LAO PEOPLE'S DEMOCRATIC REPUBLIC

PEACE INDEPENDENCE DEMOCRACY UNITY AND PROSPERITY

THE FIRST BIENNIAL TRANSPARENCY REPORT (BTR1) Under Paris Agreement

Ministry of Agriculture and Environment

2025

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THE FIRST BIENNIAL TRANSPARENCY REPORT (BTR1)

ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ
ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນະຖາວອນ

ກະຊວງ ກະສິກຳ ແລະ ສິ່ງແວດລ້ອມ

ເລກທີ 2747 /ກສ
ນະຄອນຫຼວງວຽງຈັນ, ວັນທີ 16 DEC 2025

ຂໍ້ຕົກລົງ
ວ່າດ້ວຍ ການຮັບຮອງບົດລາຍງານ ກ່ຽວກັບ ການສຳຫຼວດທາດອາຍເຮືອນແກ້ວ ທີ່ມີຄວາມໂປ່ງໃສ ສະບັບທຳອິດ ຂອງ ສປປ ລາວ

- ອີງຕາມ ດຳລັດ ວ່າດ້ວຍ ການຈັດຕັ້ງ ແລະ ການເຄື່ອນໄຫວ ຂອງກະຊວງ ກະສິກຳ ແລະ ສິ່ງແວດລ້ອມ, ສະບັບ ເລກທີ 534/ນຍ, ລົງວັນທີ 14 ສິງຫາ 2025;
- ອີງຕາມ ພັນທະຂອງສປປ ລາວ ທີ່ເປັນປະເທດພາຄີ ຕໍ່ ສົນທິສັນຍາ ສປຊ ວ່າດ້ວຍການປ່ຽນແປງດິນຟ້າອາ ກາດ ແລະ ສັນຍາປາຣີ ວ່າດ້ວຍ ການປ່ຽນແປງດິນຟ້າອາກາດ ພາຍໃຕ້ມາດຕາ 13;
- ອີງຕາມ ໜັງສືສະເໜີ ຂອງກົມສິ່ງແວດລ້ອມ, ກະຊວງກະສິກຳ ແລະ ສິ່ງແວດລ້ອມ, ສະບັບເລກທີ 1582/ ກສ.ກສລ, ລົງວັນທີ 20 ພະຈິກ 2025.

ລັດຖະມົນຕີ ກະຊວງ ກະສິກຳ ແລະ ສິ່ງແວດລ້ອມ ຕົກລົງ:

ມາດຕາ 1 ຮັບຮອງບົດລາຍງານ ກ່ຽວກັບ ການສຳຫຼວດທາດອາຍເຮືອນແກ້ວ ທີ່ມີຄວາມໂປ່ງໃສ ສະບັບທຳອິດ ຂອງ ສປປ ລາວ (ສະບັບປີ 2025);

ມາດຕາ 2 ມອບໃຫ້ ກົມສິ່ງແວດລ້ອມ ເປັນເຈົ້າການໃນການໂຄສະນາເຜີຍແຜ່ເນື້ອໃນ ຂອງບົດລາຍງານສະບັບນີ້ ໃຫ້ ແກ່ພະແນກກະສິກຳ ແລະ ສິ່ງແວດລ້ອມຂັ້ນແຂວງ, ຫ້ອງການກະສິກຳ ແລະ ສິ່ງແວດລ້ອມ ຂັ້ນເມືອງ ແລະ ພາກສ່ວນທີ່ກ່ຽວຂ້ອງ ເພື່ອຮັບຊາບ ແລະ ຈັດຕັ້ງຜັນຂະຫຍາຍ ໃຫ້ມີປະສິດທິຜົນ;

ມາດຕາ 3 ຫ້ອງການ, ບັນດາກົມ, ກອງ ແລະ ສະຖາບັນ ພາຍໃນກະຊວງ ກະສິກຳ ແລະ ສິ່ງແວດລ້ອມ, ພະແນກກະສິ ກຳ ແລະ ສິ່ງແວດລ້ອມແຂວງ, ຫ້ອງການກະສິກຳ ແລະ ສິ່ງແວດລ້ອມເມືອງ ແລະ ພາກສ່ວນທີ່ກ່ຽວຂ້ອງ ຈົ່ງຮັບຮູ້ ແລະ ຈັດຕັ້ງປະຕິບັດບົດລາຍງານໃຫ້ໄດ້ຮັບຜົນດີ;

ມາດຕາ 4 ຂໍ້ຕົກລົງສະບັບນີ້ ມີຜົນສັກສິດນັບແຕ່ວັນລົງລາຍເຊັນເປັນຕົ້ນໄປ.

ລັດຖະມົນຕີ

ປອ. ລິນຄຳ ດວງສະຫວັນ

FORWARD

Lao People's Democratic Republic (Lao PDR), like many other countries, faces significant challenges from climate change. It's high vulnerability to extreme weather events, rising temperatures, and changing rainfall patterns poses sensitivity risks to the country's environment and development. In respond, the government of Lao PDR has demonstrated consistent commitment to its obligation under the Paris Agreement and the United Nations Framework Convention on Climate Change (UNFCCC). It has also established a comprehensive policy framework to address climate change challenges and foster national development priorities, environmental protection, economic development, and the well-being of its people. BTRs are backbone of the global climate accountability. By providing transparent, standardized, and reviewed information, they enable countries to learn from each other, identify areas for improvement, and collectively advance stronger climate action.

Lao PDR, as a country in the Group of Least Developed Countries is proud to submit this First Biennial Transparency Report (BTR1). This submission reflects the country's steadfast efforts to fulfill its commitment under the Pari Agreement in accordance with Decision 18/CMA.1 (MPGs), Paragraph 3 and Paragraph 4. For the national greenhouse gas inventory report under BTR1, with a base year of 2022, Lao PDR is applying the flexibility provided under Paragraph 58 of MPGs. The National Inventory Reporting (NIR), Common Reporting Table (CRTs), and Common Tabular Formats (CTF) will be submitted separately. The BTR1 encompasses key information such as the national greenhouse gas inventory, information on track progress made in implementing and achieving the Nationally Determined Contributions (NDCs) under Article 4 of the Paris Agreement, information on climate change impacts and adaptation under Article 7, and information on financial, technology, and capacity-building support under Articles 9-11. A solid framework for institutional monitoring has also been developed to generate robust evidence on progress and challenges.

Despite several significant challenges, such as data limitations for supporting BTR1 preparation, and limited capacity and understanding of new reporting requirements under ETF, Lao PDR has demonstrated a strong commitment to reporting on national climate action. This represents a highly significant step for an LDC like Lao PDR, reflecting its dedication to climate change action to address global challenges. This report will facilitate continuous policy refinement, baseline for updating the NDC 3.0 and achieve our climate change targets under the SDGs.

The Ministry of Agriculture and Environment, on behalf of the Government of the Lao PDR, sincerely thanks all stakeholders for their invaluable contributions to this document. This includes the Steering Committee of the BTR1 project, the Technical Working Group on Climate Change (TWGCC), the secretariat, line ministries, development partners, international organizations, and international experts. We also extend our gratitude to the Global Environment Facility (GEF), funded through the United Nations Environment Programme (UNEP), for their crucial financial support in preparing BTR1. We are also grateful to the UNFCCC for their support in providing quality assurance for the national greenhouse gas (GHG) inventory management system and the

national GHG inventories, and to the CBIT-GSP project for supporting the quality assurance of Lao PDR's BTR1.

Lastly, we thank the Ministry of the Environment of Japan, especially Mitsubishi UFJ Research and Consulting Ltd., Japan, for their technical assistance in the National Inventory Report (NIR) preparation. For committed to addressing the global challenge of climate change, Lao PDR strongly encourages and looks forward to cooperation with all our national and international partners and continual improvement of the next BTRs.

Minister
Ministry of Agriculture and Environment

Dr. Linkham DOUANGSAVANH

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AD	Activity Data
ADB	Asian Development Bank
AFOLU	Agriculture Forestry and Other Land Use
AP	Agriculture Plantation
Ap1-L	Approach 1-Level Assessment
Ap1-T	Approach 1-Trend Assessment
BAU	Business-as-Usual
BOL	Bank of Lao PDR
BTR	Biennial Transparency Report
BUR	Biennial Update Report
CBIT-GSP	The Capacity-building Initiative for Transparency – Global Support Programme
CF	Coniferous Forest
CMA	Conference of the Parties serving as the meeting of the Parties to the Paris Agreement
CO2	Carbon Dioxide
CRT	Common Reporting Table
CSOs	Civil Society Organizations
CTF	Common Tabular Formats
DCC	Department of Climate Change
DD	Dry Dipterocarp Forest
DOF	Department of Forestry
EF	Emission Factors
EG	Evergreen Forest
ETF	Enhance Transparency Framework
EVs	Electric Vehicle
EWS	Early Warning System
FIPD	Forest Inventory and Planning Division
FNFI	First National Forestry Inventory
GEF	Global Environment Facility
Gg	Gigagrams
Gg CO2 eq	Gigagrams of carbon dioxide equivalent
GGGI	Global Green Growth Institute
GHG	Greenhouse Gases
GHGI	Greenhouse Gases Inventory
GoL	Government of Lao PDR
GW	Gigawatt
GWP	Global Warming Potential
HFCs	Hydrofluorocarbons
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industry Process and Production Use
ktCO2e	kilotons of carbon dioxide equivalent

LAK	Laotian Kip (Lao currency)
Lao PDR	Lao People's Democratic Republic
LSB	Lao Statistics Bureau
LULUCF	Land Use, Land-Use Change, and Forestry
MAE	Ministry of Agriculture and Environment
MAF	Ministry of Agriculture and Forestry
MEM	Ministry of Energy and Mine
MOEJ	Ministry of the Environment of Japan
MOES	Ministry of Education and Sport
MOIC	Ministry of Industry and Commerce
MONRE	Ministry of Natural Resource and Environment
MPGs	Modalities, Procedures and Guidelines
MPI	Ministry of Planning and Investment
MPWT	Ministry of Public Work and Transport
MRV	Monitoring, Reporting, and Verification
MW	Megawatts
NAP	National Adaptation Plan
NDC	National Determine Contribution
NE	Not Estimated
NEC	National Environment Committee
NGO	Non-Governmental Organization
NIR	National Inventory Reporting
NSCC	National Strategy on Climate Change
NSEDP	National Socio-Economic Development Plan
QA	Quality Assurance
QC	Quality Control
REED	Reducing Emissions from Deforestation and Forest Degradation
REED+	Reducing Emissions from Deforestation and Forest Degradation Plus, the Conversation of Forest carbon Stock, Sustainable Management of Forest and Enhancement of Forest Carbon Stocks
SDGs	Sustainable Development Goals
SNC	Second National Communication
SNFI	Second National Forestry Inventory
tCO2e	Tonnes of carbon dioxide equivalent
TNC	Third National Communication
TWGCC	Technical Working Group on Climate Change
UNDP	United Nations Development Programme
UNEP	United National on Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
VUDAA	Vientiane Urban Development and Administration Authority
WB	World Bank

EXCUTIVE SUMMARY

Lao PDR was prepared and submitting this First Biennial Transparency Report (BTR1) that complies with the United Nations Framework Convention on Climate Change (UNFCCC) and Paris Agreement reporting requirements while responding to national development goals. The preparation of the BTR1 is in line and consistent with decision 18/CMA.1 (MPGs) Paragraph 3 and Paragraph 4.

The National Greenhouse Gases Inventory is prepared in accordance with the Modalities, Procedures, and Guidelines for the Transparency Framework for Action and Support Referenced in Article 13 of the Paris Agreement (Decision 5/CMA.3 Annex). The sectoral reported comprised: Energy, Industrial Processes and Product Use (IPPU), Agriculture, Land Use, Land-Use Change and Forestry (LULUCF), and Waste. The estimation approach of greenhouse gas emission and removals from sources and sinks, and the trends in emission and removals for greenhouse gas, including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and Hydrofluorocarbons (HFCs). The GHG estimation method was based on the 2006 IPCC Guidelines, developed by the Intergovernmental Panel on Climate Change (IPCC). The annual emission inventories from 2020 to 2022 are reported in the Common Reporting Table (CRT). This CRT report includes each year's emission data, activity data, and implied emission factors. The emission trends are provided for each greenhouse gas and for total greenhouse gas emissions in CO_2 equivalents.

Base on result of national greenhouse gas inventory under BTR1 the total GHG emission for 2022 in Lao PDR (Excluding LULUCF) was 38,844.04 Gg CO_2 eq, in which the highest GHG emission was CO_2, accounting for 25,692.19 $GgCO_2$ eq or 66.14% and the lowest GHG emission were HFCs, accounting for 200.02 $GgCO_2$ eq or 0.51%. Since 2020, the amount of CO_2 has increased by 10.56 % compared to the emission in 2022. The GHG emissions by sector present that the energy sector is the largest emission source, accounting for 21,688.98 $GgCO_2eq$ or 55.84%, followed by the agriculture sector, accounting for 10,480.02 $GgCO_2eq$ or 26.98%, the IPPU accounting for 5,226.55 $GgCO_2eq$ or 13.46%, and the Waste sector accounting for 1,448.49 $GgCO_2eq$ or 3.73%.

Key category analysis was conducted in a compliance with the 2006 IPCC Guidelines. The Approach 1, Level and Trend assessment has applied for all of the inventory categories. This included both including and excluding of the LULUCF sector. The analysis concluded that, in the case of including the LULUCF sector, there were 57 sources and sinks and 11 key categories for 2022 while excluding LULUCF sector were 48 source and sinks and 14 key categories for 2022.

In recent decades, Lao PDR has encountered climate change-related issues, with increased severe weather occurrences and disturbances to seasonal weather patterns. The Lao PDR is increasingly vulnerable to the impacts of climate change, with significant implications for its environment, economy, and the livelihoods of its people. AFOLU, energy, IPPU, and waste are the four most important sectors related to GHG emissions for Lao PDR. Over the past ten years, the energy industry has provided significant support for socioeconomic development and the shift from agricultural to industrial development and modernization. The energy sector is one of the many industries that propel social and economic growth. Furthermore, one of the key industries for socioeconomic growth, particularly for ensuring food security, is forestry and agriculture. Infrastructure for agriculture has significantly improved and developed due to new policy implementation, which moved the industry away from subsistence production and toward market-oriented and commercialized development. However, the largest contributor to greenhouse gas emissions in the Lao PDR is the agriculture, forestry, and other land use (AFOLU) sector, which produced 78% of all emissions in 2014 (BUR1, 2020).

The government structure of Lao PDR is crucial for implementing and achieving its Nationally Determined Contributions (NDCs) under the Paris Agreement. Lao PDR established an unconditional mitigation target of a 60% reduction in national GHG emissions in 2030 (or around 62,000 ktCO2e in absolute terms) compared to projected 2030 GHG emissions in the baseline scenario. This national target demonstrates the country's enhanced contribution to the Paris Agreement, considering the 34% GHG emission reductions compared to the baseline scenario achieved in 2020 (NDC, 2021). Under the unconditional targets of the NDC for the AFOLU sector, about 1,100 ktCO2e/year between 2020 and 2030 average emission reductions target shall be achieved. Overall, the Lao PDR is on track to achieve this target. It is also targeted to increase the country's forest cover by up to 70% of the total land area (or approximately 16.58 million hectares) through reduced deforestation and forest degradation, increased forest conservation, sustainable management of forests, and enhancement of forest carbon stocks or REDD+ Forestry. In 2022, Lao PDR has increased its forest cover up to 57% or around 13,142,040 ha of total forest cover. This means Lao PDR has about 13% of the remaining land to increase forest cover to achieve the NDC target 2030. For the agriculture sector, the conditional NDC target is to provide 50,000 hectares with adjusted water management practices in lowland rice cultivation. It showed that the country's NDC target has been exceeded almost 2 times.

NDC unconditional target for the energy sector is 13 GW of installed hydropower capacity. It was indicated that Lao PDR had a total installed capacity of 4.5 GW in 2018. In 2024 the capacity increased to 10.16 GW of total installed capacity from hydropower (90 installed hydropower plants), representing about 83.06% of the country's total energy production. The Lao PDR has potential in renewable energy resources, including hydropower, solar, wind, and biomass.

For other renewable energies like solar and wind, the conditional target is 1 GW of installed capacity by 2030, expected to reduce 100,000 tCO2e/year. This target is on track because in 2022, there were eight solar power plants with a capacity of 56 MW. This solar energy produced about 93.07 GWh/year, or an average of 0.48% of the country's total energy. This is expected to increase in 2024 with a total of 12 solar power plants providing a capacity of 73 MW. It is highlighted that their energy production could reach 108.92 GWh/year, or an average of 0.62% of the country's total energy.

For energy efficiency, the Lao PDR has another unconditional NDC target to introduce 50,000 energy-efficient, clean cookstoves by 2030; however, reaching the NDC target is considered unlikely to be achieved. For Biomass: 300 MW installed capacity, including using agricultural residues to reduce slash-and-burn practices and air pollution. This can reach about 37.3% of the NDC target. Under the NDC target 2030, the Lao PDR shall improve the "New Bus Rapid Transit system in Vientiane Capital and associated Non-Motorized Transport (NMT) component". Currently, the Vientiane Capital Sustainable Urban Transport Project is under development and is expected to reduce 25,000 tCO2e/year. Conditional NDC targets for the transport sector include achieving 30% of the national vehicle fleet as Electric Vehicles (EVs) for two-wheelers and passenger cars, with a goal to reduce 30,000 tCO2e/year. As of 2024, Lao PDR has made significant progress towards this target, registering 24,426 EVs, which surpasses the 2025 goal of 20,000 EVs by 22.13%. This milestone highlights the country's commitment to decarbonizing its transport sector.
In addition, the NDC includes a target of replacing 10% of transport fuels with biofuel, aiming to achieve an annual reduction of 29 ktCO2e, further reinforcing efforts to mitigate climate change. The current status of this target is considerably lower than expectations. Moreover, the NDC target for the waste sector was implementing 500 tons/day of sustainable municipal solid waste

management in Vientiane Capital (40,000 tCO2e/y). Vientiane Urban Development and Administration Authority (VUDAA) reported an average of about 406 tons/day from 2019-2023. This was about 81% of the NDC target achievement.

Lao PDR has shown resilience and dedication in addressing climate change through various measures such as reforestation, sustainable land management, promotion of renewable energy, and community-based adaption projects. Effective cooperation among government agencies, civil society organizations, and international partners is essential for promoting climate resilience and securing a sustainable future for Laos and its population.

Lao PDR is a landlocked country located in Southeast Asia, covering an area of 236,800 km2, extending approximately 1,700 kilometers from north to south and between 100 to 400 kilometers from east to west. The mountainous areas in the north rise above 1,000 meters in elevation and experience high humidity, with average annual rainfall ranging from 1,500 to 2,000 mm. In the central and southern mountainous regions, elevations range from 500 to 1,000 meters, with higher average annual rainfall between 2,500 and 3,500 mm. The climate is divided into two seasons, from May to mid-October for the rainy season and mid-October to April for the dry season. The average temperature in the eastern mountainous is 20°C while the plain area is 25-27 °C.

Lao PDR is one of the most vulnerable countries to climate change impact due to its geography, predominantly on natural resources, and limited adaptative capacity. The key climate change impact or disasters includes flooding, drought, storm, and slides. These have adversely impacted the socioeconomic development and rural communities' livelihoods. The evidence showed that from 2009 until 2018, annual economic loss and damage from flooding and drought was $ 94 million in 2009, $ 200 million in 2011, $ 219 million in 2013, and $ 371.5 million in 2018, which was equivalent to 2.1% of the country's projected 2018 GDP.

Under the National Adaptation Planning (NAP) of Lao PDR has prioritized nine (9) sectors in addressing climate change, including agriculture, land use planning, health, public work and transportation, energy and mine, education, water resources, health, tourism. The key adaptive strategies are the following:

- Improve climate information systems, strengthen the development of early warning systems (EWS), cutting-edge technology, and techniques for improving climate resilience and agricultural production;
- Forest protection and land-use planning;
- Development of smart city plans with environmentally friendly infrastructure;
- Promoting the use of clean and renewable energy in transport, building, and industrial sectors;
- Develop curriculum and teaching material on climate change in formal and informal schools;
- Protection and restoration of water and water resources;
- Improve risk monitoring and warning systems in the health sector;
- Promote eco-tourism value chains to preserve environmental and cultural integrity, benefit local communities economically, and promote sustainable and green tourism practices;
- Develop and strengthen prevention, risk reduction, and disaster preparedness systems

Lao PDR is a party to the UNFCCC as non-Annex I and is committed to fulfilling its duty of international solidarity under the Paris Agreement and to contributing effectively to the achievement of the SDGs.

The National Strategy on Climate Change (NSCC) requires Lao PDR to monitor, assess and report on progresses and accomplishments of the national strategy implementation, including achievement of the annual climate change management targets. A measurement, reporting, and verification system will be created in accordance with the UNFCCC and Paris Agreement and requirements for measuring, reporting and verifying progresses of the actions including financial support, technological transfer and capacity enhancement for climate change management needed and received.

As presented in this report, Lao PDR has made significant institutional and legislative progress and is in the process of significant improvement in order to establish a national system and mechanism for tracking the climate change related support. However, this process is in very early stages and further development is needed including identifying and defining the roles, responsibilities and mandates for key data providers in the public sector, donors or development partners as well as private sector.

CHAPTER I: National Circumstance and Institutional Arrangement

1.1. National circumstance

1.1.1. Demographic profile

The population of Lao PDR is approximately 7,546,000 people, according to the National Statistical Bureau in 2023[1]**.** Projection suggests a substantial population increase, with an anticipated rise from 1.71 to 1.91 million people by 2030 and a population of 10.25 to 10.72 million by 2050**.** In Lao PDR, the women living in urban areas cover 51.8 %, a slightly higher proportion of males, while the women in rural without roads cover 49.9 %, a lower proportion of males (Figure 01). By age group, 26.9% of the female population is aged 14 and under, 67.0% are between 15 and 64 years old, and 6.1% are 65 and older, while the men's age groups consist of 28.6%, 65.6%, and 5.8%, respectively (Figure 02). Regarding marital status, most women and men are married (70.8% and 72.5%, respectively), followed by those who have never married (14.8% and 22.2%). Interestingly, a higher percentage of women are widowed compared to men 9.4% versus 2.3% (Figure 03)[2].

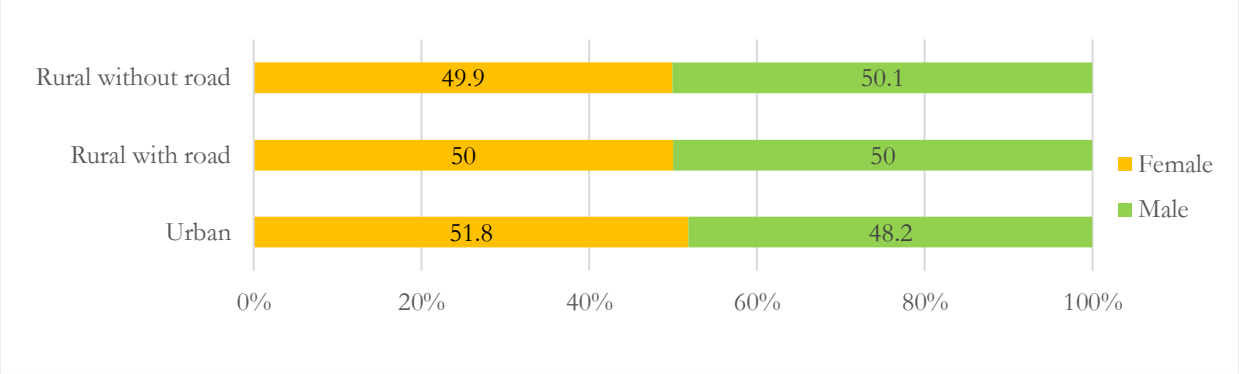


Figure 1: Share of female and male population by place of residence (%)

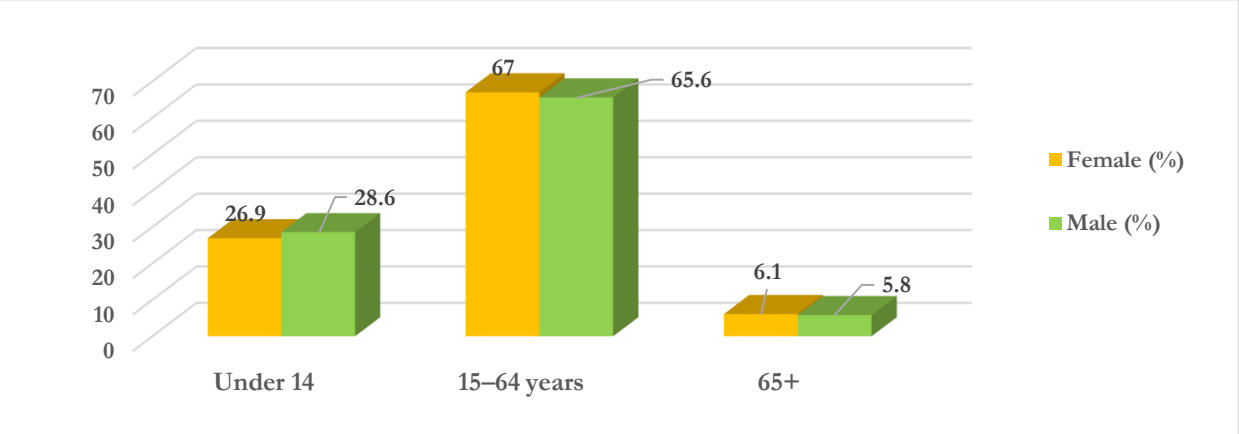


Figure 2: Share of female and male population by age group (%)

[1] https://laosis.lsb.gov.la/tblInfo/TblInfoList.do

[2] Lao People's Democratic Republic, Labor Force Survey, 2022.

