- 2) The 9th Lao National Socio-Economic Development Plan, 2021-2025;
- 3) The Initial Nationally Determined Contributions (NDC), 2015;
- 4) The Nationally Determined Contributions (NDC), 2020;

- 5) National Strategy on Climate Change of the Lao PDR, 2010;
- 6) Action Plan on Climate Change 2013-2020, issued in 2013;
- 7) Strategy on Forestry to the year 2020, issued in 2005;
- 8) Strategy on Renewable Energy Development of the Lao PDR, 2011;
- 9) National Adaptation Program, 2009;
- 10) Draft Strategy on Water and Water Resources to 2030, developing since 2019;
- 11) Master Plan on Land Use, 2018.

Research Papers, Reports and others:

1. International Panel on Climate Change (IPCC), 2018. Executive Summary for Leaders. In V. Masson-Delmotte et al., eds. increasing of global average temperature 1.5°C: Special Report of IPCC.
2. Government of the Lao PDR, 2019. Post Disaster Need Assessment: Flood in 2018, Lao PDR, Vientiane Capital.
3. National Statistic Center, 2015. Statistic Year Book 2015. Vientiane Capital
4. Government of the Lao PDR. Ministry of Agriculture and Forestry, 2018. Forest Reference Emission Level and Forest Reference Level (FREL/FRL) of the Lao PDR for the expenditure in REDD+ under the UNFCCC. Vientiane Capital. https://redd.unfccc.int/files/2018_frel_submission_laopdr.pdf.
5. Government of the Lao PDR, Ministry of Energy and Mine and Economic Research Institute for ASEAN and East, (ERIA). 2020. Lao PDR Energy Outlook 2020. Jakarta: ERIA. <https://www.eria.org/uploads/media/Research-Project-Report/Lao-Energy-Outlook-2020/Lao-PDR-Energy-Outlook-2020.pdf>
6. MEM. 2018. Lao PDR Energy Statistics 2018.
7. The World Bank. The World Bank in Lao PDR; ADB. 2017. Country Partnership Strategy: Lao People's Democratic Republic, 2017–2020. Manila. <https://www.adb.org/sites/default/files/institutional-document/360121/cps-lao-2017-2020.pdf>.
8. Government of the Lao PDR, National Statistic Center. Gross Domestic Products (assessed in the 10th June 2020). <https://laosis.lsb.gov.la/tblInfo/TblInfoList.do?rootId=2101000&menuId=2101101>.
9. ADB. 2019. Lao People's Democratic Republic Energy Sector Assessment, Strategy, and Road Map. Manila. <https://www.adb.org/sites/default/files/institutional-document/360121/cps-lao-2017-2020.pdf>.

10. Asian Development Bank (ADB). Lao People's Democratic Republic, Key Indicators.
11. ADB. 2017. Country Partnership Strategy: Lao People's Democratic Republic, 2017–2020. <https://www.adb.org/sites/default/files/institutional-document/360121/cps-lao-2017-2020.pdf>; and ADB. 2019. Lao People's Democratic Republic Energy Sector Assessment, Strategy, and Road Map. Manila.
12. ADB. Asian Development Outlook 2020: What Drives Innovation in Asia? Manila.
13. Ministry of Natural Resources and Environment. 2016. Report on History of Climate Change, Vulnerability and Prediction for the Lao PDR. Department of Climate Change, Vientiane Capital.
14. National Statistic Center (NSC). 2018. Statistics 2018. Vientiane Capital.
15. IPCC. 2014. Asia. In V.R. Barros, et al., eds. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge and New York: Cambridge University Press.