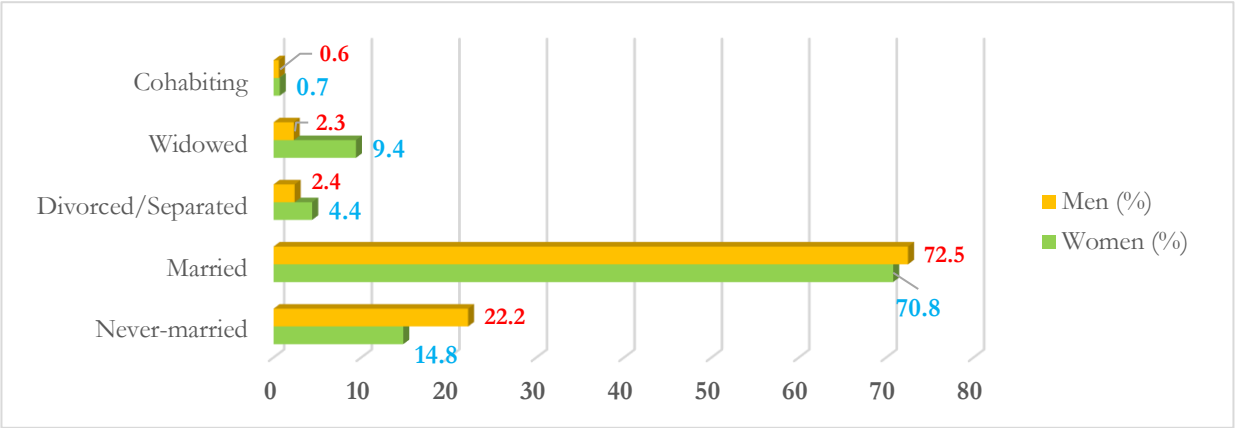


Figure 3: Share of female and male population by marital status (%)

1.1.2. Economic profile

In 2023, the economic recovery of the Lao PDR was in the initial phase from the impact of the COVID-19 pandemic and the effects of natural disasters, causing various challenges, including financial stability, LAK depreciation, and persistently high inflation. The government continued to overcome economic issues by supporting domestic production, import and export business, and tourism. The GDP in 2023 grew by 4.2 % from 4.4 % in 2022, while GPD per capita decreased to USD 1,832 from USD 2,022 (Figure 04) [3]

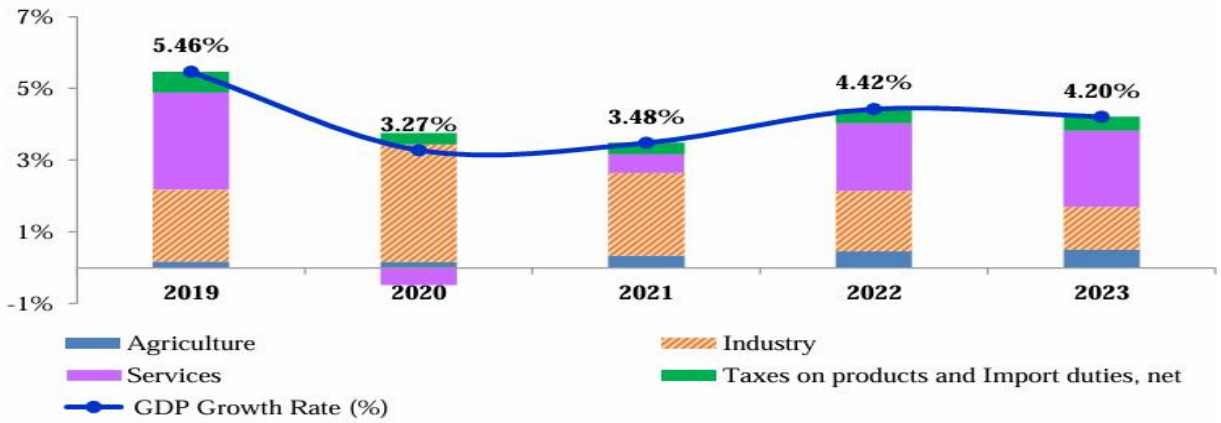


Figure 4: Gross Domestic Products during 2019 - 2023

1.1.2.1. Industry sector

In 2023, the industrial sector growth plummeted by 3.1 % from 4.4 % in 2022, which was estimated to be 32.1 % of GDP, and contributed to GDP growth by 1.2 % from 1.7 % in 2022. The slow growth of this sector was predominantly stemming from a decrease in electricity sector growth by 0.5 % from 2.7 % last year owing to climate change. Other sectors that contributed to the slow growth of the industrial sector also included the mining sector grew by 2.3 % (from 2.8 % in 2022), the food production manufacturing sector grew by 2.5 % (from 2.6 % in 2022), and

[3] Bank of Lao PDR, 2023: National Economic Report, Page 03

beverages and tobacco manufacturing sector grew by 3.9 % (from 4.3 % in 2022). The construction sector growth dropped by 6.2 % (from 7.2 % in 2022) on account of the completion of some mega-construction projects. Notwithstanding, the growth of the above sector declined, while the other manufacturing sector and water supply-waste management and remediation activities increased by 6.4 % and 5,6 %, respectively
(Figure 5)[4]

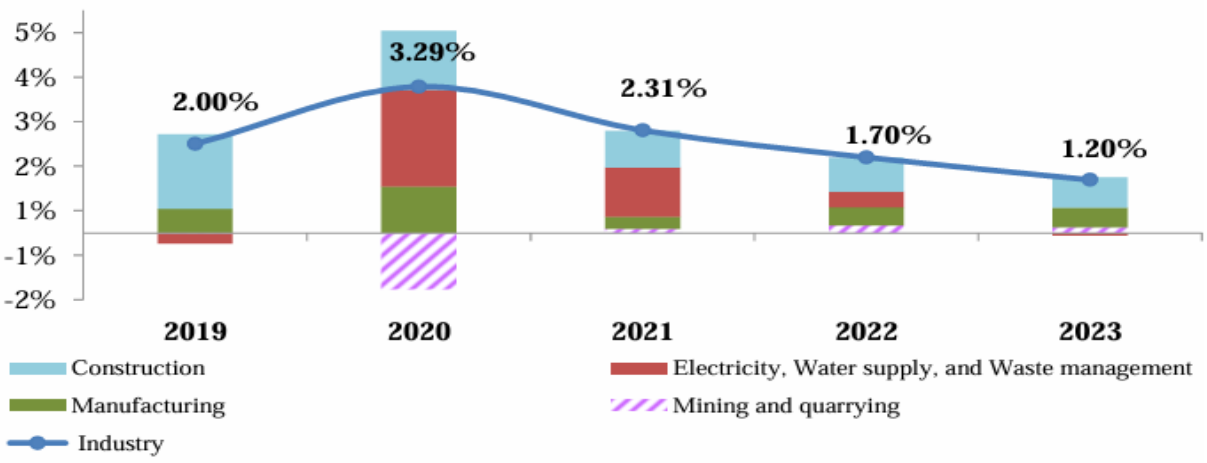


Figure 5: Industry Sector to GDP

1.1.2.2. Agriculture sector

The agriculture sector grew by 3.7% and accounted for 21.0% of the country's GDP, contributing 0.5% to overall GDP growth. The main driver of this expansion was crop production, which increased by 3.6%. In 2023, rice production totaled 3.98 million tons, including 3.1 million tons from rainfed lowland rice, 0.44 million tons from irrigated rice, and 0.20 million tons from upland rice. In addition, the livestock sector expanded by 4.2%, forestry and logging by 4.6%, and fisheries by 3.7%
(Figure 6)[5].

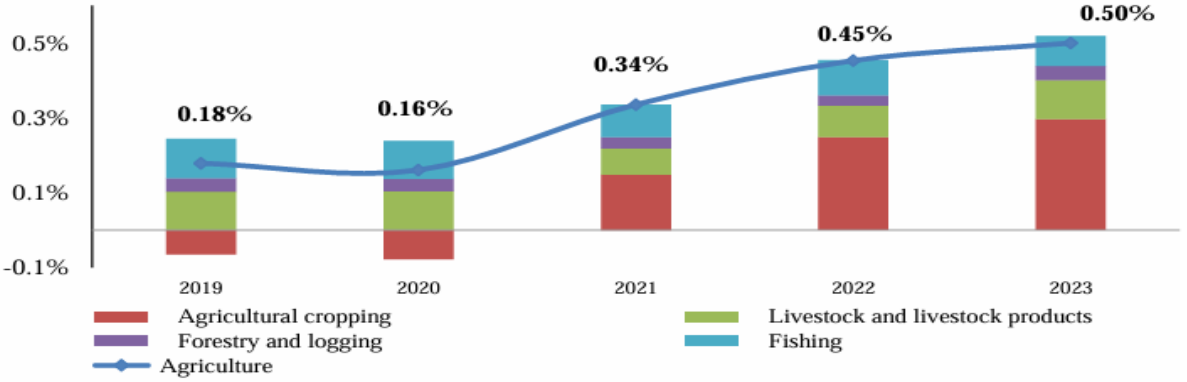


Figure 6: Agriculture Sector to GDP

1.1.2.3. Service sector

The service sector was the main contributor to the GDP growth compared to the other two sectors, accounting for 35.8 % of GDP, and contributed to GDP growth by 2.1% from 1.9% in 2022 because of an increasing number of domestic and international tourists. For instance, the accommodation and food service activities increased by 41.3% from 8.6% in 2022, followed by

[4] Bank of Lao PDR, 2023: National Economic Report, Page 04
[5] Bank of Lao PDR, 2023: National Economic Report, Page 04

the transportation and storage activities rose by 17.8%. In addition, the information and communications activities, the human health and social welfare activities, the wholesale and retail trade, the financial and insurance activities rose by 5.1%, 4.6%, and 3.9%, respectively (Figure 7) [6]

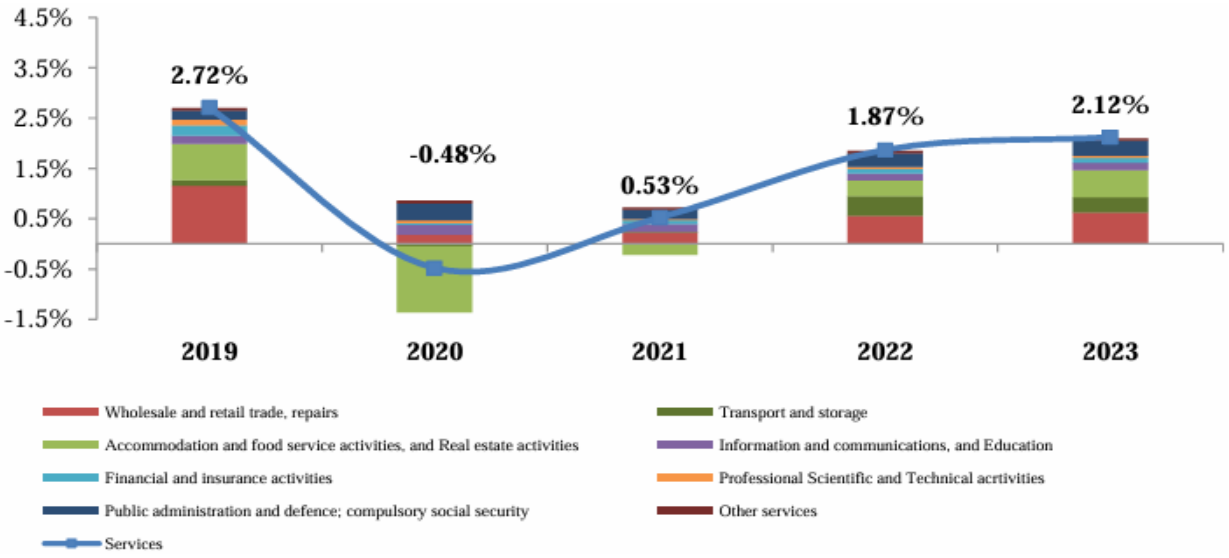


Figure 7: Service Sector to GDP

1.1.3. Natural resources and environment

1.1.3.1. Land

Land Law, No.70/NA, dated 21 June 2019, Article 21 defines that land use is classified into eight categories such as agriculture land, forestland, water land area, industrial land, communication land, cultural land, defense and security land, and construction land [7]. Lao PDR has conducted a targeted land survey to preserve and protect forestland of approximately 16.5 million hectares, or 70% of the country's total land area. These included protected forest land areas are 20%, buffer forest land areas are 35%, production forests, and some planting forest land areas are 13%, and industrial woodland areas are 2%. The remaining 30% of the land area is allocated for development, including 19% for agricultural land and settlement, construction, and 11% for other land use[8]. Based on the Third National Communication (TNC), the Land Use Planning has categorized in (Table 01) as follows:

Table 01 : Land Use Planning in Lao PDR [9]

No	Land Categories	Total areas	
		Hectares (ha)	Percent (%)
I	Conservation Land for Forest Cover	16.576.500	70
1	Conservation forest	4.718.000	20
2	Protection forest	8.247.000	35
3	Production forest	3.110.000	13
4	Industrial tree plantation	501.500	2

[6] Bank of Lao PDR, 2023: National Economic Report, Page 05
[7] GoL, 2019: Land Law, National Assembly
[8] MONRE, 2023: National Strategy on Climate Change to the year 2030, Vientiane Capital.
[9] Lao PDR, 2023: The Third National Communication on Climate Change, Department of Climate Change, Ministry of Natural Resource and Environment.

II	Land Utilization and Economic Development	7.102.500	30
2.1	Agriculture	4.502.500	19
2.1.1	Paddy field	2.000.000	8,4
2.1.2	Biennial plants and short live plants	1.000.000	4,2
2.1.3	Fruit tree cultivation	802.500	3,4
2.1.4	Pasture	7.00.000	3
2.2	Building up and other usage	2.600.000	11
2.2.1	Transportation	180.000	0,8
2.2.2	Construction	370.000	1,6
2.2.3	Others	2.050.000	8,6
	Total	**23.680.000**	**100**

1.1.3.2. Water resource

Laos is affluent in water resources, and most of the population in the country lives along the Mekong Basin. The massive water sources are from the Mekong River and its tributaries. It is estimated at 270 billion m3 of an average annual flow, or equivalent to 35% of the mean annual flow of the Mekong Basin, and the water resources per capita is approximately 55,000 m3 per year. The monthly distribution of the river flow in the country during the rainy season from May to October covered 80% and 20% in the dry season from October to April. [10]. Water resources have been exploited in various sectors, such as 93% of agriculture sectors, 4% of hydropower, and 3% of households [11].

(Table 02) presents the lengths of 15 main rivers in Laos, totaling 6097 km. The longest river is the Mekong River, which flows along the Laos-Thailand border for 919 km. The second longest is the Nam Neun River, flowing through Houaphanh and Xhienkhouang provinces for 610 km. The Nam Xekong River, with a length of 400 km, flows through Champasack, Saravan, Sekong, and Attapeu provinces, representing a middle-range length among the rivers listed. The shortest river is the Nam Sueng River, flowing 150 km through Houaphanh and Luangprabang provinces.

Table 02: The Length of Main Rivers in Laos [12]

No	River name or River Basin	Flows Through	Length (KM)
01	Mekong	Laos - Thailand	919
02	Nam Ou	Phongsaly, Oudomxay, Luangprabang	485
03	Nam Ngum	XiengKhuang, Xaysomboun, Bolikamxay, Loungprabang, Vientiane, Vientiane Capital	358
04	Nam Xebanghieng	Khammoun, Savannakhet, Salavan	358
05	Nam Tha	Luangnamtha, Bokeo, Oudomxay	325
06	Nam Xekong	Champasack, Saravan, Sekong, Attapue	400
07	Nam Xebangfai	Khammuane, Savannakhet	250
08	Nam Xedone	Xekong, Saravan, Champasack	228
09	Nam Thun-Kading	Borikhamxay, Xiengkhoung, Khammouan	353
10	Nam Khan	Houaphanh, Xhiengkhouang, Luangprabang	198
11	Nam Neun	Houaphanh, Xhiengkhouang	610

[10] World Bank & ADB, 2021: Climate Risk Country Profile, Lao PDR
[11] Lao PDR, 2023: The Third National Communication on Climate Change, Ministry of Natural Resource and Environment
[12] MONRE, 2022: Natural Resource and Environment Statistics, Vientiane Capital

12	Nam Sueng	Houaphanh, Luangprabang	150
13	Nam Ma	Houaphanh, Luangprabang	589
14	Nam Ngiep	Xiengkhuang, Xaysomboun, Bolikamxay	424
15	Nam Xum	Houaphanh	450
	Total		6097

1.1.3.3. Forest resource

Forest and forest resources play a paramount role in national socio-economic development, environment protection, biodiversity conservation, and climate change mitigation[13]. Hence, the government of Lao PDR (GoL) has allocated 16.58 million to increase forest cover to 70% of the land area through reduced emissions from deforestation and forest degradation, promoting conservation, forest sustainable management, buffer zones of national parks and other preserves and increasing of forest carbon stocks [14]. The emission reduction target from deforestation and forest degradation by 2025 is approximately 30 million tonnes of carbon dioxide equivalent (tCO2e), with the target of reducing emission from forest loss is 21 million tCO2e, and the removal target from forest restoration and plantation being 9 million tCO2e [15]. The forest in Lao PDR encompassed six types: Evergreen Forest, mixed deciduous forest, dry dipterocarp forest, coniferous forestry and broadleaved forest, and forest plantation [16]. Based on the forest Law, Article 14, the forest in Lao PDR is classified into three categories: Protection, conservation forest, and production forests [17]. The forest inventory in 2015 found that the total forest area in Lao PDR is 13.7 million hectares (ha), or equivalent to approximately 58% of the land area in the country. The production forest covered 3.1 million hectares, of which 2.2 million ha (70.8%) were forest, and the rest were other land use. The protection forest covered 7.9 million hectares, of which 4.8 million hectares (59.8%) were forest, and the rest were other land uses; the Conservation Forest covered 4.8 million hectares, of which 4.8 million (73.4%) was forest, and the rest were other land use. On top of that, the forest land covered 7.8 million hectares, including 3.2 ha of forest (Table 03) [18].

Table 03: Forest type and areas in 2015

Forest categories	Areas (Mha)	Forest cover (Mha)	Forest cover (%)
Production forests	3.1	2.2	70.8
Protection forest	7.9	4.8	59.8
Conservation forest	4.8	3.5	73.4
Forests have not categories yet	7.8	3.2	42.5

The first National Forestry Inventory (FNFI) was conducted in 1991-1999. Its result showed that forest cover decreased from 70% in 1940 to 41.5% in 2002. The Second National Forestry Inventory (SNFI) conducted again in 2015-2017 found that the forest cover was 60.2% or equivalent to 14.3 million and 58% or 13.7 million hectares in 2005 and 2015, respectively. It was noted that the forest cover in 2010 declined 59.3% or equivalent to 13.7 million hectares[19]. The underlying cause of forest cover decrease due to deforestation and forest degradation,

[13] Lao PDR, 2021: National REED+ Strategy, Ministry of Agriculture and Forestry
[14] GoL 2021: Lao PDR Nationally Determined Contribution (NDC)
[15] Lao PDR, 2021: National REED+ Strategy, Ministry of Agriculture and Forestry
[16] MAF, 2018: Lao People's Democratic Republic Forest Reference Emission Level and Forest Reference Level for REDD+ Results Payment under the UNFCCC
[17] GoL, 2021: Law on Forestry, Department of Forestry, Ministry of Agriculture and Forestry
[18] Lao PDR, 2023: The Third National Communication on Climate Change, Department of Climate Change, Ministry of Natural Resource and Environment.
[19] Lao PDR, 2023: The Third National Communication on Climate Change, Department of Climate Change, Ministry of Natural Resource and Environment.

including policy formulation for the development of relevant sectors, was not centralized, consistent, and inclusive. Forest management and law enforcement are not strict, and the registration to support forest management tools was not yet complete; illegal logging due to the high value of demand for agricultural products in domestic and external markets; most communities who are living in upland are poor and constrained livelihood alternative; uncontrolled shifting cultivation; agriculture expansion and the demand for infrastructure evelopment, such as hydropower and transmission line construction road construction, and mining. [20].

1.1.3.4. Biodiversity

Lao PDR is one of the most affluent countries in terms of biodiversity. It plays a significant role in the national and local economic growth. There are approximately 166 species of reptiles and amphibians, 700 species of birds, 90 species of bats, and 500 species of mammals. In addition, there are 500 fish species along the Mekong River and Its tributaries and 8,000-11,000 flower plants**.** Approximately 67 % of the Lao population has been living in rural areas, of which 75-80 % rely on biodiversity for their daily subsistence income and animal products. Approximately 67 % of the Lao population has been living in rural areas, of which 75-80 % rely on biodiversity for their daily subsistence income and animal products. However, the increase in global temperature would adversely affect biodiversity, mainly flora and fauna. Hence, proper and early-stage measures are required to prevent biodiversity loss[21]. However, several species might be endangered (Tables 04 and 05) while new species are still being discovered, and reptiles, insects, and rodents are not well-known and documented

Table 04: Threatened species by taxonomic group[22]

Country	Mammal	Birds	Reptiles	Amphibians	Fishes	Molluscs	Other Invertebrates	Plants	Fungi and Protists	Total
Lao PDR	47	29	28	6	56	16	5	62	0	249

Table 05: Number of species in IUCN's Red List Category [23]

Taxonomic Group	Ex	EW	Subtotal	CR	EN	VU	Subtotal	NT	LR/cd	DD	LC	Total
Animals	1	0	1	33	52	102	187	95	0	222	1,517	2,022
Plants	0	0	0	5	29	28	62	18	0	37	606	723

Notes: EX - Extinct; EW - Extinct in the Wild; CR - Critically Endangered; E – Endangered; VU – Vulnerable; NT: Near Threatened; LR/cd - Conservation Dependent; Data - Deficient, LC - Least Concern.

1.1.3.5. Mineral resource

Minerals are one of the main income sources of the Lao PDR. In the year 2022, the mining and quarrying industry has a total revenue of 8,596 billion kip [24]**.** Over the last ten years, mining development promotion has been progressing in many factors, especially establishing the mine extraction, processing, and transform factories. These products have been sold domestically and exported to other countries. Lao PDR is considered a significant sector that stimulates the

[20] Lao PDR, 2021: National REED+ Strategy, Ministry of Agriculture and Forestry.
[21] MONRE, 2023. The National Strategy on Climate Change toward 2030
[22] MONRE, 2020. The Lao People's Democratic Republic: State of Environment Report, March 2020.
[23] MONRE, 2016. The National Biodiversity Strategy and Action Plan for Lao PDR 2016-2025. Department of Water Resource Management. Vientiane Lao PDR
[24] Bank of Lao PDR, 2022: National Economic Report

country's economic growth in the long run. (Table 06) shows the cumulative mines in Lao PDR [25].

Based on the Third National Communication (TNC) found that there are more than 500 intact resources and locations, including gold, diamond, coal, oil, metal, copper, salt, lead, zinc, and gypsum. The mineral production has considerably increased pa, particularly lignite coal production, since the country's first coal-fired power plant operation in 2015, while the second largest minerals are limestones [26].

Table 06: Cumulative mines in Lao PDR

NO	Cumulative mines	Tonnes
1	Gold-silver	389,183,275
2	Copper	156,269,912
3	Nigan	608,075
4	Coban	21,153
5	Antimon	482,960
6	Live-Zine	2,087,953
7	Cement	1,364,985,807
8	Glue Stone	11,080,986
9	Boxite	407,131,300
10	Potassium Chroride	12,320,015,470
11	Coal	4,677,099,875
12	Barite	92,876,690
13	Quack	852,081
14	Pakodai	1,115,905
15	Gypsum	1,153,230,814
16	Crayyey Soil	8,417,500

1.1.3.6. Energy

National hydropower development potential is between 23,000– 26,000 megawatts (MW). According to the modified data on electricity generation sources in 2022, there were 94 operating power plants with an average installed capacity of over 1 MW, making the sector's total installed capacity 11,661.12 MW, generating 58,700.61 gigawatt-hours (GWh) per year. These include 81 hydropower plants with a total capacity of 9,615.14 MW and a total power generation of 45,703.25 GWh/year. The energy sector's power generation mix includes coal, thermal, and renewable source[27].

Up to 2021, the nationwide electrification ratio reached the following: (i) 100% of all 148 districts; (ii) 93.3% of all 8,450 villages; and (iii) 95% of total households. These indicators contribute to the Lao PDR's sustainable development and poverty eradication goals. According to reports on the 8th Five-Year Energy and Mine Development Plan (2016–2020) and the 9th Five-Year Energy and Mine Development Plan (2021–2025), the electrical grid had a total combined length of 63,563 circuit kilometers (cct-km) throughout the country. These included high-voltage gridlines of 500 kilovolts (kV) at 626 cct-km; 230 kV gridlines at 2,637 k-cct; 115 kV at 7,213 cct-km; medium-voltage gridlines of 22 kV at 34,626 cct-km; and low-voltage

[25] Lao PDR, 2023: National Strategy on Climate Change toward 2030, Ministry of Natural Resource and Environment

[26] Lao PDR, 2023: The Third National Communication on Climate Change, Department of Climate Change, Ministry of Natural Resource and Environment

[27] MEM. Strategy on Renewable Energy Development of the Lao PDR, Vientiane

gridlines of 0.4 kV at 20,441 cct-km. There were 74 power stations throughout the country, including 11 230/115/22 kV stations, 62 115/22 kV stations, and 1 T-Off 230 kV station[28].

1.2. Institutional arrangements

1.2.1. Regulatory framework

The country has ratified and is committed to numerous international conventions and frameworks, particularly those related to environmental and climate change matters. Among these, Lao PDR ratified all three Rio Conventions, namely, the United Nations Framework Convention on Climate Change (UNFCCC) in 1995, the Convention on Biological Diversity (CBD), and the UN Convention on Combatting Desertification in 1996. The country also committed to several other agreements that include the Montreal Protocol on Substances that Deplete the Ozone Layer, the Convention on International Trade in Endangered Species of Fauna and Flora, and the Stockholm Convention on Persistent Organic Pollutants (POPs).

With regards to climate change specifically, the GoL PDR ratified the UNFCCC in 1995 and the Kyoto Protocol in 2003. More recently, Lao PDR signed the Paris Agreement in 2016 and agreed to implement the Intended Nationally Determined Contribution (INDC), and NDC 2.0 to reduce greenhouse gas emissions (GHG). As a result, the country is now dedicated to supporting global efforts to limit warming to 1.5°C and attain net-zero emission by 2050.

In recent years, Lao PDR has strengthened its legal framework to integrate climate change strategies into national and sectoral development plans. In 2019, the country enacted the Decree on Climate Change, its first dedicated legal framework for addressing climate issues. This decree establishes principles, regulations, and measures for both climate change adaptation and mitigation. It also assigns the responsibility of managing climate change activities and coordinating with relevant ministries, organizations, and local authorities[29]

1.2.2. Institutional frameworks for climate change

In 2009, the National Environment Committee (NEC) was established through Decree No. 162/PM, dated June 21, 2009, defining the roles, responsibilities, scope of rights, organizational structure, and work plan of the NEC. It also defined the principles of implementation of work, coordination of decision-makers on environmental management related to many sectors at the centre, and coordination on managing, monitoring, and solving environmental problems effectively throughout the country. The NEC comprises high-level representatives from various related sectors, with the Deputy Prime Minister as the committee chairman, who has joint meetings as necessary to solve environmental problems. In addition, this committee has been established at the local level, including the provincial and district levels

[28] MEM, 2024, Energy policy and electric power development strategy of the Lao PDR 2021-2030, Vientiane, Laos
[29] GoL, 2019: Climate Change Decree. https://data.laos.opendevelopmentmekong.net/dataset/decree-on-climate-change-lao-pdr-2019

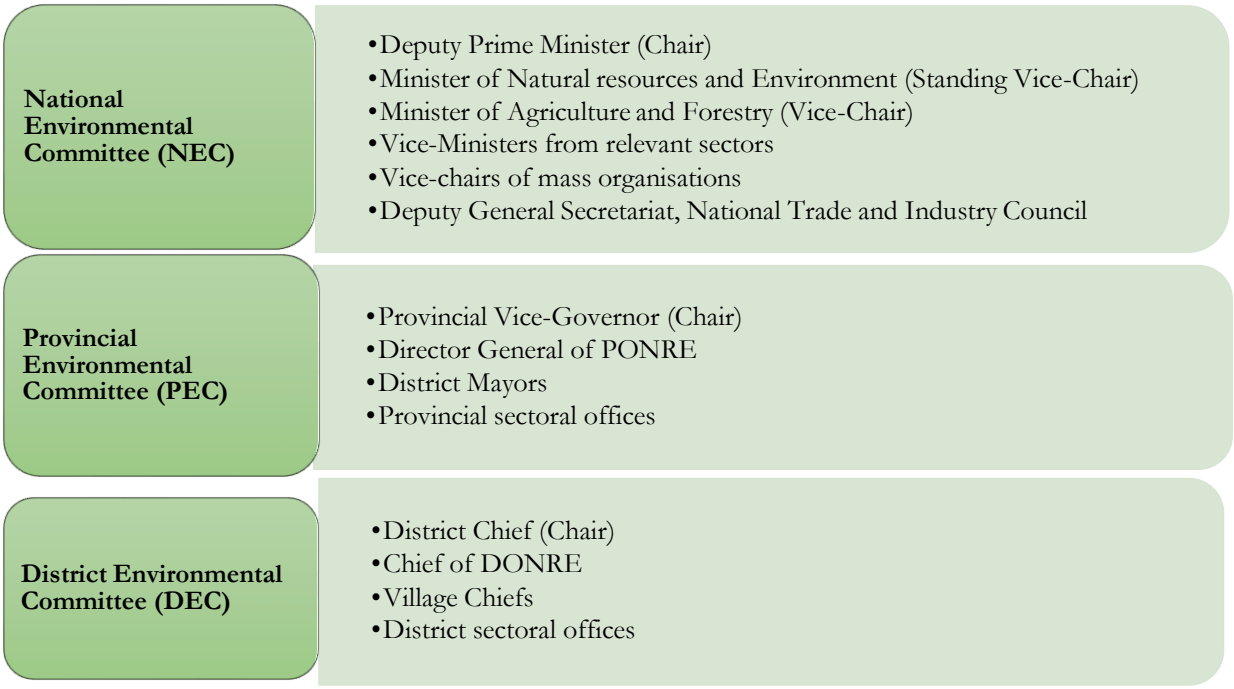


Figure 8: National Environment Committees at three levels

1.2.3. National entity and national focal point

The Lao PDR government had designated the Department of Climate Change (DCC) within the Ministry of Natural Resources and Environment (MONRE) as the national focal point for climate change. According to the resolution from the National Assembly on approving the restructure of the government's organization (No.05/NA, dated 20 March 2025) to merge some Ministries (such as the merge of the Ministry of Energy and Mines into the Ministry of Commerce and Industry, the merge of the Ministry of Investment and Planning into the Ministry of Finance, and the merge of the Ministry of Natural Resources and Environment and the Ministry of Agriculture and Forestry (MAF) into the new Ministry of Agriculture and Environment), and change the name of the Ministry of Information Culture and Tourism to the Ministry of Culture and Tourism, effective June 2025. The Department of Climate Change continues its role and responsibilities as a coordinating agency for climate change and in spearheading the development of relevant policies. During the technical preparation of Lao PDR's BTR1, the DCC worked with the cross-ministerial, Technical Working Group on Climate Change, key stakeholders, and Development Partners. Key ministries that contributed to the BTR's development process (specifically from August 2023 to May 2025) included the former Ministry of Agriculture and Forestry, the former Ministry of Energy and Mines, the Ministry of Industry and Commerce, the former Ministry of Planning and Investment, the Ministry of Foreign Affairs, the Ministry of Labor and Social Welfare, the Ministry of Public Health, the Ministry of Information Culture and Tourism, the Ministry of Public Works and Transport, the Ministry of Finance, and the Ministry of Education and Sports.

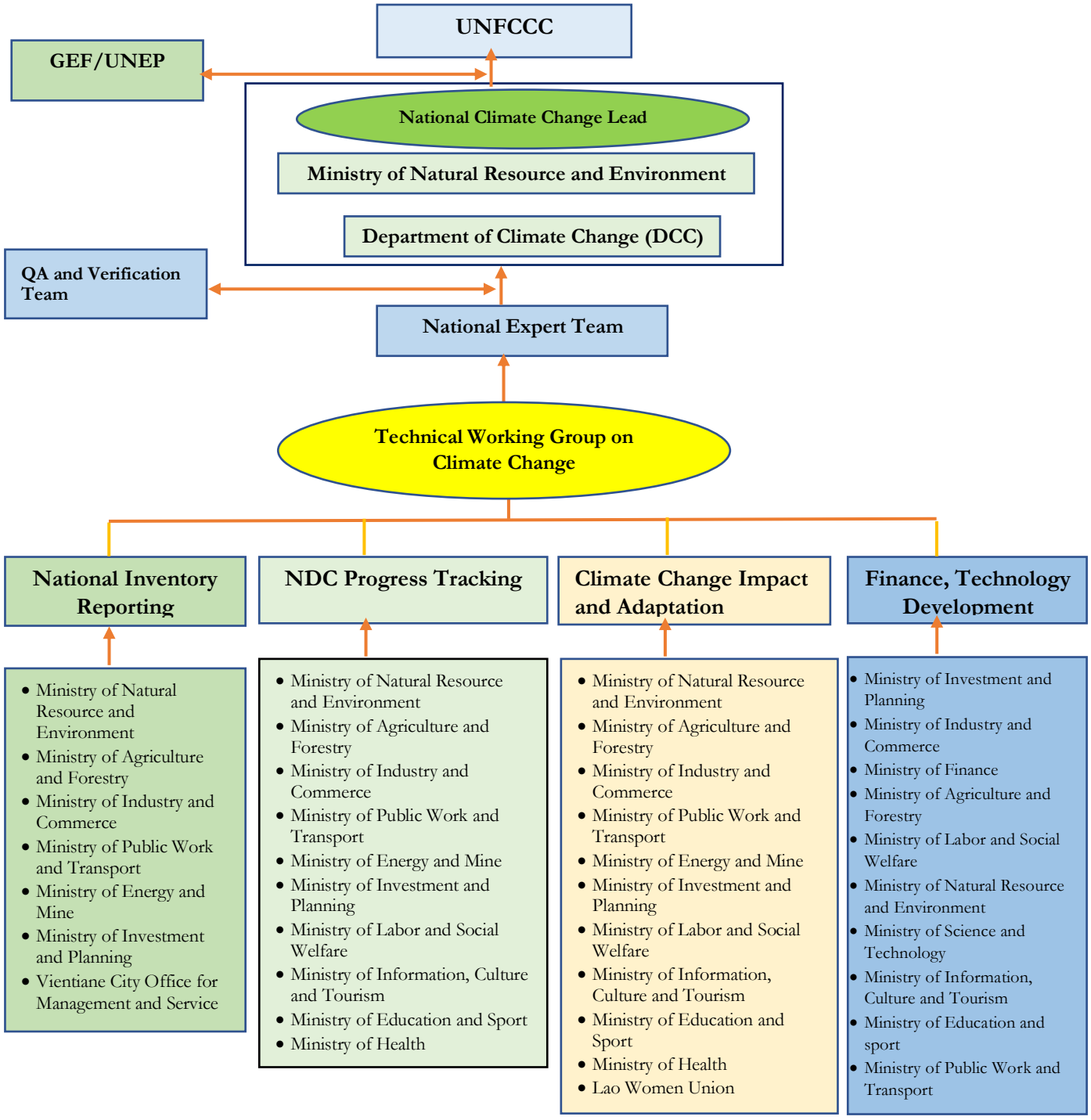


Figure 9 : Institutional Arrangement for BTR1 (during August 2023 – June 2025)

1.2.4. Roles and responsibility

This section outlines the roles and responsibilities of the relevant ministries during the technical preparation of the BTR1 from August 2023 to June 2025.

1) Ministry of Natural Resource and Environment

- The Department of Climate Change (DCC), is the national climate change focal point and coordinating agency for climate change in the country;
- DCC will not only ensure quality, relevance, and compliance with the BTR process but also ensure delivery of the BTR and communication with MONRE leadership;
- Track the progress of NDC implementation, including maintenance of data and information;
- Develop policies, guidelines, and regulations to support relevant Ministries in setting sectoral priorities in line with NDC implementation;
- Disseminate the NDC targets and priority actions to relevant sectors at the central and local levels;
- DCC will implement the BTR project, including consulting and coordination, data collection, assessment, QA/QC, validation, and reporting;
- DCC will also ensure that the BTR report, which will be submitted to UNFCC, is aligned with the 2006 IPCC Guidelines.

2) Ministry of Agriculture and Forestry (MAF)

- The department provides data for preparing GHG inventory and includes the Department of Forestry (REDD+ Division, Forest Inventory, and Planning Department), Department of Agriculture, Department of Livestock and Fisheries, National Agriculture and Forestry Research Institute;
- The MAF provides technical inputs on preparing BTR's report in each chapter, such as National Inventory Report, NDC tracking, and assessment of climate change impact under the guidance of DCC and MONRE;
- The MAF provides data that will be used for estimating GHG emissions, including livestock (Enteric Fermentation and Manure management) and land (Forest Land, Cropland, Grassland, Wetland, Settlements, and Other Land).

3) Ministry of Energy and Mine (MEM)

- The MEM provides data for preparing GHG inventory, including the Department of Energy Management, Department of Energy Business, Department of Mines Management, and Institute of Renewable Energy Promotion;
- The MEM provides technical inputs on preparing BTR's report in each chapter, such as National Inventory Report, NDC tracking, and assessment of climate change impact under the guidance of DCC and MONRE;
- The MEM provides data that will be used for estimating GHG emissions, including fuel combustion activities (Energy industries, Manufacturing Industries and Construction, Transport, and Other Sectors), Fugitive Emission from Fuels (Solid Fuels and Oil and Natural Gas), and Carbon dioxide Transport and Storage.

4) Ministry of Industry and Commerce (MOIC) [30] [31]

- The MOIC provides data for preparing GHG inventory, including the Department of Industry and Handicraft, the Department of Import and Export, Domestic and International Trade, and Micro-Small-Medium Enterprise Promotion;
- The data provided by the MOIM to estimate the GHG emissions, including Mineral Industry (Cement production, Lime Production, Glass Production, and Other Process Uses of Carbonates), Chemical Industry, Metal Industry, Non-Energy Products from Fuels and Solvent, Electronic Industry, Product Uses as Substitutes for Ozone Depletion, Other Product Manufacture and Use, and Other;
- Encouraging the use of eco-friendly technologies and infrastructure development to reduce greenhouse gas emissions within the industrial and commerce sectors;
- Research and support business units and utilize environmentally friendly technology in the industry and commerce sector to reduce greenhouse gas emissions and create industry infrastructure that is resilience to climate change;

5) Ministry of Planning and Investment (MPI) [32] [33]

- MPI is responsible for preparing the ODA grant programs/projects in coordination with MOF, MOFA, and other concerned ministries and line agencies;
- Summarize and report the progress of NSEDP and state investment programs implementation to the government regularly;
- Ensuring ODA is aligned with the NSEDP;
- Promote foreign direct investment (FDI) in Lao PDR by offering investment incentives, screening investment proposals, correcting investment data, and monitoring investment practices;
- Lead in development ODA database system by coordination with MOF, MOFA and other concerned ministries and line agencies;
- Lead in implementing, promoting, and monitoring the progress of Development Cooperation around the country according to the single window principle and coordinating with concerned stakeholders regarding the management, inspection, and evaluation of ODA disbursements[34];
- Provide relevant data to MONRE for developing the NDC, NC, and BTR.

6) Ministry of Foreign Affairs (MOFA)

- MOFA is responsible for approving grant programs/ projects that are not ODA. This includes funds from NGOs, associations, foundations, charities, legal entities, and individuals;

7) Ministry of Labor and Social Welfare [35] [36]

- Mainstreaming climate change activity in labor and social welfare;
- Provide and integrate disaster data with climate data of the Ministry of Natural Resource and Environment;
- Support relevant climate and disaster data to MONRE for developing the NDC, NC, and BTR and energy activities;
- Encourage public awareness companions through advocating and dissemination information to the public and communities related to the danger, severe negative impacts from disasters, measures for preparing response, preventing and reducing impacts from disasters.

[30] MONRE, 2022: Handbook for Climate Change Management in Lao PDR for Decision-Maker
[31] 2006 IPCC Software
[32] MONRE, 2022: Handbook for Climate Change Management in Lao PDR for Decision-Maker
[33] Decree on the management and utilization of ODA No. 357/ GO dated 09 October 2019
[34] Decision on the establishment and implementation of DIC No. 2708/ MPI dated 09 November 2017
[35] MONRE, 2022. Handbook for Climate Change Management in Lao PDR for Decision-Maker
[36] MOSWL, 2020: The Law on Disaster Management, Ministry of Social Welfare and Labor, Lao PDR

8) Ministry of Public Health [37] [38]

- Mainstream climate change activities in the Public Health;
- Research the widespread human disease caused by climate change;
- Awareness of the linkage between climate change and health;
- Support relevant GHGs emission and climate data to MONRE for developing the, NDC, NC, and BTR

9). Ministry of Information, Culture and Tourism[39]

- Mainstream climate change activities in Information, Culture, and Tourism;
- Disseminate climate change information through mass media in combination with concerned stakeholders;
- Support relevant data for MONRE in developing the NDC, NC, BTR, and energy activities.

10). Ministry of Public Work and Transport [40] [41]

- Mainstream climate change activity within Public Work and Transport;
- Research and define measures on the Public Works and Transport infrastructure development that are resilience to climate change;
- Encourage the utilization of environmentally friendly technology in Public Work, Transport, and Urban development to reduce greenhouse gas emissions;
- Support relevant data for MONRE in developing the NDC, NC, BTR, and energy activities.

11). Ministry of Finance [42]

- Coordinate with major international organization on loans, debt management, and fiscal policy;
- Mapping climate related expenditures;
- Provide the relevant data on MOF to MONRE.

12). Ministry of Education and Sports [43] [44]

- Improve decree on prevention and controlling of climate change and disaster relevant to education, science, and sports;
- Mainstreaming climate change activities in Education and Sports;
- Research and develop a curriculum on climate change by collaborating with concerned stakeholders;
- Establish national safety schools to meet the international and regional standards;
- Establish a national coordination mechanism in the education sector to address climate change and disaster issues;
- Mobilize international and national funds for employing in preventing and controlling climate change and disasters;
- Enhance cooperation with international and regional in addressing climate change and disaster;
- Support relevant GHG emission and climate data to MONRE for developing the NDC, NC, and BTR and energy activities;

[37] MONRE, 2022: Handbook for Climate Change Management in Lao PDR for Decision-Maker
[38] Government of Lao PDR, 2019: Decree on Climate Change, Vientiane Capital, dated 18 September 2019.
[39] MONRE, 2022: Handbook for Climate Change Management in Lao PDR for Decision-Maker
[40] MONRE, 2022: Handbook for Climate Change Management in Lao PDR for Decision-Maker
[41] Government of Lao PDR, 2019: Decree on Climate Change, Vientiane Capital, dated 18 September 2019.
[42] MONRE, 2022: Handbook for Climate Change Management in Lao PDR for Decision-Maker
[43] MONRE, 2022: Handbook for Climate Change Management in Lao PDR for Decision-Maker
[44] MOES, 2022: Agreement on implementation and movement of Disaster Management and Climate Change in Education and Sport Sector

CHAPTER II: National Inventory Report of Anthropogenic Emissions by Sources and Removals by Sinks of Greenhouse Gases

2.1. Background information on greenhouse gas inventories

This National Inventory Report contains detailed information on Lao PDR's greenhouse gas (GHG) emissions and their removals from 2020 to 2022. The report structure conforms with the Modalities, Procedures, and Guidelines for the Transparency Framework for Action and Support Referred to in Article 13 of the Paris Agreement (MPGs, Decision 18/CMA.1 Annex).

The GHG estimation method was based on the 2006 IPCC Guidelines, developed by the Intergovernmental Panel on Climate Change (IPCC). The annual emission inventories from 2020 to 2022 are reported in the Common Reporting Table (CRT). This CRT report includes each year's emission data, activity data, and implied emission factors. The emission trends are provided for each greenhouse gas and for total greenhouse gas emissions in CO_2 equivalents.

The annual emission inventories for 2020 – 2022 are reported in the Common Reporting Table (CRT). Within this submission, separate CRTs are available at the Department of Climate Change, Ministry of Natural Resource and Environment, and (UNFCCC). The CRT spreadsheet encompasses data on emission, activity data, and applied emission factors for each year. Emission trends are given for each greenhouse gas and total greenhouse gas emissions in CO_2 equivalent. In addition, the CRT comprises trends in greenhouse gas emissions, a description of each emission category, planned improvements, and procedures for quality assurance and control.

2.1.1. Overview of national emission and removal trends (By gas)

The total GHG emission for 2022 in Lao PDR (Excluding LULUCF) was 38,844.04 Gg CO2 eq, in which the highest GHG emission was CO2, accounting for 25,692.19 GgCO2 eq or 66.14% and the lowest GHG emission were HFCs, accounting for 200.02 GgCO2 eq or 0.51%. Since 2020, the amount of CO2 has increased by 10.56 % compared to the emission in 2022 (Figure 10) and (Figure 11).

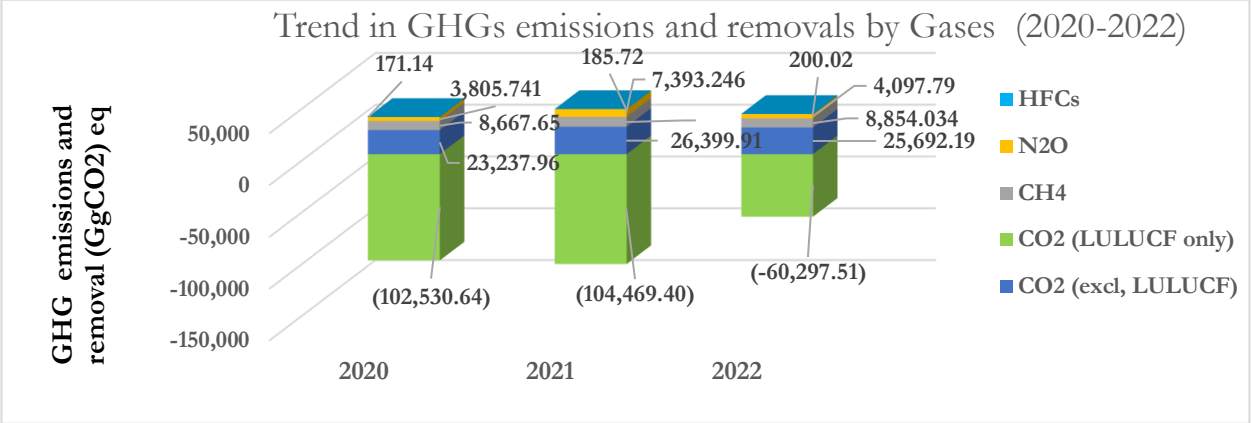


Figure 10: Trends in GHGs Emission and Removals by Gases (Excluding LULUCF) from 2020 – 2022

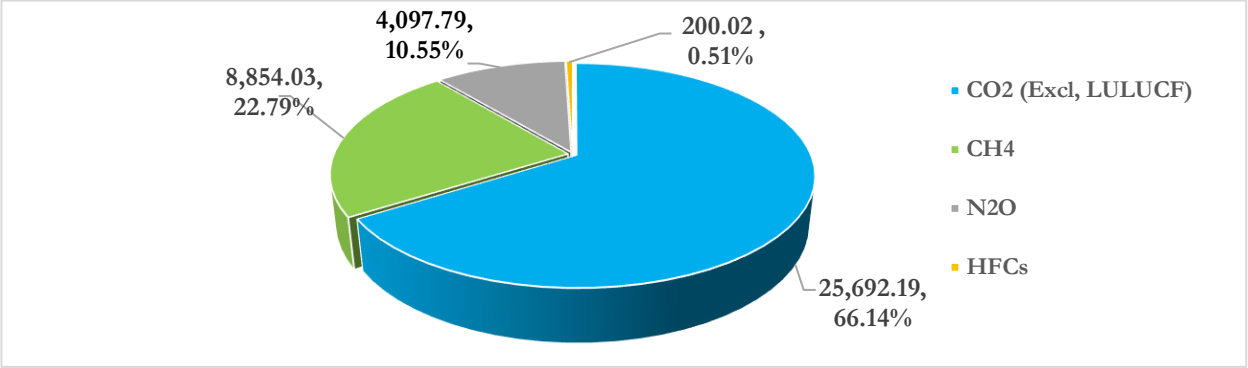


Figure 11: Share of GHGs Emissions and Removals by Gases (Excluding LULUCF) for 2022 in percent (%)

Table 07: Trends in GHG Emission and Removal by Gases, 2020 – 2022

Trends in GHG emission and Removal	2020	2021	2022
CO_2 (Excluding LULUCF)	23,237.96	26,399.91	25,692.19
CO_2 (LULUCF only)	(102,530.64)	(104,469.40)	(60,297.51)
CH_4 (Excluding LULUCF)	8,667.65	8,736.52	8,854.03
CH_4 (Including LULUCF)	8,737.22	9,651.87	8,885.76
N_2O (Excluding LULUCF)	3,805.74	6,751.53	4,097.79
N_2O (Including LULUCF)	3,825.11	7,393.25	4,106.62
HFCs	171.14	185.72	200.02
Total (Excluding LULUCF)	35,882.49	42,073.67	38,844.04
Total (LULUCF only)	(102,530.64)	(104,469.40)	(60,297.51)
Total GHG Removals and Sinks	**(66,648.15)**	**(62,395.73)**	**(21,453.47)**

2.1.2. Overview of national emission and removal trends (By sectors)

The total (Excluding LULUCF) GHG emissions in Lao PDR in 2020, 2021, and 2022 are 35,882.49 (Gg CO_2 eq), 42,073.67 (Gg CO_2 eq), and 38,844.04 (Gg CO_2 eq), respectively while the GHGs emissions and removals from the (LULUCF, Only) in 2020, 2021, and 2022 are (102,530.63) (Gg CO_2 eq), (104,469.39) (Gg CO_2 eq), and (60,297.51) (Gg CO_2 eq), respectively. The total GHGs emissions change from 2020 until 2022 has increased by 8.25% (Figure 12).

In 2022, the GHG emissions by sector present that the energy sector is the largest emission source, accounting for 21,688.98 GgCO_2eq or 55.84%, followed by the agriculture sector, accounting for 10,480.02 GgCO_2eq or 26.98%, the IPPU accounting for 5,226.55 GgCO_2eq or 13.46%, and the Waste sector accounting for 1,448.49 GgCO_2eq or 3.73% (Figure 13). The emission result also shows that Lao PDR is a net sink of (21,453.47) GgCO_2eq, which is derived by total removal from (LULUCF, Only) (60,297.51) Gg CO_2 eq and total (Excluding LULUCF) by 38,844.04 Gg CO_2 eq (Table 08).

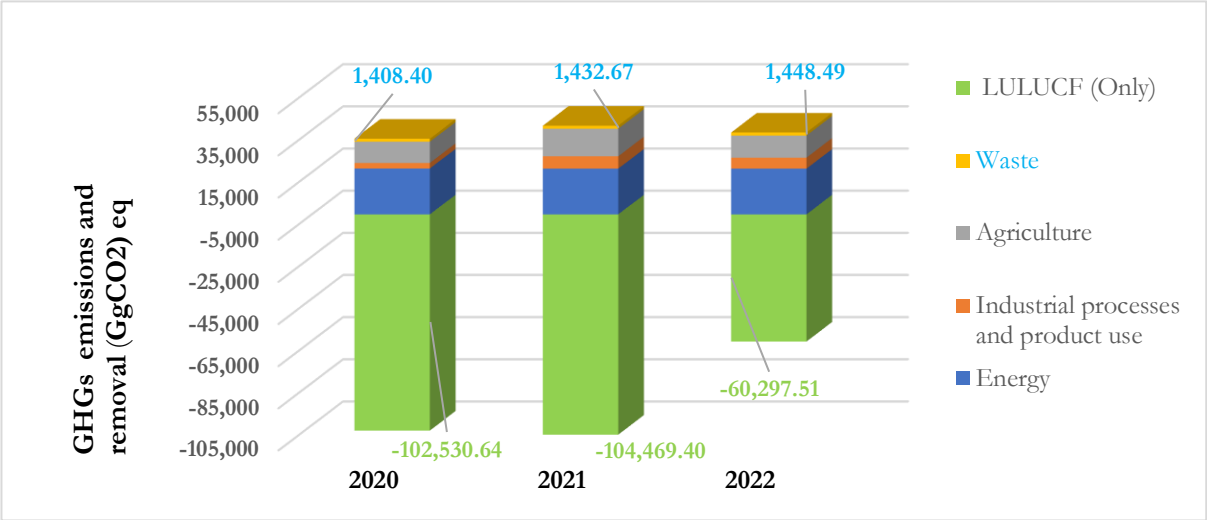


Figure 12: Trend in GHGs Emissions and Removals by Sector from 2020 – 2022

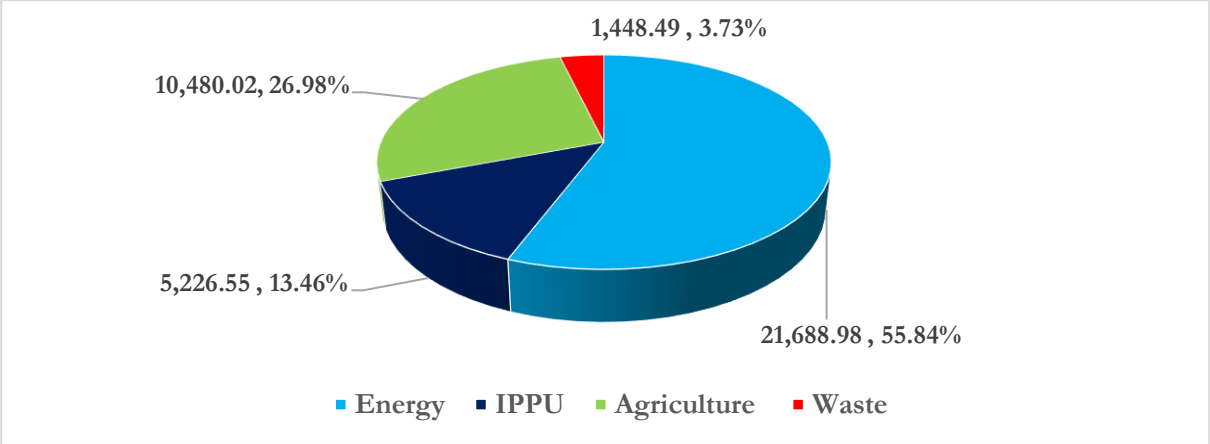


Figure 13: Share of GHGs Emissions and Removals (Excluding LULUCF) by Sector for 2022 in Percent (%)

Table 08: Trends in GHGs Emissions and Removals by Sectors for 2020 – 2022

Source Categories	2020	2021	2022
Energy	21,786.61	21,705.15	21,688.98
Industrial processes and product use	2,606.78	5,849.95	5,226.55
Agriculture	10,080.71	13,085.90	10,480.02
Waste	1,408.40	1,432.67	1,448.49
LULUCF (Only)	-102,530.64	-104,469.40	-60,297.51
Total (Excluding LULUCF)	35,882.49	42,073.67	38,844.04
Total GHGs Removals and Sink	(66,648.14)	(62,395.72)	(21,453.47)

2.2. Brief description of key categories for 2022

The Modalities, Procedures, and Guidelines for the Transparency Framework for Action and Support Referred to in Article 13 of the Paris Agreement (Decision 18/CMA. 1 Annex) require parties to identify key categories by implementing a key category analysis in compliance with the

2006 IPCC Guideline. The key category analyses were done for both data of fiscal year 2022 (The latest year of the inventory time series) and fiscal year 2020 (the start year). The result is presented below:

2.2.1. Key categories analysis

Key category analysis was conducted in a compliance with the 2006 IPCC Guidelines. The Approach 1, Level and Trend assessment has applied for all of the inventory categories. This included both including and excluding of the LULUCF sector. The analysis concluded that, in the case of including the LULUCF sector, there were 57 sources and sinks and 11 key categories for 2022 while excluding LULUCF sector were 48 source and sinks and 14 key categories for 2022.

Based on the Modalities, Procedures, and Guideline for the Transparency Framework for Action and Support Refereed to in Article 13 of the Paris Agreement (Decision 18/CMA.1 Annex), all parties require to analysis key categories based on the 2006 IPCC Guidelines for analyzing a key category. The detailed is presented in (Table 09).

Table 09: Lao PDR Key Categories for 2022, Including the LULUCF sector

NO	A Code	B Category	C GHGs	AP1-L	AP1-T
#1	3.B.1.a	Forest land Remaining Forest land	CO_2	#1	#2
#2	3.B.2.b	Land Converted to Cropland	CO_2	#2	#1
#3	1.A.1	Energy Industries - Solid Fuels	CO_2	#3	#3
#4	3.B.1.b	Land Converted to Forest land	CO_2	#4	#6
#5	2.A.1	Cement production	CO_2	#5	#7
#6	3.B.6.b	Land Converted to Other land	CO_2	#6	#4
#7	3.A.1	Enteric Fermentation	CH_4	#7	#8
#8	3.D.1	Harvested Wood Products	CO_2	#8	#5
#9	3.C.4	Direct N_2O Emissions from managed soils	N_2O	#9	
#10	1.A.3.b	Road Transportation - Liquid Fuels	CO_2	#10	
#11	3.C.7	Rice cultivation	CH_4		
#12	3.A.2	Manure Management	CH_4		
#13	1.A.2	Manufacturing Industries and Construction - Solid Fuels	CO_2		
#14	4.D	Wastewater Treatment and Discharge	CH_4		
#15	3.B.2.a	Cropland Remaining Cropland	CO_2		#9
#16	3.C.5	Indirect N_2O Emissions from managed soils	N_2O		
#17	3.A.2	Manure Management	N_2O		
#18	1.A.4	Other Sectors - Biomass - solid	CH_4		
#19	4.A	Solid Waste Disposal	CH_4		
#20	1.B.1.a	Coal mining and handling	CH_4		
#21	3.B.5.b	Land Converted to Settlements	CO_2		
#22	1.A.2	Manufacturing Industries and Construction - Liquid Fuels	CO_2		
#23	2.F.1	Refrigeration and Air Conditioning	HFCs		
#24	3.C.1	Burning	CH_4		
#25	1.A.4	Other Sectors - Liquid Fuels	CO_2		
#26	1.A.1	Energy Industries - Solid Fuels	N_2O		
#27	3.C.1	Burning	N_2O		
#28	3.C.6	Indirect N_2O Emissions from manure management	N_2O		
#29	1.A.4	Other Sectors - Biomass - solid	N_2O		
#30	4.D	Wastewater Treatment and Discharge	N_2O		
#31	1.A.3.b	Road Transportation - Liquid Fuels	N_2O		
#32	3.B.3.b	Land Converted to Grassland	CO_2		
#33	3.C.3	Urea application	CO_2		
#34	1.A.3.a	Civil Aviation - Liquid Fuels	CO_2		

#35	1.A.3.b	Road Transportation - Liquid Fuels	CH_4		
#36	2.A.2	Lime production	CO_2		
#37	1.A.1	Energy Industries - Solid Fuels	CH_4		
#38	2.C.1	Iron and Steel Production	CO_2		
#39	1.A.2	Manufacturing Industries and Construction - Solid Fuels	N_2O		
#40	1.A.2	Manufacturing Industries and Construction - Solid Fuels	CH_4		
#41	1.A.2	Manufacturing Industries and Construction - Biomass - solid	N_2O		
#42	1.A.2	Manufacturing Industries and Construction - Biomass - solid	CH_4		
#43	3.B.4.b.ii	Land converted to Flooded Land	CO_2		
#44	1.A.1	Energy Industries - Biomass - solid	N_2O		
#45	3.C.2	Liming	CO_2		
#46	1.A.1	Energy Industries - Biomass - solid	CH_4		
#47	1.A.2	Manufacturing Industries and Construction - Liquid Fuels	N_2O		
#48	1.A.2	Manufacturing Industries and Construction - Liquid Fuels	CH_4		
#49	1.A.3.e	Other Transportation - Liquid Fuels	CO_2		
#50	1.A.4	Other Sectors - Liquid Fuels	CH_4		
#51	4.C	Incineration and Open Burning of Waste	CO_2		
#52	2.D	Non-Energy Products from Fuels and Solvent Use	CO_2		
#53	1.A.4	Other Sectors - Liquid Fuels	N_2O		
#54	1.A.3.a	Civil Aviation - Liquid Fuels	N_2O		
#55	1.A.3.e	Other Transportation - Liquid Fuels	N_2O		
#56	1.A.3.a	Civil Aviation - Liquid Fuels	CH_4		
#57	1.A.3.e	Other Transportation - Liquid Fuels	CH_4		

Table 10: Lao PDR Key Categories for 2022, Excluding the LULUCF Sector

No	A Code	B Category	C GHGs	AP1-L	AP1-T
#1	1.A.1	Energy Industries - Solid Fuels	CO_2	#1	#2
#2	2.A.1	Cement production	CO_2	#2	#1
#3	3.A.1	Enteric Fermentation	CH_4	#3	
#4	3.C.4	Direct N_2O Emissions from managed soils	N_2O	#4	#6
#5	1.A.3.b	Road Transportation - Liquid Fuels	CO_2	#5	#7
#6	3.C.7	Rice cultivation	CH_4	#6	#8
#7	3.A.2	Manure Management	CH_4	#7	
#8	1.A.2	Manufacturing Industries and Construction - Solid Fuels	CO_2	#8	
#9	4.D	Wastewater Treatment and Discharge	CH_4	#9	#9
#10	3.C.5	Indirect N_2O Emissions from managed soils	N_2O	#10	
#11	3.A.2	Manure Management	N_2O	#11	
#12	1.A.4	Other Sectors - Biomass - solid	CH_4		
#13	4.A	Solid Waste Disposal	CH_4		
#14	1.B.1.a	Coal mining and handling	CH_4		
#15	1.A.2	Manufacturing Industries and Construction - Liquid Fuels	CO_2		#3
#16	2.F.1	Refrigeration and Air Conditioning	HFCs		
#17	3.C.1	Burning	CH_4		#4
#18	1.A.4	Other Sectors - Liquid Fuels	CO_2		
#19	1.A.1	Energy Industries - Solid Fuels	N_2O		
#20	3.C.1	Burning	N_2O		#5
#21	3.C.6	Indirect N_2O Emissions from manure management	N_2O		
#22	1.A.4	Other Sectors - Biomass - solid	N_2O		
#23	4.D	Wastewater Treatment and Discharge	N_2O		
#24	1.A.3.b	Road Transportation - Liquid Fuels	N_2O		
#25	3.C.3	Urea application	CO_2		
#26	1.A.3.a	Civil Aviation - Liquid Fuels	CO_2		
#27	1.A.3.b	Road Transportation - Liquid Fuels	CH_4		

#28	2.A.2	Lime production	CO_2		
#29	1.A.1	Energy Industries - Solid Fuels	CH_4		
#30	2.C.1	Iron and Steel Production	CO_2		
#31	1.A.2	Manufacturing Industries and Construction - Solid Fuels	N_2O		
#32	1.A.2	Manufacturing Industries and Construction - Solid Fuels	CH_4		
#33	1.A.2	Manufacturing Industries and Construction - Biomass - solid	N_2O		
#34	1.A.2	Manufacturing Industries and Construction - Biomass - solid	CH_4		
#35	1.A.1	Energy Industries - Biomass - solid	N_2O		
#36	3.C.2	Liming	CO_2		
#37	1.A.1	Energy Industries - Biomass - solid	CH_4		
#38	1.A.2	Manufacturing Industries and Construction - Liquid Fuels	N_2O		
#39	1.A.2	Manufacturing Industries and Construction - Liquid Fuels	CH_4		
#40	1.A.3.e	Other Transportation - Liquid Fuels	CO_2		
#41	1.A.4	Other Sectors - Liquid Fuels	CH_4		
#42	4.C	Incineration and Open Burning of Waste	CO_2		
#43	2.D	Non-Energy Products from Fuels and Solvent Use	CO_2		
#44	1.A.4	Other Sectors - Liquid Fuels	N_2O		
#45	1.A.3.a	Civil Aviation - Liquid Fuels	N_2O		
#46	1.A.3.e	Other Transportation - Liquid Fuels	N_2O		
#47	1.A.3.a	Civil Aviation - Liquid Fuels	CH_4		
#48	1.A.3.e	Other Transportation - Liquid Fuels	CH_4		

2.3. Description of GHG emissions and removals by sectors and by gas (Excluding LULUCF)

2.3.1. Carbon dioxide (CO_2)

The largest source of CO_2 emission for 2022 is driven from the Energy sector, covering 20,651.65 ($GgCO_2$ eq) or 80.38 %, followed by IPPU sector, accounting for 5,026.52 ($GgCO_2$ eq) or 19.56% while Agriculture sector is accounted for 13.85 ($GgCO_2$ eq) or 0.05% and Waste sector is accounted for 0.17 ($GgCO_2$ eq) or 0.001 %. The reasons that the source of CO_2 emission increases more than others are because of the higher consumption in Energy industries, manufacturing industries, and construction and transport.

Regarding the trends in 2022 compared to the year 2020, it found that the CO_2 emission from the Energy sector has decreased by 0.66% compared to the year 2020, while the CO_2 emission in the IPPU sector has increased by 106,37%, the agriculture sector has increased by 2.29%, and the Waste sector has increased 112.50% (Figure 14).

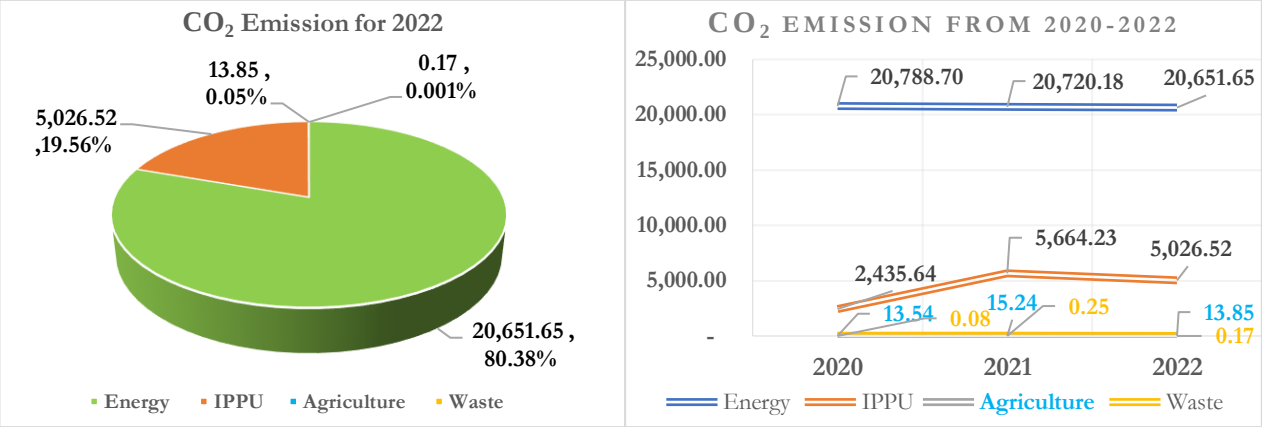


Figure 14: Emission and Removal Trends by CO2 for 2022 and Time Series for 2020 – 2022

2.3.2. Methane (CH_4)

The largest source of CH_4 emission for 2022 is driven by the agriculture sector, comprising 6,5757.24(Gg CO_2 eq) or 74.26 %, followed by the Waste sector, accounting for 1,403.92 (Gg CO_2 eq) or 15.86 % and the Energy sector, accounting for 875.00(Gg CO_2 eq) or 9.88% while there is no CH_4 emission released from the IPPU sector. The main sources of CH_4 emission in the agriculture sector are enteric fermentation, manure management, burning in Forest land, Cropland, Grassland, and Rice cultivation. Regarding the trends from the years 2020 and 2022, it shows that the CH_4 emission in 2022 from the agriculture increased by 1.65% compared to the year 2020, the Energy sector increased by 4.86%, and the Waste sector increased by 2.83% (Figure 15).

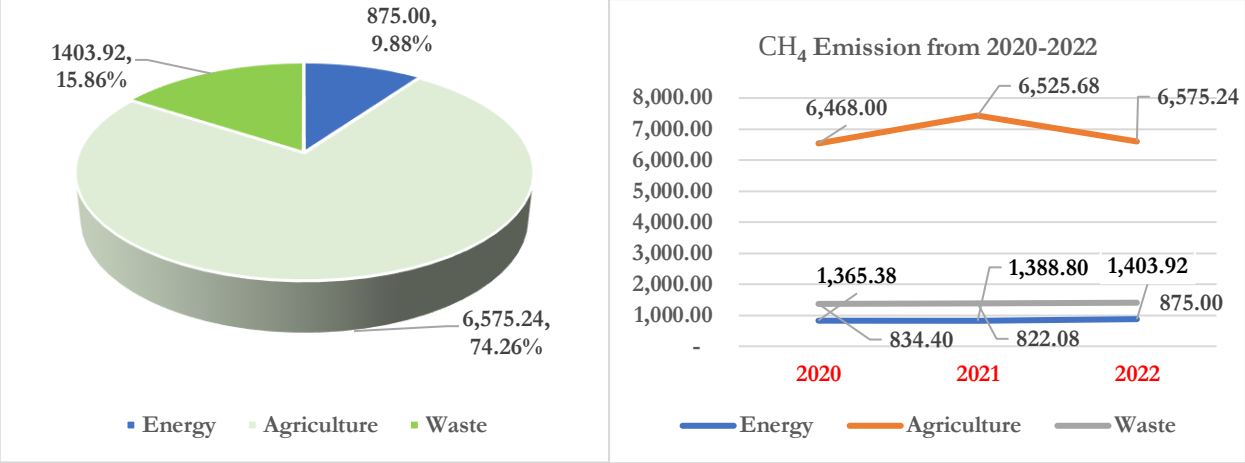


Figure 15: Emission and Removal Trends by CH4 for 2022 and Time Series for 2020 – 2022

2.3.3. Nitrous oxide (N_2O)

The largest source of Nitrous Oxide (N_2O) emission for 2022 is driven by the agriculture sector, encompassing 3,890.20 ($GgCO_2$ eq) or 94.95%, followed by the Energy sector, accounting for 161.65 ($GgCO_2$ eq) or 3.95% and Waste sector, accounting for 45.05 ($GgCO_2$ eq) or 1.1% while there is no Nitrous Oxide (N_2O) emission released from the IPPU sector. The primary sources of nitrogen oxide (N_2O) emission from the agricultural sector are manure management, burning in forest land, cropland, grassland, and rice cultivation. The trends from the years 2020 and 2022 found that the Nitrous Oxide (N_2O) emission in 2022 from the agriculture sector increased by 8.1% compared to the year 2020, the Waste sector increased by 6.25%, and the Energy sector decreased by 1.61% (Figure 16).

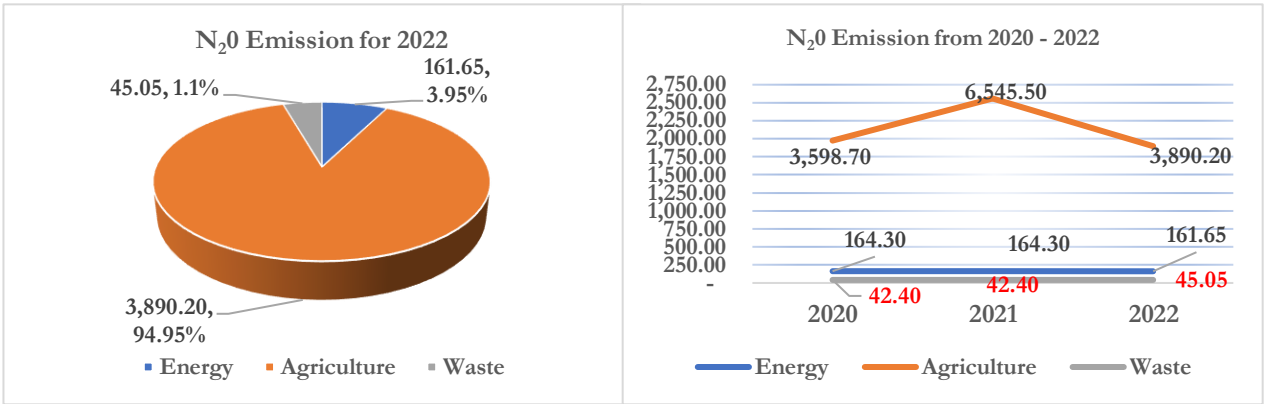


Figure 16: Emission and Removal Trends by (N_2O) for 2022 and Time Series for 2020 – 2022

2.3.4. Hydrofluorocarbons (HFCs)

The total HFCs emission for 2022 was 200.02 $GgCO_2eq$. The change of HFCs increased 16.87 % compared to the year 2020 (Figure 17).

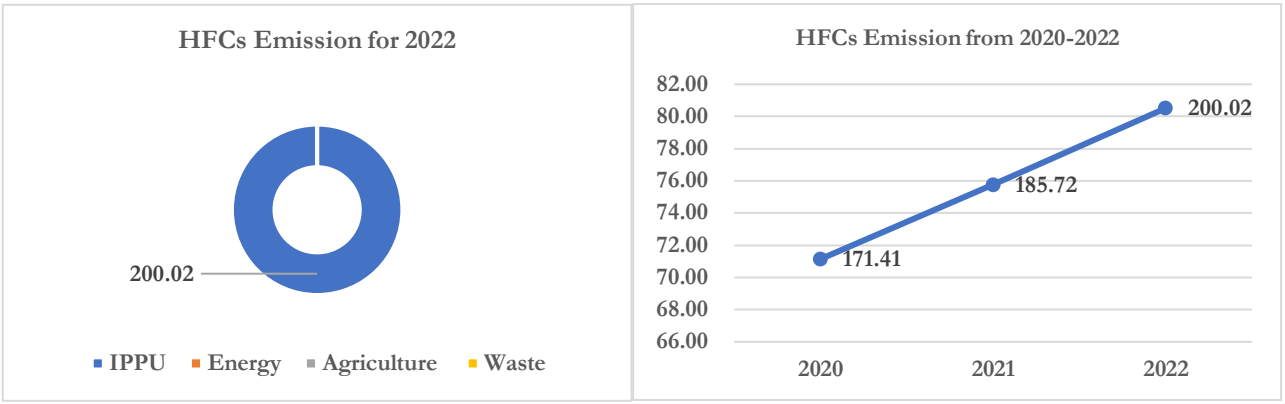


Figure 17: HFCs Emission for 2022 and Time Series for 2020 -2022

2.4. Description of GHG emissions and removals by sectors

The greenhouse gas emissions are computed based on the 2006 IPCC Guidelines and are aggregated into five sectors: Energy, IPPU, Agriculture, LULUCF, and Waste Sector. The greenhouse gases obtained from the mentioned sectors encompassed CO_2, CH_4, N_2O, and HFCs, (Figure 08) presents total greenhouse gas emissions by Sectors excluding LULUCF from 2020 – 2022. In 2022, the Energy sector is the most significant source emission, accounting for 21,688.98 Gg CO_2 eq or 55.84 % followed by Agriculture sector, accounting for 10,480.02 Gg CO_2 eq or 26.98 %, IPPU is accounted for 5,226.55 Gg CO_2eq or 13.46 % and Waste is accounted for 1,448.49 Gg CO_2 eq or 3.73 % (Figure 18).

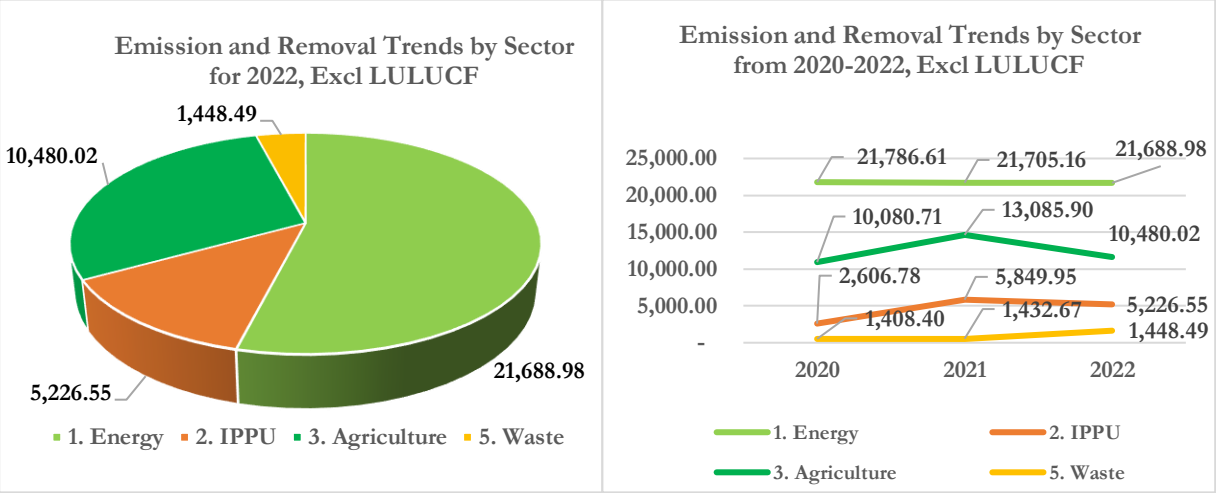


Figure 18: Emission and Removal by Sector for 2022 and Time Series for 2022 – 2022

2.4.1. Energy sector

2.4.1.1. Overview of the energy sector

The greenhouse gas (GHG) emissions in the Energy Sector include CO_2, CH_4, and N_2O. These emissions were estimated from three primary sources: Fuel Combustion Activities (1A), Fugitive Emissions from Fuels (1B), and Carbon Dioxide Transport and Storage (1.C). The total emissions

from the Energy Sector were 21,688.98 $GgCO_2eq$. The largest emission source was CO_2, accounting for 20,651.647 $GgCO_2eq$, followed by CH_4 emissions at 874.88 $GgCO_2eq$, and N_2O emissions at 162.45 $GgCO_2eq$. The GHG emissions in the Energy Sector for 2022 are presented in (Table 11).

Table 11: GHG Emissions from the Energy Sector for 2022

Categories (2022)	Global Warming Potential_ AR5 Emission ($GgCO_2$ eq)			Total GHG emissions
	CO_2	CH_4	N_2O	
Total Energy	**20,651.647**	**874.884**	**162.451**	**21,688.982**
1.A. Fuel combustion activities (sectoral approach)	**20,651.647**	**469.332**	**162.451**	**21,283.431**
1.A.1. Energy industries	16,817.409	5.140	66.790	16,889.338
1.A.1.a. public electricity and heat production	16,817.409	5.140	66.790	16,889.338
1.A.2. Manufacturing industries and construction	1,208.901	4.971	6.866	1,220.737
1.A.2.g. Other	1,208.901	4.971	6.866	1,220.737
1.A.3. Transport	2,546.721	9.399	34.585	2,590.705
1.A.3.a. Domestic aviation	9.939	0.002	0.074	10.014
1.A.3.b. Road transportation	2,536.566	9.397	34.490	2,580.452
1.A.3.c. Railways	NE	NE	NE	NE
1.A.3.d. Domestic navigation	NE	NE	NE	NE
1.A.3.e. Other transportation	0.216	0.000	0.022	0.239
1.A.4. Other sectors	78.617	449.823	54.210	582.650
1.A.4.a. Commercial/institutional	47.136	94.258	11.751	153.145
1.A.4.b. Residential	30.667	355.563	42.375	428.605
1.A.4.c. Agriculture/forestry/fishing	0.815	0.001	0.083	0.900
1.B. Fugitive emissions from fuels	-	**405.551**	-	**405.551**
1.B.1. Solid fuels	-	405.551	-	405.551
1.B.1.a. Coal mining and handling	-	405.551	-	405.551

2.4.1.2. Key categories of the energy sector

Table 12. Key Categories of Energy Sector (Including LULUCF) for 2022

No	A Code	B Category	C GHGs	AP1-L 2022	AP1-T 2020-2022
#3	1.A.1	Energy Industries - Solid Fuels	CO_2	#3	#3
#10	1.A.3.b	Road Transportation - Liquid Fuels	CO_2	#10	
#13	1.A.2	Manufacturing Industries and Construction - Solid Fuels	CO_2		
#18	1.A.4	Other Sectors - Biomass - solid	CH_4		
#20	1.B.1.a	Coal mining and handling	CH_4		
#22	1.A.2	Manufacturing Industries and Construction - Liquid Fuels	CO_2		
#25	1.A.4	Other Sectors - Liquid Fuels	CO_2		
#26	1.A.1	Energy Industries - Solid Fuels	N_2O		
#29	1.A.4	Other Sectors - Biomass - solid	N_2O		
#31	1.A.3.b	Road Transportation - Liquid Fuels	N_2O		
#34	1.A.3.a	Civil Aviation - Liquid Fuels	CO_2		
#35	1.A.3.b	Road Transportation - Liquid Fuels	CH_4		
#37	1.A.1	Energy Industries - Solid Fuels	CH_4		
#39	1.A.2	Manufacturing Industries and Construction - Solid Fuels	N_2O		
#40	1.A.2	Manufacturing Industries and Construction - Solid Fuels	CH_4		
#41	1.A.2	Manufacturing Industries and Construction - Biomass - solid	N_2O		

#42	1.A.2	Manufacturing Industries and Construction - Biomass - solid	CH_4		
#44	1.A.1	Energy Industries - Biomass - solid	N_2O		
#46	1.A.1	Energy Industries - Biomass - solid	CH_4		
#47	1.A.2	Manufacturing Industries and Construction - Liquid Fuels	N_2O		
#48	1.A.2	Manufacturing Industries and Construction - Liquid Fuels	CH_4		
#49	1.A.3.e	Other Transportation - Liquid Fuels	CO_2		
#50	1.A.4	Other Sectors - Liquid Fuels	CH_4		
#53	1.A.4	Other Sectors - Liquid Fuels	N_2O		
#54	1.A.3.a	Civil Aviation - Liquid Fuels	N_2O		
#55	1.A.3.e	Other Transportation - Liquid Fuels	N_2O		
#56	1.A.3.a	Civil Aviation - Liquid Fuels	CH_4		
#57	1.A.3.e	Other Transportation - Liquid Fuels	CH_4		

Note 1: Ap1-L: Approach 1-Level Assessment, Ap1-T: Approach 1-Trend Assessment
Note 2: Figures recorded in the Level and Trend columns indicate the ranking of individual level and trend assessments.

Table 13. Key categories of the Energy Sector (Excluding LULUCF), for 2022

No	A Code	B Category	C GHGs	AP1-L	AP1-T
#1	1.A.1	Energy Industries - Solid Fuels	CO_2	#1	#2
#5	1.A.3.b	Road Transportation - Liquid Fuels	CO_2	#5	#7
#8	1.A.2	Manufacturing Industries and Construction - Solid Fuels	CO_2	#8	
#12	1.A.4	Other Sectors - Biomass - solid	CH_4		
#14	1.B.1.a	Coal mining and handling	CH_4		
#15	1.A.2	Manufacturing Industries and Construction - Liquid Fuels	CO_2		#3
#18	1.A.4	Other Sectors - Liquid Fuels	CO_2		
#19	1.A.1	Energy Industries - Solid Fuels	N_2O		
#22	1.A.4	Other Sectors - Biomass - solid	N_2O		
#24	1.A.3.b	Road Transportation - Liquid Fuels	N_2O		
#26	1.A.3.a	Civil Aviation - Liquid Fuels	CO_2		
#27	1.A.3.b	Road Transportation - Liquid Fuels	CH_4		
#29	1.A.1	Energy Industries - Solid Fuels	CH_4		
#31	1.A.2	Manufacturing Industries and Construction - Solid Fuels	N_2O		
#32	1.A.2	Manufacturing Industries and Construction - Solid Fuels	CH_4		
#33	1.A.2	Manufacturing Industries and Construction - Biomass - solid	N_2O		
#34	1.A.2	Manufacturing Industries and Construction - Biomass - solid	CH_4		
#35	1.A.1	Energy Industries - Biomass - solid	N_2O		
#37	1.A.1	Energy Industries - Biomass - solid	CH_4		
#38	1.A.2	Manufacturing Industries and Construction - Liquid Fuels	N_2O		
#39	1.A.2	Manufacturing Industries and Construction - Liquid Fuels	CH_4		
#40	1.A.3.e	Other Transportation - Liquid Fuels	CO_2		
#41	1.A.4	Other Sectors - Liquid Fuels	CH_4		
#44	1.A.4	Other Sectors - Liquid Fuels	N_2O		
#45	1.A.3.a	Civil Aviation - Liquid Fuels	N_2O		
#46	1.A.3.e	Other Transportation - Liquid Fuels	N_2O		
#47	1.A.3.a	Civil Aviation - Liquid Fuels	CH_4		
#48	1.A.3.e	Other Transportation - Liquid Fuels	CH_4		

Note1: Ap1-L: Approach 1-Level Assessment, Ap1-T: Approach 1-Trend Assessment
Note2: Figures recorded in the Level and Trend columns indicate the ranking of individual level and trend assessments.

2.4.2. Industrial process and production use (IPPU)

2.4.2.1. Overview of the IPPU sector

The greenhouse gas (GHG) emissions in the IPPU sector include CO_2 and HFCs. These emissions were estimated from Cement production, Lime production, Iron and Steel Production, Lubricant use, Paraffin Use, Refrigeration and Stationary Air Conditioning, and Mobile Air Conditioning. The largest gas emitted was CO_2, accounting for 5,026.52 (Gg CO_2 eq), and followed by HFCs emissions at 200.02 (Gg CO_2 eq). The GHG emissions in the IPPU sector for 2022 are presented in (Table 14).

Table 14: GHG Emissions from the IPPU Sector for 2022

Categories 2022	Global Warming Potential_ AR5 Emission (GgCO2 eq)				Total
	CO_2	CH_4	N_2O	HFCs	
2. Industrial processes and product use	**5,026.52**	NA, NO	NA, NO	200.02	**5,226.55**
2.A. Mineral industry	5,022.20				5,022.20
2.B. Chemical industry	NO	NO	NO	NO	0.00
2.C. Metal industry	4.16	NA, NO	NO	NO	4.16
2.D. Non-energy products from fuels and solvent use	0.16	NA, NO	NA, NO		0.16
2.E. Electronic Industry			NO	NO	0.00
2.F. Product uses as ODS substitutes				200.02	200.02
2.G. Other product manufacture and use	NO	NO	NO	NO	0.00
2.H. Other	NO	NO	NO	NO	0.00

2.4.2.2. Key categories of IPPU sector

Table 15 : Key Categories of IPPU (Including LULUCF)

No	A Code	B Category	C GHGs	AP1-L 2022	AP1-T 2020-2022
#5	2.A.1	Cement production	CO_2	#5	#7
#23	2.F.1	Refrigeration and Air Conditioning	HFCs		
#36	2.A.2	Lime production	CO_2		
#38	2.C.1	Iron and Steel Production	CO_2		
#52	2.D	Non-Energy Products from Fuels and Solvent Use	CO_2		

Note 1: Ap1-L: Approach 1-Level Assessment, Ap1-T: Approach 1-Trend Assessment,
Note 2: Figures recorded in the Level and Trend columns indicate the ranking of individual level and trend assessments.

Table 16: Key Categories of IPPU (Excluding LULUCF)

No	A Code	B Category	C GHGs	AP1-L	AP1-T
#2	2.A.1	Cement production	CO_2	#2	#1
#16	2.F.1	Refrigeration and Air Conditioning	HFCs		
#28	2.A.2	Lime production	CO_2		
#30	2.C.1	Iron and Steel Production	CO_2		
#43	2.D	Non-Energy Products from Fuels and Solvent Use	CO_2		

Note 1: Ap1-L: Approach 1-Level Assessment, Ap1-T: Approach 1-Trend Assessment,
Note 2: Figures recorded in the Level and Trend columns indicate the ranking of individual level and trend assessments.

2.4.3. Agriculture sector

2.4.3.1. Overview of the agriculture sector

GHG emissions and removals in the agriculture sector for the inventory year of 2022 were calculated based on the 2006 IPCC Guidelines. The Agriculture Sector consists of the following categories[45].

a. Emission from Livestock (3A);
b. Burning in Cropland (3.C.1.b)
c. Burning in Grassland (3.C.1.c)
d. Liming (3.C.2)
e. Urea application (3.C.3)
f. Direct N_2O emission from managed soil (3.C.4)
g. Indirect N_2O emission from managed soil (3.C.5)
h. Indirect N_2O emission from manure management (3.C.6)
i. Rice cultivation (3.C.7)

The total GHG emissions from the agriculture sector in 2022 were 10,480.02 (Gg-CO_2 eq), in which the emissions from the Enteric Fermentation are the largest emission, accounting for 3,678.04 (Gg-CO_2 eq), followed by Agricultural soils, account for 3,274.42 (Gg-CO_2 eq), and the lowest was Liming, accounting for 0.53 (Gg-CO_2 eq).

Table 17: The total GHG Emission from Agriculture Sectors (Excluding LULUCF) for 2022 (Gg-CO_2eq)

Categories	Global Warming Potential AR5 Emission for 2022 (Gg-CO2eq)			Total
	Net CO2 emissions	CH_4	N_2O	
3. Agriculture	**13.85**	**6,575.16**	**3,891.02**	10,480.02
3.A. Enteric fermentation	0.00	3,678.04		3,678.04
3.B. Manure management	0.00	1,036.33	561.56	1,597.90
3.C. Rice cultivation	0.00	1,754.79		1,754.79
3.D. Agricultural soils	0.00		3,274.43	3,274.43
3.E. Prescribed burning of savannahs	0.00	46.90	40.53	87.43
3.F. Field burning of agricultural residues	0.00	59.09	14.50	73.59
3.G. Liming	0.54	0.00		0.54
3.H. Urea application	13.31	0.00	0.00	13.31
3.I. Other carbon-containing fertilizers		0.00		0.00
3.J. Other				0.00

2.4.3.2. Key categories of agriculture

Table 18: Key Categories of the Agriculture Sector (Including LULUCF)

No	A Code	B Category	C GHGs	AP1-L 2022	AP1-T 2020-2022
#7	3.A.1	Enteric Fermentation	CH_4	#7	#8
#8	3.D.1	Harvested Wood Products	CO_2	#8	#5
#9	3.C.4	Direct N_2O Emissions from managed soils	N_2O	#9	
#11	3.C.7	Rice cultivation	CH_4		
#12	3.A.2	Manure Management	CH_4		

[45] In this BTR, the category codes according to the 2006 IPCC Guidelines are used.

#16	3.C.5	Indirect N_2O Emissions from managed soils	N_2O		
#17	3.A.2	Manure Management	N_2O		
#24	3.C.1	Burning	CH_4		
#27	3.C.1	Burning	N_2O		
#28	3.C.6	Indirect N_2O Emissions from manure management	N_2O		
#33	3.C.3	Urea application	CO_2		
#45	3.C.2	Liming	CO_2		

Note1: Ap1-L: Approach 1-Level Assessment, Ap1-T: Approach 1-Trend Assessment
Note2: Figures recorded in the Level and Trend columns indicate the ranking of individual level and trend assessments.

Table 19: Key Categories of Agriculture Sector (Excluding LULUCF)

No	A Code	B Category	C GHGs	AP1-L	AP1-T
#3	3.A.1	Enteric Fermentation	CH_4	#3	
#4	3.C.4	Direct N_2O Emissions from managed soils	N_2O	#4	#6
#6	3.C.7	Rice cultivation	CH_4	#6	#8
#7	3.A.2	Manure Management	CH_4	#7	
#10	3.C.5	Indirect N_2O Emissions from managed soils	N_2O	#10	
#11	3.A.2	Manure Management	N_2O	#11	
#17	3.C.1	Burning	CH_4		#4
#20	3.C.1	Burning	N_2O		#5
#21	3.C.6	Indirect N_2O Emissions from manure management	N_2O		
#25	3.C.3	Urea application	CO_2		
#36	3.C.2	Liming	CO_2		

2.4.4. Land use, land-use change and forestry (LULUCF) sector

2.4.4.1. Overview of the sector

The land use, land use change, and forestry (LULUCF) sector address with greenhouse gas (GHG) emissions and removal resulting from the forestry activities and land use change. The GHG emissions and removal occurs in this sector compromise carbon stock changes in five carbon pools, such as living aboveground biomass, living below ground biomass, dead organic matter in wood, dead organic matter in litter, and soil organic matter. The LULUCF Sector consists of the following categories:

- Forest land (3.B.1);
- Cropland (3.B.2);
- Grassland (3.B.3.);
- Wetland (3.B.4);
- Settlement (3.B.5);
- Other land (3.B.6)
- Harvested wood products (3.D)

LULUCF comprise both sources and sinks. The net removals for 2022 were -21,453.47 Gg CO_2 eq. The change of net removal was decreased 67.81% compared to the year 2020.

Table 20: Total Net Removals and Sinks for LULUCF, 2020 - 2022 (Gg- CO2 eq)

Category	2020	2021	2022
4. Land use, land-use change and forestry	**-102,530.64**	**-104,469.40**	**-60,297.51**
4.A. Forest land	-102,426.54	-101,103.47	-99,566.97
4.B. Cropland	-1,003.30	-1,003.30	37,458.47
4.C. Grassland	-0.22	-0.22	20.24

4.D. Wetlands	0.00	0.00	1.30
4.E. Settlements	0.00	0.00	317.67
4.F. Other land	1,040.70	1,040.70	4,157.45
4.G. Harvested wood products	-141.27	-3,403.10	-2,685.68
4.H. Other	NO	NO	NO

2.4.4.2. Key categories in LULUCF

Table 21: Key Categories of LULUCF Sector (Including LULUCF)

No	A Code	B Category	C GHGs	AP1-L 2022	AP1-T 2020-2022
#1	3.B.1.a	Forest land Remaining Forest land	CO_2	#1	#2
#2	3.B.2.b	Land Converted to Cropland	CO_2	#2	#1
#4	3.B.1.b	Land Converted to Forest land	CO_2	#4	#6
#6	3.B.6.b	Land Converted to Other land	CO_2	#6	#4
#8	3.D.1	Harvested Wood Products	CO_2	#8	#5
#15	3.B.2.a	Cropland Remaining Cropland	CO_2		#9
#21	3.B.5.b	Land Converted to Settlements	CO_2		
#32	3.B.3.b	Land Converted to Grassland	CO_2		
#43	3.B.4.b.ii	Land converted to Flooded Land	CO_2		

Note1: Ap1-L: Approach 1-Level Assessment, Ap1-T: Approach 1-Trend Assessment

Note2: Figures recorded in the Level and Trend columns indicate the ranking of individual level and trend assessments.

2.4.5. Waste sector

2.4.5.1. Overview of waste sector

The GHG in the WASTE sector encompass CO_2, CH_4, and N_2O. Those emission were estimated from different sources: Solid Waste Disposal (4.A), Biological Treatment of Solid Waste (4.B), Incineration and Open Burning of Waste (4.C), and Wastewater Treatment and Discharge (4.D).

The total emission in the WASTE sector is 1,448.49 ($GgCO_2eq$), in which the largest emission from CH_4 with the amount of 1,403.99 ($GgCO_2eq$) while the second largest source are from N_2O with the amount of 44.32 ($GgCO_2eq$) and the least emission source are from CO_2 with the amount of 0.17($GgCO_2eq$). The detail of the GHG emission in the WASTE sector for 2022 are presented in (Table 22).

Table 22: GHG Emission of Waste Sector for 2022

Categories	Global Warming Potential Values (AR5) Emission ($GgCO_2eq$)			
	CO_2	CH_4	N_2O	Total
4 - Waste	**0.17**	**1,403.99**	**44.32**	**1,448.49**
4.A - Solid Waste Disposal	-	423.31	-	423.31
4.A.1 - Managed Waste Disposal Sites	-	NE	-	-
4.A.2 - Unmanaged Waste Disposal Sites	-	410.21	-	410.21
4.A.3 - Uncategorized Waste Disposal Sites	-	13.10	-	13.10
4.B - Biological Treatment of Solid Waste	-	-	-	-
Composting	-	NE	NE	-
Anaerobic digestion at biogas facilities	-	NE	NE	-
Other	-	NE	NE	-
4.C - Incineration and Open Burning of Waste	0.17	-	-	0.17
4.C.1 - Waste Incineration	0.17	-	-	0.17
4.C.2 - Open Burning of Waste	NA	NE	NE	-
4.D - Wastewater Treatment and Discharge	-	980.68	44.32	1,025.01
4.D.1 - Domestic Wastewater Treatment and Discharge	-	267.96	44.32	312.29
4.D.2 - Industrial Wastewater Treatment and Discharge	-	712.72	IE	712.72

4.E - Other (please specify)	NE	NE	NE	-

2.4.5.2. Key categories of waste sector

Table 23. Key Categories of Waste Sector (Including LULUCF)

No	A Code	B Category	C GHGs	AP1-L 2022	AP1-T 2020-2022
#14	4.D	Wastewater Treatment and Discharge	CH_4		
#19	4.A	Solid Waste Disposal	CH_4		
#30	4.D	Wastewater Treatment and Discharge	N_2O		
#51	4.C	Incineration and Open Burning of Waste	CO_2		

Table 24. Key Categories of Waste Sector (Excluding LULUCF)

No	A Code	B Category	C GHGs	AP1-L	AP1-T
#9	4.D	Wastewater Treatment and Discharge	CH_4	#9	#9
#13	4.A	Solid Waste Disposal	CH_4		
#23	4.D	Wastewater Treatment and Discharge	N_2O		
#42	4.C	Incineration and Open Burning of Waste	CO_2		

Note1: Ap1-L: Approach 1-Level Assessment, Ap1-T: Approach 1-Trend Assessment**Note2:** Figures recorded in the Level and Trend columns indicate the ranking of individual level and trend assessments.

CHAPTER III: Information Necessary to Track Progress Made in Implementing and Achieving Nationally Determined Contributions Under Article 4 of the Paris Agreement

3.1. Description of a party's national determined contribution under article 4 of the paris agreement, including updates

3.1.1. Lao PDR's national and sectoral NDC mitigation targets

As part of the Paris Agreement, Lao PDR was one of the nations that submitted its nationally determined contributions (NDCs) to the UNFCCC in October 2015. In compliance with the Paris Agreement (Article 4, paragraph 2), which mandates that every Party prepare, communicate, and maintain successive NDCs that intend to achieve their goals, the Lao PDR's NDC detailed both unconditional and conditional domestic contributions to the international climate change effort, which covered the AFOLU, Energy, Transport, and Waste sectors.

National GHG mitigation target

Lao PDR established an unconditional mitigation target of a 60% reduction in national GHG emissions in 2030 (or around 62,000 $ktCO_2e$ in absolute terms) compared to projected 2030 GHG emissions in the baseline scenario. This national target demonstrates the enhanced contribution of the country to the Paris Agreement, considering the 34% GHG emission reductions compared to the baseline scenario achieved in 2020 [46]

Sectoral GHG mitigation target

In addition to the national GHG mitigation target, Lao PDR has established several sector-specific GHG mitigation targets. These sector-specific targets are described in the subsections below for each sector. Each subsection summarizes the individual mitigation targets for a sector and the expected GHG emission reductions or removals that are expected to result from the achievement of each of the mitigation targets.

3.1.1.1. Energy Sector

Lao PDR has substantial untapped renewable energy resources. It has not only hydropower but also solar, wind, and biomass. Due to the comparatively low cost of fuelwood and electricity, energy efficiency has not been a priority. It is indicated that the development of new hydropower plants has significantly contributed to mitigating the emissions of greenhouse gases over the past decades. In addition, new coal plants have also been built to diversity the grid mix. The unconditional and condition detailed are presented in (Table 25).

Table 25: Unconditional and conditional mitigation targets for the Energy sector [47]

Unconditional Targets		
	Mitigation target (2020-2030)	Emissions reduction ($ktCO_2e$ /year)
Hydropower	13 GW total hydropower capacity (domestic and export use) in the country	**2,500**

[46] MONRE, 2021: National Determined Contribution (NDC), Page 5 and Page 6, Lao PDR
[47] MONRE, 2021: National Determined Contribution (NDC), Page 5 and Page 6, Lao PDR

Energy Efficiency	Introduction of 50,000 energy efficient clean cook stoves	50
Conditional Targets		
	Mitigation target (2020-2030)	Emissions reduction ($ktCO_2e$ /year)
Other Renewables	Solar and wind: 1 GW installed capacity in the country	100
	Biomass: 300 MW installed capacity, including through utilization of agricultural residues to reduce slash and burn practices and air pollution	84
Energy Efficiency	10% reduction of final energy consumption compared to business-as-usual scenario	280

3.1.1.2. Transport sector

According to the first updated NDC, the transport sector's unconditional and conditional targets are identified in the following table:

Table 26: Unconditional and conditional mitigation targets on transport sector [48]

Unconditional Targets		
	Mitigation target (2020-2030)	Emissions reduction ($ktCO_2e$ /year)
Transport	New Bus Rapid Transit system in Vientiane Capital and associated Non-Motorized Transport (NMT) component	25
	Lao-China Railway	300
Conditional Targets		
	Mitigation target (2020-2030)	Emissions reduction ($ktCO_2e$ /year)
Transport	30% Electric Vehicles penetration for 2-wheelers and passengers' cars in national vehicles mix	30
	Biofuel to meet 10% of transport fuels	29

3.1.1.3. AFOLU sector

Forest and forest resources are paramount in contributing to national socio-economic development, environmental protection, and biodiversity conservation. In addition, it also plays a significant role in addressing climate change as it has substantial potential for carbon sequestration [49]. Based on the first update of NDC in 2021, two sets of targets were defined: unconditional and conditional targets. The details are presented below [50]

Table 27: Unconditional and conditional mitigation targets for the AFOLU sector

Unconditional Targets		
	Mitigation target (2020-2030)	Emissions reduction ($ktCO_2e$ /year)

[48] MONRE, 2021: National Determined Contribution (NDC), Page 5 and Page 6, Lao PDR
[49] MAF, 2021: National REDD+ Strategy, Ministry of Agriculture and Forestry, Page 1, Lao PDR
[50] MONRE, 2021: National Determined Contribution (NDC), Page 5 and Page 6, Lao PDR

Land Use Change and Forestry	-4.5%/year average CO_2 emissions through reduced emissions from deforestation and forest degradation, foster conservation, sustainable management of forests, and enhancement of forest carbon stocks [51]	1,100
Conditional Targets		
	Mitigation target (2020-2030)	Emissions reduction ($ktCO_2e$ /year)
Land Use Change and Forestry	Increased forest cover to 70% of the total land area (i.e., to 16.58 million hectares) through reduced emissions from deforestation and forest degradation, forest conservation, sustainable management of forests, and enhancement of forest carbon stocks or REDD+	45,000
Agriculture	50,000 hectares using adjusted water management practices in lowland rice cultivation	128

3.1.1.4. Waste sector

Only one conditional target for the waste sector is identified, as shown in the table below:

Table 28: Conditional mitigation targets for the Waste sector [52]

Conditional Targets		
	Mitigation target (2020-2030)	Emissions reduction($ktCO_2e$ /year)
Waste	Implementation of 500 tons/day sustainable municipal solid waste management in Vientiane Capital	40,000

3.2. Information necessary to track progress made in implementing and achieving nationally determined contributions under article 4 of the paris agreement

3.2.1. Energy sector

3.2.1.1. Unconditional target for energy sector

a) Hydropower: 13 GW total hydropower capacity (domestic and export use) in the country

It was indicated that a total installed capacity of 4.5 GW in Lao PDR in 2018. This was increased up to 9.6 GW of total installed capacity from hydropower (81 installed hydropower plants) or about 82.45% of total country energy production. In addition, there have been about 70 projects, which consist of over 5 MW capacity projects, under construction and start generating electricity for domestic consumption and exports. Together, these assessments provide 9.7 GW of capacity, with the potential for electricity production capacity at 46,045 GWh/year. This increase demonstrates that the energy sector is on track to achieve its NDC target, potentially before 2030, with about 3.3 GW of capacity remaining to achieve the NDC. According to the statistics of Energy and Mines 2022, the sources of electricity through the system of Électricité du Laos with

[51] MONRE, 2023: Nationally Determined Contributions Implementation Plan of Lao PDR, Page 9.
[52] MONRE, 2021: National Determined Contribution (NDC), Page 6, Lao PDR

an installed capacity of 1 MW or more are comprised of 94 projects, including 81 hydropower plants.

b). Energy Efficiency: Introduction of 50,000 energy efficient clean cook stoves with emission reduction target 50 ktCO_2e /year.

According to the most recent report on September 2024 from the Lao government, only 300 cookstoves were produced and distributed for pilot project to local villagers in seven districts in Vientiane Capital since the project started in 2019. The local villagers have been using these energy-efficient, clean cookstoves. It is suggested that a clean cookstove can reduce GHGs of 2,09 tCO_2e /year or 627 tCO_2e /year in total. However, this energy efficiency is falling short of the target set in NDC 2020, reaching only 0.6% of its target so far. Key influential factors include the project's inability to conduct key activities during the COVID-19 pandemic (the project was implemented between 2019 and 2023), the government's inability to produce, transport, and distribute the clean cookstoves within three targeted provinces: Vientiane Capital, Savannakhet, and Champasak, and finally the budget from the World Bank and donors is unable to resume. The latest progress report from the World Bank on the cook stoves project does not bring forward any emission reductions as of February 2022. Nevertheless, the project implementation is rated as 'satisfactory'. Moreover, it is highlighted that energy efficiency has not been a priority due to relatively low-cost electricity and fuelwood prices. Therefore, reaching the NDC target is considered unlikely to be achieved. It was suggested that this target shall be moved from unconditional to conditional section in the next revision of the NDC. Future plans of the energy sector are to continue to cooperate with SNV. It is updated that the Lao government has completed the signing of the MOU to continue the work of the clean cookstoves, as well as creating supported regulations to promote and find other sources of funding.

3.2.1.2. Conditional target for other renewable energy

a). Solar and Wind: 1 GW installed capacity with emission reduction target 100 ktCO_2e /year.

According to the consultations and national statistics yearbook, it is reported that in 2022, there were a total of 8 solar power plants, which have the capacity of 56 MW. This solar energy produces about 93.07 GWh/year, or an average of 0.48% of the country's total energy. This is expected to increase in 2024, when there will be a total of 12 solar power plants able to provide a capacity of 73 MW. It is highlighted that its energy production could reach 108.92 GWh/year, or an average of 0.62% of the country's total energy. In addition, more projects are expected to be further developed before 2026 with an installed capacity of 1 GW, with an energy that can produce 2,901 GWh/year. For wind power, there is a 600 MW Monsoon Wind Farm project, with costs of 1 billion USD from 2022-2047 (25-year project), which is able to reduce about 1,400,000 **t**CO_2e /year during the project lifetime. Moreover, there is a 1.2 GW wind farm project in Lao PDR. This project construction cost is about 2.15 billion USD and is expected to be completed by the end of 2025. Electricity will be produced from wind power and used domestically, as well as exported to Vietnam. Finally, there is also a project under ongoing feasibility study from the ADB. The most updated official figure indicated that there will be 8 solar power plants in 2022.

b). Biomass: 300 MW installed capacity, including through utilization of agricultural residues to reduce slash and burn practices and air pollution with emission reduction target 84 ktCO_2e /year.

There was a project on reducing GHG emissions in the industrial sector through palletization technology in Lao PDR - this project was designed to contribute to sustainable energy in the Lao PDR, which aimed to promote the production and use of biofuels in the industry between 2015-2022. The 8 million USD project is estimated to reduce GHGs by 182,455 tCO_2 over 15 years or

12,163 tCO_2/year. In 2024, it is reported that there are a total of 4 biomass power plants with 112 MW, which could produce energy around 702.71 GWh/year, or an average of 0.92% of the total energy. This can reach about 37.3% of the NDC target. In addition, there are also projects to be completed before 2026 with an installed capacity of 1,020 MW, which can produce 2,901.01 GWh/year.

C). Energy efficiency: 10% reduction of final energy consumption compared to business as-usual scenario with the emission reduction target 280 KtCOe/year

Regarding this NDC target, there is no progress. The Government of the Lao PDR, especially the Ministry of Energy and Mines (MEM), has continuously encouraged the effective use of energy to lower the peak load as part of demand-side management, even though no projects related to energy efficiency are now underway or planned. According to the National Energy Strategy, it is indicated that the government aims to reduce the energy consumption in the industrial sector, residential and office buildings, as well as in the transport sector by 10% in 2030 through the use of energy-saving and energy-efficiency appliances and motors (for factories and vehicles). However, this goal may be challenged by the growing number of factories, residential buildings, and urban development, which increase dependency on fossil fuel-powered vehicles in the lack of public transportation. At this stage, only regulations and instructions have been developed to promote its efforts, such as an official agreement on energy efficiency and its practices, instruction on energy saving for residential and factories, and creating public awareness for energy efficiency. These regulations have been developed and have progressed by about 30%. The most progressive is a regulation on air conditioning, already completing about 90%.

3.2.2. Transport sector

3.2.2.1. Unconditional target for transport sector

a). New Bus Rapid Transit System in Vientiane Capital and associated Non-Motorized Transport (NMT) Component with emission reduction target 25 ktCO_2e /year

Under the NDC target 2030, the Lao PDR shall improve the "New Bus Rapid Transit system in Vientiane Capital and associated Non-Motorized Transport (NMT) component." Currently, the Vientiane Capital Sustainable Urban Transport Project is under development, and is expected to reduce 25,000 tCO_2e /year. This Project aims to improve the quality of life in Vientiane by improving access and mobility. The Project will achieve its targets by establishing a sustainable urban transport agency, a high-quality public bus transport system, a parking management system, and a national electronic vehicle registration system and by improving traffic management and accessibility for pedestrians and non-motorized transport. The construction of bus routes and bus stations, known as Bus Rapid Transit (BRT) under the Vientiane Sustainable Urban Transport Project, started construction in 2023. In the 2024 the project is about 63% complete. The project involves creating a transportation management system in the city, improving public bus services, and developing a BRT and better traffic management system. The proposed BRT project has a distance of ~66 km total, including three contracts: BRT A is 24.35 km, BRT B is 28.50 km, and BRT D is 12.90 km, including a route through the centre of the capital, Vientiane, connecting the Wattay International Airport with the National University of Laos. The introduction of electric buses will reduce greenhouse gas emissions by 5,817 tCO_2e per year and 93,070 tCO_2e over the life of the 16-year Project. The Asian Development Bank (ADB) has approved a loan of 35 million USD, including a loan of 15 million USD by the OPEC Fund for International Development and A loan of 20 million USD by the European Investment Bank (EIB).

b). Lao-China Railway with emission reduction target 300 K tCO_2e /year

Under the NDC target 2030, the Lao PDR shall also develop the Laos-China Railway, which expects to reduce emissions by 300,000 tCO_2e /year. The Lao-China Railway is part of China's Belt and Road Initiative. The project helps connect Lao PDR to other trade partners. It also helps attract foreign investment and enhance Lao PDR's economy, including trade and tourism. Additionally, the electrified high-speed railway was designed to contribute to emission reductions in the transport sector. The Laos-China Railway construction project started in 2016 and was 100% completed on December 3rd, 2021, with a budget of 6 billion dollars. Since its opening, the Lao-China Railway (LCR) has played an important role in the transformation of Laos and connects the regional countries. The railway has grown significantly, carrying about 3.1 million passengers on average. There are 4,889 passengers/day and 10,917 passengers/day during the peak period. The railway has a 103.7 % increase in passenger traffic by 2023, with more than 1.75 million passengers traveling from January to September.

3.2.2.2. Conditional target for transport sector

a). 30% Electric Vehicles penetration for 2- wheelers and passengers' cars in national vehicles mix with emission reduction target 30 K tCO_2e /year

The government's strategy is to increase electric vehicle EVs by 1% or 20,000 in 2025. As of 2024, Lao PDR has made significant progress towards this target, registering 24,426 EVs, which surpasses the 2025 goal of 20,000 EVs by 22.13% and archived only 12.2 % of the 2030 goal. This milestone highlights the country's commitment to decarbonizing its transport sector.

There are more than 74 charging stations nationwide, and 27 car dealers have expressed interest in importing more electric cars to sell nationwide. This leads to an excellent incentive for Lao people to shift to EVs. However, some concerns need to be considered due to the lack of charging stations. This is a significant challenge preventing people from purchasing and shifting to EVs. According to MEM, most EV charging stations are distributed through only Vientiane and major cities in Lao PDR. In addition, limited automotive manufacturing and lack of user experience are also major challenges to increasing EV penetration in the national vehicle mix. Hence, to raise EV consumption to meet the 30% target, the government should support the development of incentive policies for EV deployment, technical capacity buildings, and communication campaigns to raise awareness of EVs.

b). Biofuel to meet 10% of transport with the emission reduction target 29 K tCO_2e /year

The current status of this target is considerably lower than expectations. By 2022, there was a Premium Alternative Fuel Helimax project for 12 years, with a project cost of 20 million USD. This project is expected to help the Lao PDR reduce its dependence on imported petrol. This 12-year biofuel project aims to allow the country to produce 500,000 litters of biofuel per day, equal to 12.5 million litters per month. This project aimed also to help the country to cope with shortages or financial difficulties caused by the increase in global oil prices. Only three companies have started trials, which can only produce 40 million litters or only 1% of what can be achieved. In conclusion, this estimate has a great deal of uncertainty because this is the only biofuel processing plant now under construction, and no other biofuel projects have been started at the Lao PDR.

3.2.3. AFOLU sector

3.2.3.1. Unconditional target for AFOLU sector

a). Land use change and forestry

- 4.5%/year average CO_2 emissions through reduced emissions from deforestation and forest degradation, foster conservation, sustainable management of forests, and enhancement of forest carbon stocks with the emission reduction target 1,100 K tCO_2e /year.

In order to track this target, average annual GHG emissions (tCO_2e /yr) were used as a key indicator. It was suggested that Lao PDR has successfully implemented more than 10 projects with a total funding volume of USD 190.5 million as of early 2023. According to the most recent report of the DoF, it was indicated that approximately 3,204,614 tCO_2e was removed from 2019-2021[53], or 1,068,205 tCO_2e annually, via the project on "Promoting REDD+ through Governance, Forest Landscapes and Livelihoods in Northern Lao PDR." The data was estimated by using available satellite images for forest cover and national forest inventory (NFI) data conducted by FIPD, DoF, and Japanese experts. This was a successful contribution from the implementation of the Lao PDR Emission Reductions Programme through improved governance and sustainable forest landscape management (I-GFLL Project) in the six provinces in the north of Laos. Another assessment showed that the project contributed to reducing GHG emissions by approximately 5,000,000 tCO_2e for the year 2022-2024 (3 years) or about 1,666,667 tCO_2e /year (See Common Tabula Format-CTF 4). However, this assessment was conducted using an independent body's MRV process. The most important projects are "Scaling up the Implementation of the Lao PDR Emission Reductions Program through Improved Governance and Sustainable Forest Landscape Management" and "Lao Landscapes and Livelihoods Project (LLL)" The objectives of these projects consist of promoting sustainable forest management, improving protected area management, and enhancing livelihood opportunities in selected landscapes in Lao PDR. The project aims to achieve different outcomes, including building natural capital from improved forest landscape management, strengthening sustainable forest management and landscape restoration, improving smart livelihood opportunities, strengthening institutions, policies, incentives, and information for sustainable forest landscapes, and maintaining project management and monitoring, with a budget of 57 million USD for 7 years from 2021-2027. This project has been under implementation, and it is expected to contribute to emission reductions of 10,000,000 tCO_2e over the project's lifetime. Therefore, GHG emissions reductions from these projects combined would yield at least 18,200,000 tCO_2e reductions in total over the 10-year NDC implementation period or 1,820,000 tCO_2e on average annually, thus meeting and exceeding the 2030 unconditional target. However, there is a need to monitor on an annual basis due to the very nature of tree growth, and it is then recommended to strengthen the capacity of the government implementing agency to monitor, report, and verify their sequestration performance as part of the project implementation on an annual or bi-annual basis, rather than only at the end of the projects, to reduce the risk of underperformance. Thus, this has concluded that the Lao PDR has been achieving as defined targets**.**

3.2.3.2. Conditional target for AFOLU sector

a). Land Use Change and Forestry:

Increased Forest cover to 70% of the total land area (i.e., to 16.58 million hectares) through reduced emissions from deforestation and forest degradation, forest conservation, sustainable

[53] AENOR INTERNACIONAL S.A.U, 2023: Forest Carbon Partnership https://www.forestcarbonpartnership.org/sites/default/files/documents/verification_report_lao_pdr_1.4_26102023.pdf

management of forests, and enhancement of forest carbon stocks or REDD+ with the emission target reduction 45,000 tCO_2e /year.

According to the most recent official national forest mapping, under the Forest Inventory and Planning Division (FIPD), DoF, MAF, forest cover was 48% in 2010 and increased to 57% by 2022, or around 13,142,040 ha of total forest cover. This implies that Lao PDR has about 13% of the remaining land to increase forest cover and achieve the NDC target in 2030 or 2035, according to the GoL's national forest strategy. Additionally, there are about 27.1% or 6,245,493 ha that could be potential forest area, however forest rehabilitation, and restoration is required to promote and fulfil its target. FIPD reported that net emissions of Lao PDR were about 58,911,000 tCO_2e in 2022, according to the national estimation of NFI3 [54]. In 2024, about 20 forestry and land use projects were implemented and almost completed. These projects are under the official development assistance (ODA) under the MAF, including the Department of Forestry (DOF), Department of Planning and Cooperation (DPC), Department of Forest Inspection (DoFI), Agricultural, Forestry, and Rural Development Research Institute (NAFRI), Department of Extension and Cooperatives, Lao-Korean Cooperation Centre and Poverty Reduction Fund.

b). Agriculture: 50,000 hectares using adjusted water management practices in lowland rice cultivation with the emission target reduction 128 ktCO_2e /year.

In order to track this NDC target for Laos, an area of adjusted water management in lowland rice production across the country was used as an indicator. According to the existing statistics from the local government during 2019-2022, the Lao PDR has managed and promoted adjusted water management practices in lowland rice cultivation across the country by an average of 96,468 ha per year. The total irrigated area, especially for rice cultivations in the dry season, was about 94,043 ha, 96,193 ha, 99,238 ha, and 97,917 ha from 2019-2022, respectively. This figure showed was about 192 % of the NDC target achievement or exceeded almost 2 times

3.2.4. Waste sector

3.2.4.1. Conditional target for WASTE sector

a). Implementation of 500 tons/day sustainable municipal solid waste management in Vientiane Capital with the emission target reduction 40,000 ktCO_2e /year

Vientiane City Office for Management and Services (VCOMS) reported about 406 tons/day on average from 2019-2023. This was about 81% of the NDC target achievement. In addition, the Mechanical and Biological Treatment Facility in Vientiane might be successfully implemented in time to reduce average emissions by 40,000 tCO_2e /year between 2020 and 2030. This project is expected to reduce 1,100,000 tCO_2e during 23 years of the project's life, and this project alone makes it possible to meet the NDC target. Nevertheless, the project implementation plan is unclear, leading to uncertainty about the NDC achievement. In addition, a major policy hurdle to reducing waste creation is the absence of a supporting regulatory environment, particularly regarding the implementation of waste-to-resource activities, limited coverage of low-income communities and metropolitan regions, and waste collection issues. Large-scale projects in planning, smaller-scale projects under implementation, and smaller-scale projects in preparation are the identified initiatives that will help reach the sectoral NDC target. This assessment consulted with public and private sectors through workshops and focus group discussions. As of early 2023, 15 projects have been identified, with a total financing volume of USD 98 million.

[54] https://nfms.maf.gov.la

3.3. Mitigation policies and measures, actions and plans, including those with mitigation co-benefits resulting from adaptation actions and economic diversification plans, related to implementing and achieving a nationally determined contribution under article 4 of the paris agreement

Lao PDR has been actively introducing mitigation policies and measures for reducing greenhouse gas emissions, showcasing its strong dedication to effective climate actions. These are crucial elements of the country's strategy for controlling carbon emissions and adhering to global climate objectives. The Lao PDR has positioned itself as an active contributor to the global effort to address climate change, using its notable accomplishments in meeting both unconditional and conditional reduction goals, as mentioned in the above sections. The remarkable advancements in the AFOLU sector demonstrate the efficacy of Laos' strategic frameworks and regulatory systems. The successful implementation of crucial projects, backed by financial obligations, demonstrates the country's proactive approach to complying with the Paris Agreement and its commitment to mitigating emissions. The Lao PDR gains vital insights to improve and strengthen its mitigation measures through a comprehensive evaluation of the probable paths of emissions and removals. This proactive approach not only assists policymakers in formulating sustainable policies but also establishes the country as a conscientious participant in the wider global endeavors to tackle climate change. The Lao PDR has invested in policies and measures to prioritize investments in expanding hydropower capacity to reduce reliance on fossil fuel energy sources. In addition, efforts in forest management and afforestation contribute to reducing emissions. The country's National Climate Change Strategy emphasizes climate-smart agriculture, promoting sustainable farming practices and using crop varieties that are resistant to drought. Furthermore, community-based adaptation initiatives and effective monitoring of hydro conditions play roles in addressing the impacts of climate change. Laos actively collaborates with partners and climate funds to secure technical support for projects to reduce emissions, highlighting a comprehensive and cooperative approach towards building a sustainable and resilient future. Therefore, the Lao PDR has applied mitigation policies and measures to tackling climate change through a collective effort led by crucial government entities. More details are explained below.

3.3.1. Energy sector

The Lao PDR has undertaken comprehensive policies in its energy sector to mitigate greenhouse gas (GHG) emissions and support its broader climate goals. Central to this strategy is the expansion of renewable energy capacity, particularly hydropower, which by 2017 reached an installed capacity of 6,300 megawatts (MW). This focus on installing hydropower has effectively displaced fossil fuel-based energy and achieved significant reductions in GHG emissions. To build on this foundation, Lao PDR has also been working to diversify its renewable energy sources, advancing solar, wind, and biomass projects to reach a 30% renewable energy share by 2025. These diversification efforts are expected to reduce reliance on non-renewable sources, thus amplifying emissions reductions across the energy sector**.** In addition, solar energy initiatives emphasize off-grid solutions and hybrid systems tailored for isolated communities.

The Lao government has implemented several policies and programs to promote energy efficiency across industrial, residential, and commercial sectors. Although the specific quantitative impact of these energy efficiency measures remains to be fully detailed, they are anticipated to further lower energy consumption and emissions. The government also promotes biofuels, aiming to replace 10% of transport fuel by 2025, which will support rural energy

stability, reduce fossil fuel imports, and stimulate economic growth in remote areas. However, these targets have made negligible progress due to some limitations and barriers. Biomass and biogas programs focus on converting agricultural and municipal waste into energy, aiming to expand biogas usage to 50,000 households by 2025. These programs are designed to limit demand for liquefied petroleum gas (LPG) and wood fuel, reducing deforestation and improving indoor air quality (ADB, 2019) & (National Strategy on Renewable Energy Development, 2011).

To attract investment in these renewable energy projects, Lao PDR offers financial incentives such as import duty exemptions, tax reductions, and establishing a renewable energy fund to increase investors' confidence. Additionally, the Ministry of Energy and Mines developed a 5-Year Development Plan for the energy and mine sector (2021-2025) under the guidance of the Ministry of Planning and Investment, which aligns energy sector objectives with national development goals, ensuring that renewable energy infrastructure investments are climate-resilient. The Lao PDR aims to ensure a stable renewable energy supply that aligns with its climate resilience and mitigation strategies by investing in infrastructure that can withstand climate-related risks, especially in hydropower. Collectively, these initiatives reflect a holistic approach to achieving substantial GHG reductions, bolstering energy security, and advancing socio-economic progress, mainly through rural electrification and poverty reduction.

In recent years, Lao PDR has strengthened its commitment to integrating sustainable development principles into its energy and mine sector, aligning with the Sustainable Development Goals (SDGs), Green Growth (GG) initiatives, and its Nationally Determined Contributions (NDCs). Under the 9th Five-Year Sector Development Plan (2021-2025), the Ministry of Energy and Mines, guided by the Ministry of Planning and Investment, set Goal 12: integrating SDGs and Green Growth into sectoral development plans. This goal includes two primary targets and four focus areas, contributing to the broader National Socio-Economic Development Plan for the 2030 Agenda. Central to these efforts are two indicators within the SDGs: ensuring access to permanent electricity and increasing the share of renewable energy in the total energy mix, which supports SDG Goal 7 on affordable and clean energy. The Ministry has identified four focus areas to achieve these targets, emphasizing the development of an action plan for the SDGs, Green Growth, and NDCs, alongside a legislative framework for energy data collection. Efforts include collaborations with public and private sectors to establish a data collection manual, meetings with stakeholders to discuss climate change contribution planning, and the development of a Monitoring, Reporting, and Verification (MRV) system for climate change finance, drawing on funds from the Green Climate Fund, Global Environment Facility, and the Adaptation Fund. Additionally, household electricity consumption and other green growth indicators are being tracked with support from the Ministry of Planning and Investment and the International Green Growth Institute. This approach promotes clean energy expansion and energy efficiency, which are foundational to the 2030 Agenda targets, such as doubling energy efficiency improvements, enhancing renewable energy, and accelerating access to clean cooking technologies [55].

The Ministry's next steps include encouraging electric vehicle adoption, improving energy efficiency in lighting and appliances, and applying Minimum Energy Performance Standards (MEPS) to buildings, commercial spaces, and industries. As part of SDG 7, the government aims to ensure affordable, reliable, and modern energy access for all by 2030. Training and consultations are ongoing with relevant stakeholders to implement these initiatives effectively, reflecting the Ministry's dedication to supporting sustainable economic growth while addressing

[55] Ministry of Energy and Mine, 2023: Implementation of the Energy and Mine Sector Development Plan for 2023 and the direction of the plan for 2024, Vientiane, Laos

climate change. These actions, underpinned by the 2023 and 2024 Energy and Mine Development Plans, underscore Lao PDR's commitment to climate-responsive energy development, which is vital for meeting both national and global sustainability goals.

Moreover, Lao PDR's mitigation efforts in the transportation sector focus on promoting clean energy use to reduce fossil fuel dependence and GHG emissions. Key targets include increasing clean energy in transportation to 14% based on 2017 levels, developing biofuels and methane gas, and establishing over 100 electric vehicle (EV) and biofuel stations nationwide. Supporting tasks involve collaborating on legislation for EV adoption, licensing 41 charging stations, and exploring waste-to-energy solutions through partnerships. Additionally, projects are underway to produce biofuels from local resources like oil palm and cassava. These actions aim to advance sustainable transport, reduce oil imports, and support low-emission development in line with national climate goals (Ministry of Energy and Mine, 2023).

3.3.2. Transport sector

The Ministry of Public Works and Transport's (MPWT) Five-Year Development Plan (2021-2025) presents a comprehensive approach to mitigating emissions within Lao PDR's transport sector. This ambitious plan prioritizes sustainable infrastructure, regional connectivity, and adopting low-emission technologies, including electric vehicles (EVs). At the core of this strategy is an emphasis on expanding railway systems, notably the Lao-China Railway, which aims to shift freight and passenger traffic from road to rail. Rail transport is inherently more fuel-efficient and generates fewer greenhouse gas emissions than road transport. As part of a broader vision, this railway project not only contributes to national emission reduction targets but also positions Laos as a key connectivity hub within ASEAN and the Greater Mekong Sub-region, linking it with economic corridors to foster lower-emission transport options across the region [56]. Expanding multimodal transport systems is another essential element of MPWT's mitigation strategy, integrating rail, road, and waterways to optimize fuel use and reduce emissions. For instance, by enhancing public transportation options such as bus rapid transit (BRT) systems in urban areas, MPWT aims to reduce the reliance on private vehicles and alleviate traffic congestion. This shift is particularly focused on urban centres like Vientiane, where promoting public transit over private car usage can significantly cut urban emissions. To further support this transition, MPWT is updating vehicle standards and inspection systems, promoting fuel-efficient technologies within the national fleet, which helps lower emissions from existing vehicles while setting stricter standards for new ones [57]**.** In addition to public transport and rail, electric vehicles (EVs) are a cornerstone of MPWT's low-carbon transport strategy. The plan includes measures to incentivize EV adoption by offering financial incentives and prioritizing the establishment of necessary EV infrastructure, such as charging stations in major urban areas and along key transit routes. By supporting the use of EVs and hybrids, particularly in high-density areas, MPWT expects to reduce urban air pollution and CO_2 emissions substantially. Furthermore, by partnering with the private sector and international investors, MPWT is accelerating the development of an EV charging network, positioning EVs as a practical and sustainable transportation solution nationwide. This infrastructure supports individual EV adoption and sets a foundation for future expansion as EV technology becomes more accessible [58].

In addition, MPWT's emission mitigation strategy includes reducing urban congestion and improving traffic flow, which can minimize fuel consumption and emissions from idling vehicles.

[56] MPWT, 2022: 5 Year Development plan of Ministry of Public works and Transport, Vientiane, Laos.
[57] MPWT, 2022: 5 Year Development plan of Ministry of Public works and Transport, Vientiane, Laos
[58] MPWT, 2022: 5 Year Development plan of Ministry of Public works and Transport, Vientiane, Laos

This approach is further supported by the expansion of public transportation networks, development of safe infrastructure for pedestrians and cyclists, and the implementation of traffic management systems to encourage sustainable urban mobility. These initiatives are designed to align with Lao PDR's climate goals and contribute to a transition towards a resilient, low-emission transport sector that supports sustainable urban growth. Furthermore, specific projects such as the "Low Carbon Buses for the Bus Rapid Transit (BRT) System in Vientiane Capital" bolster MPWT's mitigation efforts by introducing a fleet of electric buses to replace traditional, fossil-fuel-powered buses [59]. This shift minimizes carbon emissions per passenger trip, enhances fuel efficiency, and aligns with Lao PDR's NDC targets for emissions reduction in urban transport. In addition to directly reducing emissions, this project strengthens the sustainable transport infrastructure and serves as a model for low-emission public transit systems nationwide, demonstrating a scalable approach to sustainable urban transport that could be replicated across the country. Overall, MPWT's multi-faceted approach integrates public and private investments, innovative technologies, and sustainable infrastructure development to foster a low-emission, climate-resilient transport sector. By emphasizing rail expansion, supporting EV adoption, enhancing public transit, and implementing modern traffic management systems, MPWT's Five-Year Development Plan strategically positions Lao PDR to meet its climate objectives, reduce transport-related emissions, and promote sustainable economic growth.

3.3.3. AFOLU sector

The AFOLU sector in Lao PDR is foundational to the country's climate mitigation strategy, with robust policy frameworks guiding efforts to sequester carbon, reduce emissions, and protect valuable ecosystems. Key policies include the National REDD+ Strategy (NRS), the Constitution of Lao PDR, the National Master Plan for Land Allocation, and the Ministry of Agriculture and Forestry's (MAF) Plan of Action for Disaster Risk Management in the Agriculture and Forestry Sector [60]. Together, these policies aim to mitigate climate change by preventing deforestation, enhancing forest cover, promoting sustainable agricultural practices, and implementing disaster-resilient strategies that minimize emissions. Central to these efforts is the forest expansion goal set out in the NDC and NRS, targeting 70% forest cover by 2030. This policy drives ambitious reforestation and afforestation projects, directly contributing to GHG mitigation by enhancing the country's carbon sinks. Forest ecosystems are a critical part of the nation's carbon strategy, with each hectare of reforested land sequestering an estimated 10 tons of CO_2 annually. The National REDD+ Strategy complements this by focusing on emissions reduction from deforestation and forest degradation. This approach employs rigorous land-use regulations, such as controlling illegal logging and forest fires and reducing land encroachment, which are major sources of emissions. By preserving carbon-rich forests and restoring degraded lands, the REDD+ strategy is expected to avoid millions of tons of CO_2 emissions, establishing a strong mitigation impact [61]. The Plan of Action for Disaster Risk Management [62] in the AFOLU sector aligns with these efforts, prioritizing actions that reduce emissions from land-use change and degradation due to natural disasters. By promoting land practices that are resilient to climate impacts, this plan minimizes the risk of land degradation and carbon loss in the wake of climate-related events, which can release significant amounts of CO_2. Agroforestry is also a key component of the mitigation policies and measures, where the integration of trees within agricultural landscapes

[59] MPWT, 2022: 5 Year Development plan of Ministry of Public works and Transport, Vientiane, Laos
[60] MAF 2022: Plan of Action for Disaster Risk Management in the Agriculture and Forestry Sector (2022–2025), Vientiane, Laos.
[61] MAF, 2021: National REDD+ Strategy, Ministry of Agriculture and Forestry, Page 1, Lao PDR
[62] MAF 2022: Plan of Action for Disaster Risk Management in the Agriculture and Forestry Sector (2022–2025), Vientiane, Laos

enables soils to store more carbon. This approach helps offset emissions from agriculture, a sector that traditionally contributes to GHG emissions through land clearing and intensive farming practices. Trees in agroforestry systems sequester CO_2, estimated at 5–8 tons per hectare annually, and prevent emissions that would result from land conversion [63]. Land allocation policies in the National Master Plan for Land Allocation[64] further support mitigation by designating specific areas for conservation, agriculture, and urban development. Zoning land for forest preservation and sustainable agriculture prevents deforestation from unsustainable agriculture practices, a common source of emissions in the AFOLU sector. Designating conservation zones keeps carbon stocks intact and reduces pressure on forested areas, while concentrated agricultural zones allow for more efficient, low-emission farming practices. Additionally, sustainable land allocation reduces the spread of agriculture into high-carbon areas like primary forests, avoiding emissions from land-use change.

3.3.4. WASTE sector

The Lao PDR has implemented several policies and initiatives to mitigate greenhouse gas (GHG) emissions from the waste sector, promote sustainable waste management practices, and reduce the environmental impact of waste disposal. These efforts form a broader national strategy to align the waste sector with Lao PDR's climate goals and support the country's transition to a circular economy. The National Green Growth Strategy 2030 (NGGS) [65], approved in 2019, serves as a foundational policy for sustainable development in Lao PDR, emphasizing waste reduction, recycling, and efficient waste treatment. The NGGS targets reduced waste generation and expanded recycling initiatives to limit landfill dependency and focus on resource recovery. This strategy is designed to lower methane emissions from landfills by minimizing the decomposition of organic waste, a significant methane source—a potent GHG. Additionally, the NGGS encourages the development of green jobs in waste management, reinforcing the economic and environmental sustainability of the sector [66].

The Sustainable Solid Waste Management Strategy and Action Plan for Vientiane (2021-2030) [67] was developed to address urban waste challenges, focusing on increasing waste collection, enhancing recycling, and implementing waste-to-resource programs. The plan sets ambitious targets to improve waste collection coverage, reduce waste generation, and establish systems for recycling and composting in Vientiane Municipality. Furthermore, it promotes the development of waste-to-energy facilities that divert waste from landfills, reducing landfill volumes and emissions while contributing to renewable energy production. This action plan supports public-private partnerships and operational efficiency in the waste sector, making it a sustainable urban waste management model as Vientiane's population grows [68]. The National Strategy on Climate Change further integrates sustainable waste management into Lao PDR's climate objectives, emphasizing the mitigation potential of improved waste practices. Recognizing that enhanced waste management reduces methane emissions and delivers public health benefits, this strategy promotes sustainable practices as part of the country's broader response to climate change. By positioning waste management within the climate policy framework, the National Strategy on

[63] GoL, 2021: Nationally Determined Contributions (NDC), Laos PDR.
[64] GoL, 2018: National Master Plan for Land Allocation.
[65] GGGI 2021: Sustainable Solid Waste Management Strategy and Action Plan for Vientiane 2021-2030
[66] GoL, 2019: National Green Growth Strategy 2030 (NGGS).
[67] GGGI 2021: Sustainable Solid Waste Management Strategy and Action Plan for Vientiane 2021-2030
[68] GGGI 2021: Sustainable Solid Waste Management Strategy and Action Plan for Vientiane 2021-2030

Climate Change highlights waste as a critical area for reducing GHGs and preventing environmental pollution [69].

In addition, the Get CLEAN and GREEN Solid Waste and Plastic Management in Lao PDR report, supported by the World Bank, provides practical recommendations for addressing plastic waste. This report advocates regulatory measures, economic incentives, voluntary agreements, and awareness-building initiatives to reduce plastic waste in landfills and encourage recycling. The insights from this report contributed to the development of the National Plastic Action Plan, which explicitly targets plastic waste reduction and supports a circular economy. Managing plastic waste not only decreases the environmental footprint of waste disposal but also reduces GHG emissions associated with plastic production and disposal [70].

In line with its commitments under the Paris Agreement, Lao PDR's Nationally Determined Contribution (NDC) sets specific targets for GHG reductions in the waste sector. The NDC promotes the development of sanitary landfills equipped with methane capture technology, which prevents methane from escaping into the atmosphere and allows it to be converted into biogas. In addition, the NDC supports initiatives to improve waste collection infrastructure in both urban and rural areas, increase recycling rates, and implement waste-to-energy projects to divert organic waste from landfills and produce renewable energy. These measures contribute directly to Lao PDR's emission reduction targets while supporting sustainable urban growth [71].

The Waste to Fuel Project in Vientiane Capital is a landmark initiative under this framework, which exemplifies Lao PDR's commitment to innovative waste management solutions. This project involves the construction of a pyrolysis plant designed to convert municipal waste into fuel that meets EN590 (EURO 4) environmental standards, along with biochar as a by-product. This project directly addresses methane emissions associated with waste decomposition by reducing the volume of municipal waste sent to landfills by up to 90%. The remaining 10% of waste, which includes non-combustible metals and ceramics, will be recycled, helping Vientiane move closer to a zero-waste model, set to operate within a 24-month construction period, the Waste to Fuel Project is expected to produce approximately 10.5 million litters of fuel annually, using 300 tons of waste per day and employing around 50 people. This project not only reduces landfill-bound waste and GHG emissions but also creates renewable energy, positioning Vientiane as a pioneer in sustainable waste management within Lao PDR [72].

Thus, the Lao PDR's waste management strategy is a multi-faceted approach designed to mitigate emissions, enhance resource efficiency, and protect public health. Lao PDR aims to transition its waste sector toward a low-emission, sustainable model through comprehensive policies such as the NGGS, the Vientiane Waste Management Strategy, the National Strategy on Climate Change, the NDC, and innovative projects like the Waste to Fuel initiative. Public awareness campaigns, private sector partnerships, and infrastructure improvements further reinforce these efforts, fostering sustainable community waste practices. These policies and initiatives underscore Lao PDR's commitment to achieving its climate objectives and building a resilient, circular economy.

In response to the challenges posed by climate change, Laos has been actively implementing various adaptation measures. In 2009, Laos unveiled its National Adaptation Plan of Action (NAPA)[73], outlining 45 priority projects with a cumulative budget of US$ 85 million. These

[69] GoL, 2023: National Strategy on Climate Change, Vientiane, Laos.
[70] World Bank, 2021: Get CLAN and GREEN-Solid Waste and Plastic Management in Lao PDR
[71] MONRE, 2021: National Determined Contribution (NDC), Page 6
[72] Small B Investment & NRG-ASIA, 2024: Waste to Fuel Project in Vientiane Capital.
[73] Lao PDR, 2009: National Adaptation Programme of Action to Climate Change, Vientiane, Lao PDR

projects primarily target the initial four priority sectors, such as agriculture, forestry, water and water resources, and health, to enhance their capacity for climate change adaptation. These initiatives reflect a holistic approach aimed at safeguarding communities and ecosystems from the impacts of a changing climate. Agriculture, a cornerstone of the country's economy, is bolstered by adopting climate-resilient practices, including cultivating drought-resistant crops and improving irrigation systems. Water resource management strategies are being enhanced to mitigate the effects of floods and droughts, incorporating measures such as the construction of reservoirs and efficient irrigation systems. At the community level, disaster risk reduction efforts involve establishing early warning systems and implementing community-based training initiatives. Moreover, a focus on climate-resilient livelihoods, such as agroforestry and eco-tourism, promotes sustainable economic practices. Recently, the 2021 National Strategy on Climate Change has been drafted, which builds on the previous strategy on climate change to support sustainable development and promote a decarbonized economy. It establishes the national vision for climate change up to the year 2050, delineates the strategy and action programs for climate change management until 2030, and emphasizes risk prevention, reduction, resilience, adaptation, recovery, and mitigation of greenhouse gas emissions [74].

To summarize, Lao PDR has been consistently and significantly advancing towards reaching both unconditional and conditional mitigation objectives, therefore reinforcing its steadfast commitment to decreasing emissions. The country has successfully implemented the strategic goals set in its NDCs, demonstrating notable accomplishments in the Land Use and Forestry sectors. Simultaneously, there has been a noticeable advancement in many sectors as they conform to the objectives stated in the NDC. The notable progress may be attributed to the proactive strategy of Lao PDR, which involves the implementation of strategic frameworks, strong regulatory systems, and well-defined targets. By doing this, the government not only underlines its commitment to prioritizing NDC objectives but also integrates these efforts with more extensive socio-economic development activities. Furthermore, Lao PDR's commitment to emission reduction is shown via its comprehensive policies and methodical methodology, highlighting its responsible global participation in climate action. Moreover, the increase in the number of projects and the allocation of financial aid highlight Laos' proactive and coordinated actions to reduce emissions.

3.4. Summary of greenhouse gas emissions and removals

Between 2020 and 2022, greenhouse gas (GHG) emissions exhibited fluctuations across sectors, while the capacity for carbon sequestration through the land use, land-use change, and forestry (LULUCF) sector declined significantly. Total GHG emissions, excluding LULUCF, increased from 35,882.49 Gg in 2020 to 42,073.67 Gg in 2021 before decreasing to 38,844.04 Gg in 2022. Key contributors included carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and hydrofluorocarbons (HFCs), with CO_2 (excluding LULUCF) accounting for the largest share of emissions. Emissions from the energy, industrial processes, product use, agriculture, and waste sectors also showed gradual increases over the years, with total emissions across these sectors rising from 1,408.40 Gg in 2020 to 1,448.49 Gg in 2022. While emissions from CO_2 and CH_4 peaked in 2021 and slightly decreased in 2022, HFCs showed a consistent rise throughout the period. N_2O emissions experienced a significant increase in 2021 but declined in 2022. However, the effectiveness of the LULUCF sector as a carbon sink weakened substantially, with sequestration capacity dropping from -102,530.64 Gg in 2020 to -60,297.51 Gg in 2022. This

[74] GoL, 2023: National Strategy on Climate Change toward 2030

reduction in carbon sequestration played a key role in the decline of total net removals, which fell dramatically from -66,648.15 Gg in 2020 to -21,453.77 Gg in 2022. The data underscores the declining role of the LULUCF sector in offsetting emissions and highlights the steady rise of emissions from non-LULUCF sectors. These trends emphasize the urgent need to reduce emissions across all sectors while enhancing the resilience and capacity of the LULUCF sector to function as an effective carbon sink. The detailed is presented in (Table 29) and (Table 30)

Table 29: Trends in GHGs emissions and removals by sector for 2020 – 2022

Source Categories	2020	2021	2022
Energy	21,786.61	21,705.15	21,688.98
Industrial processes and product use	2,606.78	5,849.95	5,226.55
Agriculture	10,080.71	13,085.90	10,480.02
Waste	1,408.40	1,432.67	1,448.49
LULUCF (Only)	-102,530.64	-104,469.40	-60,297.51
Total (**Excluding LULUCF**)	35,882.49	42,073.67	38,844.04
Total GHGs Removals and Sink	(66,648.14)	(62,395.72)	(21,453.47)

Table 30: Trends in GHG Emission and Removal by gases, 2020 – 2022

Trends in GHG emission and Removal	2020	2021	2022
CO_2 (**Excluding LULUCF**)	23,237.96	26,399.91	25,692.19
CO_2 (LULUCF only)	-102,530.64	-104,469.40	-60,297.51
CH_4 (**Excluding LULUCF**)	8,667.65	8,736.52	8,854.03
CH_4 (**Including LULUCF**)	8,737.22	9,651.87	8,885.76
N_2O (**Excluding LULUCF**)	3,805.74	6,751.53	4,097.79
N_2O (**Including LULUCF**)	3,825.11	7,393.25	4,106.62
HFCs	171.14	185.72	200.02
Total (**Excluding LULUCF**)	35,882.49	42,073.67	38,844.04
Total (LULUCF only)	-102,530.64	-104,469.40	-60,297.51
Total GHG Removals and Sinks	**-66,648.15**	**-62,395.73**	**-21,453.47**

3.5. Projections of greenhouse gas emissions and removals, as applicable

(Figure 19) below provides a projection of GHG emissions from all sectors from the base year 2000 up to 2050 under three scenarios, as follows:

- A **baseline scenario** is a reference case that illustrates future GHG emission levels that are most likely to occur without GHG mitigation activities.
- An **unconditional mitigation scenario** that reflects GHG emission reduction efforts that the Lao PDR can commit to, considering its own resources and existing levels of support from developed country Parties.
- A **conditional mitigation scenario** that represents additional GHG emission reductions efforts that Lao PDR could achieve, contingent upon increased levels of financial support from developed country Parties.

The figure presents all scenarios, with historical data before 2020 and emissions estimations from 2020 to 2050, including the country's NDC mitigation targets up to 2030 and net zero emission in 2050. No Lao PDR-specific tool is currently available to produce GHG emission projections. However, the projection uses the UNEP DTU Partnership's Greenhouse Abatement Cost Model (GACMO) to compute baseline and mitigation scenarios. The primary sources of data used for its projection are the Lao PDR Forest Reference Emission Level and Forest Reference Level (FREL/FRL) for REDD+ Results Payment under the UNFCCC, Lao PDR Second National Communication to the UNFCCC, Lao PDR Technology Needs Assessments Report-Climate

Change Mitigation, Electricité du Laos (EDL) Electricity Statistics Report in 2018, and Lao PDR Energy Statistics 2018.

In the case of Lao PDR, future GHG emission levels are most likely to occur in the absence of GHG emission reductions. This projection scenario is used to develop the unconditional and conditional mitigation goal scenarios and to understand its trends at a sectoral scale. It is predicted that total GHG emissions levels in Lao PDR would be expected to reach around 82,000 k tCO_2e in 2020 and 104,000 k tCO_2e in 2030. The main sectors expected to contribute to baseline emissions are AFOLU and energy, including transport and the power sector, through the potential addition of baseload coal-fired power generation. According to the Second National Communication to the UNFCCC in June 2013, the Lao PDR's total greenhouse gas emissions in 2000 were 50,742.91 k tCO_2e, more than 95% of which were from AFOLU. Between 2000 and 2018, population and economic growth grew by 1.6% and 7.17% per year, respectively, and both are associated with increasing emissions. In addition, the country's total number of registered vehicles increased significantly from 367,900 in 2004 to 2,133,500 in 2017 (480% increase), and the amount of fuel used for transportation increased from 855 million gallons in 2013 to 1,442 million liters in 2016.

The 2030 unconditional mitigation scenario and related updated targets are presented in the graph. The 2030 conditional mitigation scenario and related goals for reaching net zero emissions by 2050 are set. The analysis covers the following sectors: AFOLU, energy, transport, and waste. Methane (CH_4), nitrous oxide (N_2O), and carbon dioxide (CO_2) are GHGs included in the analysis. In Lao PDR, emissions of sulfur hexafluoride (SF6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs) are deemed insignificant and are not included in the analysis. The analysis's boundaries line up with the country's actual borders. For all scenario calculations, 2000 is chosen as the base year.

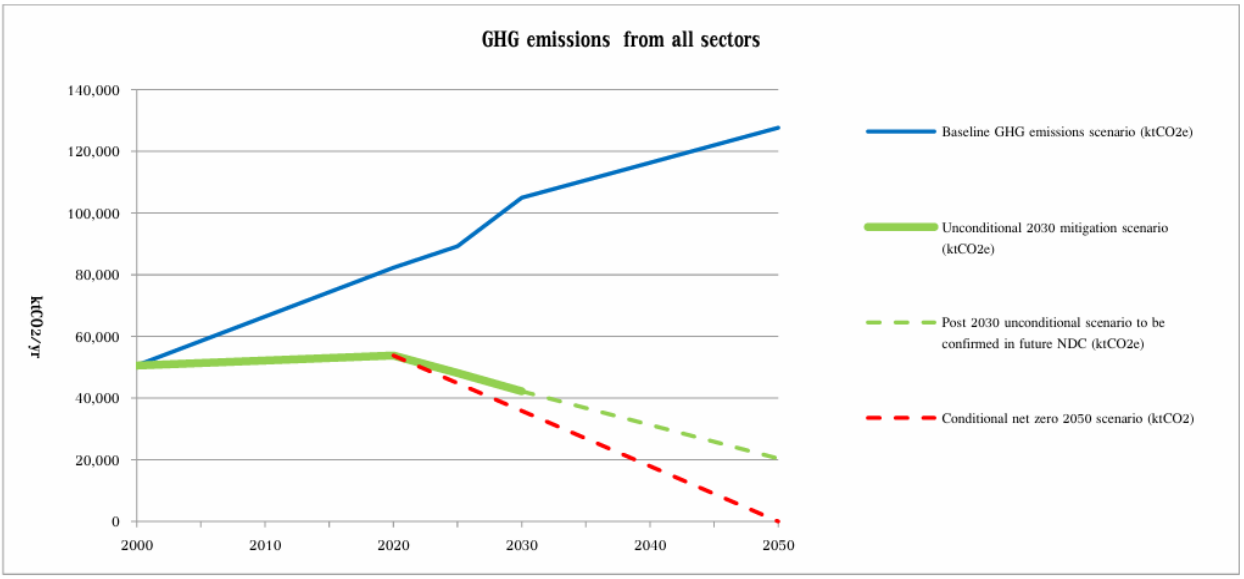


Figure 19 : GHG emission scenario from all sector, page 03 [75]

[75] MONRE. 2021: National Determined Contribution (NDC)

3.6. Intention to use cooperative approaches that involve the use of internationally transferred mitigation outcomes under article 6 towards NDCs under article 4 of the paris agreement

The Lao People's Democratic Republic has made significant progress in implementing cooperative approaches under Article 6.2 of the Paris Agreement through three key agreements: the Memorandum of Understanding between the Lao People's Democratic Republic and Republic of Singapore; the Memorandum of Understanding between the Lao People's Democratic Republic and Republic of Korea and the Implementation Agreement between the Lao People's Democratic Republic and Japan under the Joint Crediting Mechanism (JCM).

To deepen international collaborations in Article 6.2 and Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), the Lao People's Democratic Republic authorized three mitigation activities including "VCS-2521[76]: Installation of high-efficiency wood burning cookstoves in Lao PDR", "VCS-2924[77]: Grouped projects for Laos improved cookstove", and "VCS-3204[78]: Grouped projects for Laos water purifier". These activities have agreements to transfer correspondingly adjusted emissions reductions/carbon credits from the mitigation activities within the time frame from 1 January 2023 to 31 December 2032. These initiatives will be detailed in Lao PDR's Initial Report and will be published on the UNFCCC Centralized Accounting and Reporting Platform (CARP). (Table 31) and (Table 32) are Tracking progress made in implementing and achieving the NDC under Article 4 of Paris Agreement and the (Table 33) shows the impact of the correspondingly adjustment carbon credits (ITMOs) on Lao PDR's National GHG inventory in the past and upcoming year.

Table 31: Tracking progress made in implementing and achieving the NDC under Article 4 of Paris Agreement for the "VCS-252: Installation of high-efficiency wood burning cookstove" in Lao PDR.

	Unit, as applicable	Reference points	Implementation period of the NDC covering information for previous reporting years and the most recent year, including the end year or end of period							
			2023	2024	2025	2026	2027	2028	2029	2030
Annual Quantity of ITMOs first transferred [para. 23(c), annex to decisions -/CMA.3]	$ktCO_2eq$	-	0	0						
Annual quantity of mitigation outcomes authorized for use for other international mitigation purposes [para. 23(d), annex to decisions -/CMA.3]	$ktCO_2eq$	-	167.257	167.257						
Annual quantity of ITMO used	$ktCO_2eq$	-	0	0						

[76] https://registry.verra.org/app/projectDetail/VCS/2521
[77] https://registry.verra.org/app/projectDetail/VCS/2924
[78] https://registry.verra.org/app/projectDetail/VCS/3204

toward achievement of NDC [para. 23(e), annex to decisions -/CMA.3]										
Net quantity of ITMOs resulting	$ktCO_2eq$	-	167.257	167.257						

Table 32: Tracking progress made in implementing and achieving the NDC under Article 4 of Paris Agreement for the "VCS-2924: Grouped projects for Laos improved cookstove", and "VCS-3204: Grouped projects for Laos water purifier" in Lao PDR

	Unit, as applicable	**Reference points**	**Implementation period of the NDC covering information for previous reporting years and the most recent year, including the end year or end of period**							
			2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Annual Quantity of ITMOs first transferred [para. 23(c), annex to decisions -/CMA.3]	$ktCO_2eq$	-	0	0						
Annual quantity of mitigation outcomes authorized for use for other international mitigation purposes [para. 23(d), annex to decisions -/CMA.3]	$ktCO_2eq$	-	1,617.071	3,878.685						
Annual quantity of ITMO used toward achievement of NDC [para. 23(e), annex to decisions -/CMA.3]	$ktCO_2eq$	-	0	0						
Net quantity of ITMOs resulting	$ktCO_2eq$	-	1,617.071	3,878.685						

Table 33: Impact of ITMO on National GHG inventory of Lao PDR 2022

Year of emissions	GHG inventory before ITMOs, $ktCO_2eq$	ITMOs, $ktCO_2eq$	GHG inventory after ITMOs, $ktCO_2eq$	Percentage change
2023	38,844.04	1,734.328	40,628.368	4.39
2024	38,844.04	4,045.942	42,889.982	9.43

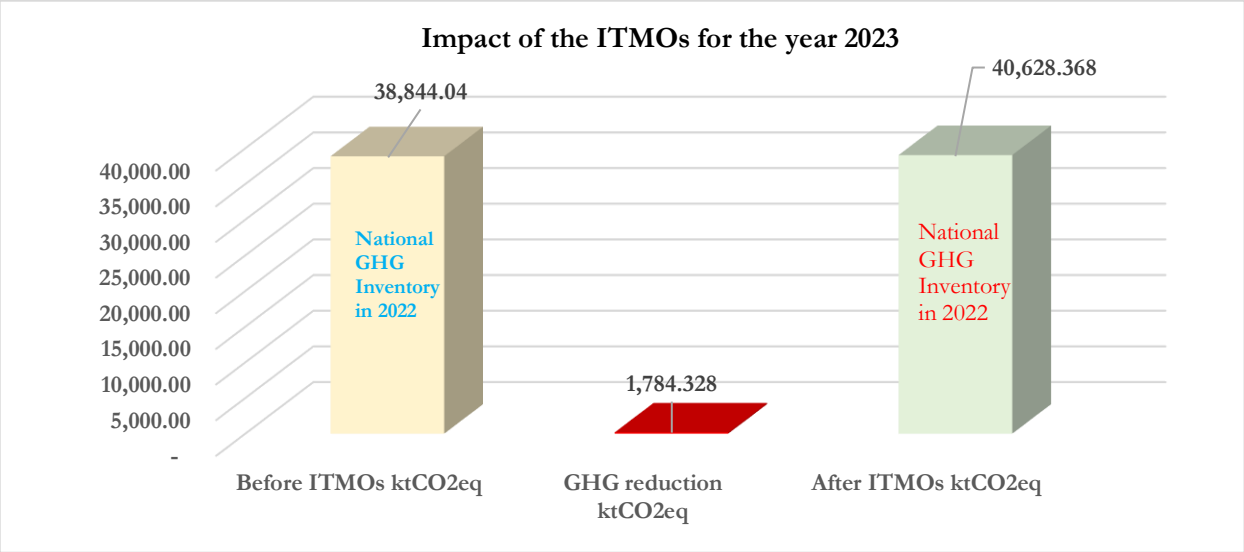


Figure 20: Impact of the ITMOs for 2023 to the National GHG inventory of Lao PDR 2022

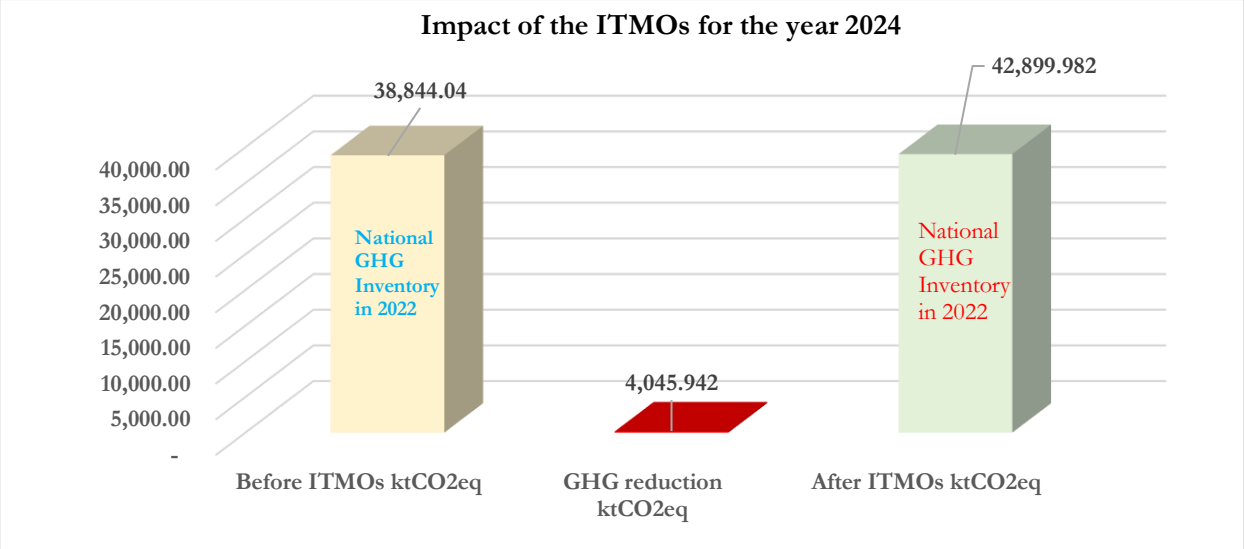


Figure 21: Impact of the ITMOs for 2024 to the National GHG inventory of Lao PDR 2022

3.7. Common tabular formats (CTF)

3.7.1. CTF for energy sector

1. Structured summary: Description of selected indicators

Indicator to select progress (a)	Information for the reference point(s), baseline(s), base year(s) or starting point(s), as appropriate (b)	Updates in accordance with any recalculation of the GHG inventory, as appropriate (b)	Relation to NDC (c)
Installed hydropower capacity (GW)	Baseline: 4.5 GW (2018).	10.16 GW installed as of 2024; target: 13 GW by 2030.	Key indicator for achieving unconditional NDC target for renewable energy.
Installed solar and wind power capacity (MW)	Solar: 56 MW (2022); Wind: 600 MW (Monsoon Wind Farm)	Solar capacity installed 83 MW by 2024; wind to reach 1.2 GW by 2025.	Contributes to conditional NDC target of 1 GW installed capacity by 2030.
Clean cook stoves distributed	Baseline: 300 stoves (2019-2023).	Target: 50,000 stoves by 2030; 0.6% of target achieved so far.	Target under unconditional NDC, may move to conditional NDC due to challenges.

2. Structured summary: Definitions needed to understand NDC

	Definitions
Definition needed to understand each indicator:	
{Indicator}	Installed hydropower, solar, and wind capacities (GW/MW); distribution of clean cook stoves.
Any sector or category defined differently than in the national inventory report	
Sector	Energy sector including renewable energy (hydropower, solar, wind) and energy efficiency (clean cook stoves).
Category	Energy sector including renewable energy (hydropower, solar, wind) and energy efficiency (clean cook stoves).
Category	Energy sector including renewable energy (hydropower, solar, wind) and energy efficiency (clean cook stoves).
Definition needed to understand mitigation co-benefits of adaptation actions and/or economic diversification plans:	
{Mitigation co-benefit(s)}	
Definition needed to understand mitigation co-benefits. benefits of adaptation actions and/or economic diversification plans:	Renewable energy reduces GHG emissions by replacing fossil fuels; clean cook stoves reduce CH and CO_2 emissions, improve health.
Any other relevant definitions	Renewable energy reduces GHG emissions by replacing fossil fuels; clean cook stoves reduce CH_4 and CO_2 emissions, improve health.
{...}	

3. Structured summary: Methodologies and accounting approaches – consistency with Article 4, paragraphs 13 and 14, of the Paris Agreement and with decision 4/CMA.1

NDC			Description or reference to the relevant section of the BTR
Transport NAMA	Accounting approach, including how it is consistent with Article 4, paragraphs 13–14, of the Paris Agreement (para. 71 of the MPGs)		
	Accounting for anthropogenic emissions and removals in accordance with methodologies and common metrics assessed by the IPCC and adopted by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement:	Each methodology and/or accounting approach used to assess the implementation and achievement of the target(s), as applicable (para. 74(a) of the MPGs)	Emission reductions from hydropower: Installed capacity of 10.16 GW (2024) with target of 13 GW by 2030. Solar and wind: Target of 1 GW by 2030, with 56 MW solar and 600 MW wind (Monsoon Wind Farm) installed. Methods based on IPCC Guidelines.
		Each methodology and/or accounting approach used for the construction of any baseline, to the extent possible (para. 74(b) of the MPGs)	Baselines established using 4.5 GW hydropower capacity (2018) and solar/wind capacities before 2022.
		If the methodology or accounting approach used for the indicator(s) differs from those used to assess the implementation and achievement of the target, describe each methodology or accounting approach used (para. 74(c) of the MPGs)	Consistent accounting methods used for renewable energy capacity and clean cook stove distribution under IPCC guidelines.
		Any conditions and assumptions relevant to the achievement of the NDC under Article 4, as applicable and available (para. 75(i) of the MPGs)	Assumes continued investment in renewable energy infrastructure (e.g., hydropower, solar, and wind).
		Key parameters, assumptions, definitions, data sources and models used, as applicable and available (para. 75(a) of the MPGs)	Parameters include installed capacities (hydropower: 9.6 GW; solar: 56 MW; wind: 600 MW); expected capacities (13 GW hydropower, 1 GW solar/wind by 2030).
		IPCC Guidelines used, as applicable and available (para. 75(b) of the MPGs)	IPCC 2006 Guidelines applied for energy sector GHG accounting.
		Report the metrics used, as applicable and available (para. 75(c) of the MPGs)	Metrics include the reductions per year for renewable energy projects and clean cook stove distribution.
		For Parties whose NDC cannot be accounted for using methodologies covered by IPCC guidelines, provide information on their own methodology used, if applicable (para. 1(b) of annex II to decision 4/CMA.1)	Lao PDR uses IPCC Guidelines but supplements with renewable energy project-level MRV systems for additional accuracy.
		Provide information on methodologies used to track	Progress tracked through installed capacities of

		progress arising from the implementation of policies and measures (para. 1(d) of annex II to decision 4/CMA.1)	hydropower, solar, and wind plants and reports from Électricité du Laos.
		Where applicable to its NDC, any sector-, category- or activity-specific assumptions, methodologies and approaches consistent with IPCC guidance (para. 75(d) of the MPGs)	Energy sector: Hydropower, solar, and wind capacities calculated based on planned and installed infrastructure; clean cook stoves track GHG reductions per unit deployed.
		For Parties that address emissions and subsequent removals from natural disturbances on managed lands, provide detailed information (para. 1(e) of annex II to decision 4/CMA.1)	Not applicable to energy sector.
		For Parties that account for emissions and removals from harvested wood products, provide detailed information (para. 1(f) of annex II to decision 4/CMA.1)	Not applicable to energy sector.
		For Parties that address the effects of age-class structure in forests, provide detailed information (para. 1(g) of annex II to decision 4/CMA.1)	Not applicable to energy sector.
		How the Party has drawn on existing methods and guidance established under the Convention and its related legal instruments, if applicable (para. 1(c) of annex II to decision 4/CMA.1)	Guidance from UNFCCC and IPCC reports used to align renewable energy tracking and MRV systems with national targets.
		Any methodologies used to account for mitigation co-benefits of adaptation actions and/or economic diversification plans (para. 75(e) of the MPGs)	Mitigation co-benefits tracked via clean cook stove adoption, which reduces GHG emissions and improves household energy efficiency.
		Describe how double counting of net GHG emission reductions has been avoided, including in accordance with guidance developed related to Article 6 if relevant (para. 76(d) of the MPGs)	Double counting avoided through centralized national reporting mechanisms and project-level MRV systems.
		Any other methodologies related to the NDC under Article 4 (para. 75(h) of the MPGs)	Renewable energy and energy efficiency methodologies align with national inventory reporting requirements and the NDC targets.
	Ensuring methodological consistency, including on baselines, between the communication and implementation of NDCs (para. 12(b)	Ensuring methodological consistency, including on baselines, between the communication and implementation of NDCs (para. 12(b) of the decision 4/CMA.1):	Consistency maintained through IPCC Guidelines, UNFCCC frameworks, and renewable energy project reports.
		Explain how consistency has been maintained between any GHG data and estimation methodologies used for accounting and the Party's	Consistency maintained through IPCC Guidelines, UNFCCC frameworks, and renewable energy project reports.

	of the decision 4/CMA.1):	GHG inventory, pursuant to Article 13, paragraph 7(a), of the Paris Agreement, if applicable (para. 2(b) of annex II to decision 4/CMA.1) and explain methodological inconsistencies with the Party's most recent national inventory report, if applicable (para. 76(c) of the MPGs)		

4. Structured summary: Tracking progress made in implementing and achieving the NDC under Article 4 of the Paris Agreement

	Unit, as applicable	**Reference point(s), level(s), baseline(s), base year(s) or starting point(s){ MPGs, p. 67, 77(a)(i)}**	**Implementation period of the NDC covering information for previous reporting years and the most recent year, including the end year or end of period {MPGs, p. 68, 77(a)(ii–iii)}**						**Target level**	**Target year or period**	**Progress made towards the NDC, as determined by comparing the most recent information for each selected indicator, including for the end year or end of period, with the reference point(s), level(s), baseline(s), base year(s) or starting point(s) (paras. 69–70 of the MPGs)**
			2019	**2020**	**2021**	**2022**	**2023**	**2024**			
Indicator(s) selected to track progress towards the implementation and/or achievement of the NDC under Article 4 of the Paris Agreement[c]: {MPGs, p. 65, 77(a)}											
{Indicator}											
13GW total hydropower capacity (domestic and export use) in the country	*GW*	*4.8 [2018]*					*8.94*	*10.16*	*13*	*2030*	*Significant progress with 90 installed hydropower plants contributing to 83.076% of total production*
Energy efficiency: Clean Cook Stoves	tCO2e/year	50,000 tCO_2e/year (NDC target)	2019-2023: 300 stoves distributed for pilot and reducing 627 tCO2e in total						50,000 tCO_2e/year	2030	*Achieved 0.6% of the target; Project delayed implementing and effected from pandemic of COVID-19 and financial discontinuation due to economic challenges faced by the country.*
Solar energy installed capacity		56 MW producing 93.07						2024: 83 MW producing	1 GW	2030	*Expected expansion more projects planned by 2026*

		GWh/year (2022)						122.92 GWh/year			
Wind power installed capacity	MW / GWh/year	600 MW Monsoon Wind Farm						2025: 1.2 GW wind project expected completion	1.8 GW	2030	*Monsoon project will reduce 1,400,000 tCO2e/year over 25 years; major progress in wind power underway*
Biomass energy installed capacity	MW / GWh/year	300 MW target						2024: 112 MW operational with 702.71 GWh/year production	300 MW	2030	*Biomass contributes 37.3% of NDC target; further projects in progress*

5. Mitigation policies and measures, actions and plans, including those with mitigation co-benefits resulting from adaptation actions and economic diversification plans, related to implementing and achieving a nationally determined contribution under Article 4 of the Paris Agreement (a, b)

Name (c)	Description (d,e,f)	Objectives	Type of instrument (g)	Status (h)	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimates of GHG emission reductions (kt CO_2eq) (j, k)
Hydropower Development	90 hydropower plants generating 10.16 GW (2024).	Achieve 13 GW installed capacity by 2030.	Renewable energy projects	On track	Renewable energy	CO_2	2018	Ministry of Energy and Mines, Électricité du Laos	Significant (~46,045 GWh/year).
Solar and Wind Energy Development	14 solar plants (83 MW) and Monsoon Wind Farm (600 MW) in progress.	Achieve 1 GW solar and wind capacity by 2030.	Renewable energy projects	Ongoing	Renewable energy	CO_2	2022	Ministry of Energy and Mines, developers	100,000 t CO_2e/year (solar); 1,400,000 tCO2e/year (wind).
Energy-Efficient Clean Cook Stoves	300 stoves distributed in 7 districts	Distribute 50,000 stoves	Energy efficiency projects	Behind schedule	Energy efficiency	CO_2, CH_4	2019	Ministry of Energy and Mines, SNV	627 t CO_2e/year (current).

	(2019–2024).	by 2030.							
Monsoon Wind Farm	600 MW wind energy project (2022–2047).	Offset emissions and export clean energy.	Renewable energy projects	Under implementation	Renewable energy	CO_2	2022	Developers, Ministry of Energy and Mines	1,400,000 t CO_2e/year (during project lifetime).
Future Solar and Wind Expansion	Additional projects for 1.2 GW installed capacity by 2025.	Increase renewable energy production.	Renewable energy projects	Feasibility stage	Renewable energy	CO_2	2025	Private developers, Ministry of Energy	Expected reductions aligned with 1 GW capacity.

6. Summary of greenhouse gas emissions and removals in accordance with the common reporting table 10 emission trends –summary

Category	Year	GHG Emissions (t CO_2e)	Removals (t CO_2e)	Net Emissions/Removals (t CO_2e)	Notes/Source
Hydropower (Renewable Energy)	2024	-	Significant	Net reductions from hydropower.	Électricité du Laos, Ministry of Energy and Mines (installed capacity: 10.16 GW).
Solar Energy	2024	-	-	Minor reductions	Installed capacity: 83 MW, contributing 122.92 GWh/year.
Wind Energy (Monsoon Project)	2024	-	~1,400,000/year	Net reductions ~1,400,000/year.	Monsoon Wind Farm data (600 MW under construction).
Energy Efficiency (Cook Stoves)	2022	~627/year	-	Minor reductions	Estimated from clean cook stove distribution for pilot (300 stoves).

7. Information on projections of greenhouse gas emissions and removals under a 'with measures' scenario a,b

Scenario	Year	Projected GHG Emissions (t CO_2e)	Projected Removals (t CO_2e)	Net Emissions/Removals (t CO_2e)	Description
Hydropower Development	2030	-	Significant (up to 13 GW).	Large net reductions.	Achieve 13 GW hydropower capacity, contributing significantly to emission reductions.
Solar Energy Expansion	2030	-	~100,000/year	Net reductions ~100,000/year.	Achieve 1 GW installed capacity for

					solar energy, reducing emissions by replacing fossil fuels.
Wind Energy Projects	2030	-	~1,400,000/year (Monsoon Wind Farm).	Net reductions ~1,400,000/year.	Monsoon Wind Farm and other wind energy projects offset emissions with clean electricity exports.
Energy Efficiency (Cook Stoves)	2030	-	~50,000/year	Net reductions ~50,000/year.	Distribute 50,000 clean cook stoves, reducing GHG emissions and improving energy efficiency.

8. Information on projections of greenhouse gas emissions and removals under a 'with additional measures' scenario

Scenario	Year	Projected GHG Emissions (t CO_2e)	Projected Removals (t CO_2e)	Net Emissions/Removals (t CO_2e)	Description
Hydropower Expansion	2030		Significant (up to 13 GW).	Large net reductions.	Expansion of hydropower capacity to 13 GW, exceeding the original NDC target, further enhancing mitigation.
Enhanced Solar and Wind Energy	2030	-	~1,500,000/year.	Net reductions ~1,500,000/year.	Scaling up renewable energy projects to achieve over 1.5 GW capacity (combined solar and wind).
Energy-Efficient Technologies	2030	-	~75,000/year	Net reductions ~75,000/year.	Increased deployment of energy-efficient technologies, such as clean cook stoves and industrial energy savings.
Emerging Technologies (e.g., CCS)	2030	-	Potentially significant.	To be determined.	Investment in carbon capture and storage (CCS) and advanced renewable technologies for further emissions cuts.

9. Information on projections of greenhouse gas emissions and removals under a 'without measures' scenario

Scenario	Year	Projected GHG Emissions (t CO_2e)	Projected Removals (t CO_2e)	Net Emissions/Removals (t CO_2e)	Description
Business as Usual (No Renewables Expansion)	2030	~70,000,000/year	Negligible	~70,000,000/year	Assumes no expansion of hydropower, solar, or wind energy. GHG emissions remain from fossil fuels.
No Energy Efficiency (Cook Stoves)	2030	~50,000/year	-	~50,000/year	No further adoption of clean cook stoves, leading to continued reliance on fuelwood for cooking.
Limited Renewable Energy Adoption	2030	~5% fossil fuel reduction	Minimal	High net emissions.	Delayed renewable projects, with solar and wind reaching only a fraction of potential capacity.
Net Impact	2020–2030	Increasing annually	-	~70,000,000/year or more	Without measures, there would be no significant reductions in emissions or improvements in removals, resulting in worsening emissions trends and missed NDC targets.

10. Projections of key indicators (a,b)

Sector	Indicator/Target	Achievements	Notes/Remarks
Renewable Energy	Hydropower capacity: 13 GW by 2030.	10.16 GW installed (2024).	On track to achieve target with significant projects under construction.
Renewable Energy	Solar and wind capacity: 1 GW by 2030.	83 MW solar and 600 MW wind (2024).	Solar expected increasing in 2025; additional wind projects planned for completion by 2025.
Energy Efficiency	50,000 clean cook stoves by 2030.	300 stoves distributed (2022).	Achieved 0.6% of the target; Project delayed implementing and effected from pandemic of COVID-19 and financial discontinuation due to economic challenges faced by the country.

11. Key underlying assumptions and parameters used for projections

Parameter/Assumption	Details
Hydropower Expansion	Assumes completion of ongoing and planned projects to achieve 13 GW capacity by 2030.
Solar and Wind Energy Development	Assumes steady growth of solar capacity (83 MW by 2024) and completion of wind farms (1.2 GW by 2025).
Energy Efficiency in Households	Assumes increased funding and production capacity for clean cook stoves, with a target of 50,000 by 2030.
Emission Reduction Metrics	Calculations based on IPCC guidelines and national project data, including t CO_2e/year for all renewables.
Socioeconomic Factors	Includes cost of electricity, energy demand, and funding availability for renewable projects.
External Influences	Assumes no significant disruptions, such as pandemics or economic crises, that could delay projects.

12. Information necessary to track progress on the implementation and achievement of the domestic policies and measures implemented to address the social and economic consequences of response measures

Policy/Measure	Objective	Key Indicators	Social Impacts	Economic Impacts	Tracking Mechanism
Hydropower Development	Increase installed capacity to 13 GW by 2030.	Total installed capacity (GW).	Improved access to reliable and clean electricity.	Increased export revenue and local energy security.	Annual reports from Électricité du Laos and Ministry of Energy.
Solar and Wind Energy Projects	Achieve 1 GW capacity by 2030.	Total installed capacity (MW).	Job creation in renewable energy sectors.	Investment in solar and wind infrastructure.	National renewable energy statistics and project reports.
Clean Cook Stoves Distribution	Distribute 50,000 stoves by 2030.	Number of stoves distributed.	Reduced indoor air pollution and improved health.	Lower fuel costs for households.	Monitoring by Ministry of Energy and Mines.
Energy Efficiency Policies	Promote energy-efficient practices and technologies.	Energy savings metrics (kWh/year).	Enhanced energy use in households and businesses.	Cost savings from reduced energy consumption.	Surveys and annual energy efficiency program reviews.
Wind Farm Projects (e.g., Monsoon Wind)	Offset emissions and produce exportable clean energy.	Annual GHG reductions (t CO_2e).	Regional development and employment opportunities.	Revenue from energy exports to neighboring countries.	MRV systems for wind projects and government energy policies.

3.7.2. CTF for transport sector

1. Structured summary: Description of selected indicators

Indicator to select progress (a)	Information for the reference point(s), baseline(s), base year(s) or starting point(s), as appropriate (b)	Updates in accordance with any recalculation of the GHG inventory, as appropriate (b)	Relation to NDC (c)
Implementation of Bus Rapid Transit (BRT) System in Vientiane	Baseline: No BRT system in 2019. Target: Implementation of ~66 km of BRT routes including non-motorized transport (NMT) components.	Adjustments to include reductions of 25,000 t CO_2e/year from 2023 upon operationalization. Data will be monitored as per Asian Development Bank (ADB) and government metrics.	Contribution to reducing urban transport emissions in line with the 2030 NDC target of sustainable urban transport.
Laos-China Railway		Incorporates yearly GHG emissions reductions monitoring since the railway's operation in 2021. Updated inventory adds new passenger and freight data for greater accuracy in recalculating impact metrics.	Contributes to emissions reductions in freight and passenger transport, aligned with conditional NDC targets for decarbonizing transport.
Electric Vehicle (EV) Development	Baseline: Low EV penetration in 2020 (less than 1%). Target: EVs form 30% of the national fleet by 2030, with interim goals (e.g., 1% penetration by 2025).	In the 2024, a total of 24,426 EVs have been registered in Lao PDR, according to the Lao Vehicle Association, including 8,475 cars and 15,951 two and three wheeled motorcycles. Compared to the 20,000 EVs, the goal has already been exceeded by 22.13% and compared 2030 target of 200,000 EVs was achieved only 12.2%. The shift to EVs has reduced fuel imports by approximately 2,213,000 liters and lowered CO_2 emissions by around 5,089.9 t CO_2. Approximately 7,638,560 kWh of electricity has been used, with 67.19% (5,132,730 kWh) consumed in the residential sector and 32.80% (2,505,830 kWh) utilized at charging stations.	Supports transition to low-carbon transport aligned with conditional NDC targets to reduce emissions through electrification and lower reliance on fossil fuels.
Biofuel Production	Baseline: Minimal biofuel production capacity in 2020. Target: Reach 10% of transport fuels via biofuels, with an estimated 29,000 t CO_2e/year reduction by 2030.	GHG inventory includes biofuel production metrics and adjustments to project timelines (12-year Helimax project). Recalculations may change based on actual production rates and facility completions by 2025.	Supports renewable fuel targets in transport, conditional NDC alignment for diversification of energy sources to meet emissions reductions.

Energy Efficiency in Transport	Baseline: Business-as-usual (BAU) energy consumption in transport, 2020. Target: 10% reduction in final energy use by 2030 (280,000 t CO_2e/year reduction).	Updates align with regulations and energy-efficient technology adoption. Progress in monitoring is slow but includes energy efficiency measures in industry and transport.	Aligns with conditional NDC targets for demand-side management and energy-efficient pra

2. Structured summary: Definitions needed to understand NDC

	Definitions
Definition needed to understand each indicator:	
{Indicator}	Sustainable urban transport (BRT), railway electrification, EV penetration, biofuel use, and energy efficiency improvements.
Any sector or category defined differently than in the national inventory report	
Sector	Transport sector, including urban public transit, railways, and electric vehicles.
Category	Sustainable urban transport; railway electrification; EV infrastructure.
Category	Sustainable urban transport; railway electrification; EV infrastructure.
Definition needed to understand mitigation co-benefits of adaptation actions and/or economic diversification plans:	
{Mitigation co-benefit(s)}	Reduced reliance on fossil fuels, improved air quality, urban mobility, and economic growth through enhanced infrastructure.
Definition needed to understand mitigation co-benefits. benefits of adaptation actions and/or economic diversification plans:	Reduced reliance on fossil fuels, improved air quality, urban mobility, and economic growth through enhanced infrastructure.
Any other relevant definitions	Collaborative public and private sector investments; incentives for EV adoption; integration of public transport networks for reducing traffic emissions.
{...}	

3. Structured summary: Methodologies and accounting approaches – consistency with Article 4, paragraphs 13 and 14, of the Paris Agreement and with decision 4/CMA.1

NDC			**Description or reference to the relevant section of the BTR**
Transport NAMA	Accounting approach, including how it is consistent with Article 4, paragraphs 13–14, of the Paris Agreement (para. 71 of the MPGs)		
	Accounting for anthropogenic emissions and removals in accordance with methodologies and common metrics assessed by the IPCC and adopted by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement:	Each methodology and/or accounting approach used to assess the implementation and achievement of the target(s), as applicable (para. 74(a) of the MPGs)	Emission reductions in transport sector: 25,000 t CO_2e/year (BRT system), 300,000 t CO_2e/year (Laos-China Railway), and additional reductions from EV adoption.

		Each methodology and/or accounting approach used for the construction of any baseline, to the extent possible (para. 74(b) of the MPGs)	Baseline emissions are calculated based on business-as-usual (BAU) transport fuel consumption and emissions data (pre-2020).
		If the methodology or accounting approach used for the indicator(s) differs from those used to assess the implementation and achievement of the target, describe each methodology or accounting approach used (para. 74(c) of the MPGs)	Project-specific methodologies include electrified rail emissions reduction calculations, vehicle fleet transition metrics, and transport modal shift impact assessments.
		Any conditions and assumptions relevant to the achievement of the NDC under Article 4, as applicable and available (para. 75(i) of the MPGs)	Assumptions include continued infrastructure funding (ADB and EIB), growth in EV adoption, and supportive policies for sustainable transport.
		Key parameters, assumptions, definitions, data sources and models used, as applicable and available (para. 75(a) of the MPGs)	Parameters include distance traveled by BRT, Laos-China Railway traffic volumes, and annual EV penetration. Data sources include Ministry of Public Works and Transport (MPWT) and IPCC guidelines.
		IPCC Guidelines used, as applicable and available (para. 75(b) of the MPGs)	IPCC 2006 Guidelines and related transport-sector-specific methodologies.
		Report the metrics used, as applicable and available (para. 75(c) of the MPGs)	Metrics include kilometers of electrified rail, EV penetration percentage, and t CO_2e reduction per project.
		For Parties whose NDC cannot be accounted for using methodologies covered by IPCC guidelines, provide information on their own methodology used, if applicable (para. 1(b) of annex II to decision 4/CMA.1)	Lao PDR supplements IPCC methodologies with project-specific assessments for transport infrastructure and EV incentives.
		Provide information on methodologies used to track	MRV systems track BRT construction

		progress arising from the implementation of policies and measures (para. 1(d) of annex II to decision 4/CMA.1)	progress, railway emissions reductions, and EV adoption.
		Where applicable to its NDC, any sector-, category- or activity-specific assumptions, methodologies and approaches consistent with IPCC guidance (para. 75(d) of the MPGs)	Assumptions include population growth, urbanization trends, and technological adoption of EVs and biofuels.
		How the Party has drawn on existing methods and guidance established under the Convention and its related legal instruments, if applicable (para. 1(c) of annex II to decision 4/CMA.1)	Guidance from UNFCCC, IPCC, and ADB transport guidelines.
		Explain how consistency has been maintained between any GHG data and estimation methodologies used for accounting and the Party's GHG inventory, pursuant to Article 13, paragraph 7(a), of the Paris Agreement, if applicable (para. 2(b) of annex II to decision 4/CMA.1) and explain methodological inconsistencies with the Party's most recent national inventory report, if applicable (para. 76(c) of the MPGs)	Methodological consistency ensured via IPCC guidelines, sector-specific MRV systems, and collaboration with international stakeholders.
		For Parties that address the effects of age-class structure in forests, provide detailed information (para. 1(g) of annex II to decision 4/CMA.1)	Not applicable to energy sector.
		How the Party has drawn on existing methods and guidance established under the Convention and its related legal instruments, if applicable (para. 1(c) of annex II to decision 4/CMA.1)	Guidance from UNFCCC and IPCC reports used to align renewable energy tracking and MRV systems with national targets.
		Any methodologies used to account for mitigation co-benefits of adaptation actions and/or economic diversification plans (para. 75(e) of the MPGs)	Mitigation co-benefits tracked via clean cook stove adoption, which reduces GHG emissions and improves household energy efficiency.
		Describe how double counting of net GHG emission reductions has been avoided, including in accordance with guidance developed related to Article 6 if relevant (para. 76(d) of the MPGs)	Double counting avoided through centralized national reporting mechanisms and project-level MRV systems.
		Any other methodologies related to the NDC under Article 4 (para. 75(h) of the MPGs)	Renewable energy and energy efficiency methodologies align with national inventory reporting

			requirements and the NDC targets.
	Ensuring methodological consistency, including on baselines, between the communication and implementation of NDCs (para. 12(b) of the decision 4/CMA.1):	Ensuring methodological consistency, including on baselines, between the communication and implementation of NDCs (para. 12(b) of the decision 4/CMA.1):	Consistency maintained through IPCC Guidelines, UNFCCC frameworks, and renewable energy project reports.
		Explain how consistency has been maintained between any GHG data and estimation methodologies used for accounting and the Party's GHG inventory, pursuant to Article 13, paragraph 7(a), of the Paris Agreement, if applicable (para. 2(b) of annex II to decision 4/CMA.1) and explain methodological inconsistencies with the Party's most recent national inventory report, if applicable (para. 76(c) of the MPGs)	Consistency maintained through IPCC Guidelines, UNFCCC frameworks, and renewable energy project reports.

4. Structured summary: Tracking progress made in implementing and achieving the NDC under Article 4 of the Paris Agreement

	Unit, as applicable	Reference point(s), level(s), baseline(s), base year(s) or starting point(s){MPGs, p. 67, 77(a)(i)}	Implementation period of the NDC covering information for previous reporting years and the most recent year, including the end year or end of period {MPGs, p. 68, 77(a)(ii–iii)}						Target level	Target year or period	**Progress made towards the NDC, as determined by comparing the most recent information for each selected indicator, including for the end year or end of period, with the reference point(s), level(s), baseline(s), base year(s) or starting point(s) (paras. 69–70 of the MPGs)**
			2019	2020	2021	2022	2023	2024			
Indicator(s) selected to track progress towards the implementation and/or achievement of the NDC under Article 4 of the Paris Agreement[c]: {MPGs, p. 65, 77(a)}											
Electric Vehicles (EVs)	t CO_2e/year	30% EV penetration targeted						24,426 of the EVs	30,000 tCO_2e	2030	EV penetration is growing but limited by infrastructure; Compared to target 2025 of 20,000 EVs

											was already been exceeded by 22.13% and compared 2030 target of 200,000 EVs was achieved only 12.2%.
Biofuel production	t CO_2e/year	10% of transport fuels (29,000 t CO_2e/year reduction)			2022: Project initiated but only 1% of target reached so far				29,000 t CO_2e	2030	Biofuel project has low progress; uncertainty remains on reaching 10% of transport fuels target
Energy efficiency (Transport)	t CO_2e/year	280,000 t CO_2e/year reduction (10% final energy consumption reduction)							280,000 t CO_2e	2030	Regulatory progress made but no projects underway; potential challenges due to urban development
Biomass energy installed capacity	MW / GWh/year	300 MW target						2024: 112 MW operational with 702.71 GWh/year production	300 MW	2030	Biomass contributes 37.3% of NDC target; further projects in progress

5.Mitigation policies and measures, actions and plans, including those with mitigation co-benefits resulting from adaptation actions and economic diversification plans, related to implementing and achieving a nationally determined contribution under Article 4 of the Paris Agreement (a, b)

Name (c)	Description (d,e,f)	Objectives	Type of instrument (g)	Status (h)	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimates of GHG emission reductions ($ktCO_2eq$) (j, k)
Bus Rapid Transit (BRT)	Construction of ~66 km of BRT routes and bus stations; includes traffic management systems, public bus services, and EV buses for Vientiane Capital.	Improve urban mobility and reduce GHG emissions.	Infrastructure and transportation policy	63% complete	Urban transport	CO_2	2023	Ministry of Public Works and Transport (MPWT), ADB	25 kt CO_2e/year

Laos-China Railway	Electrified railway connecting Lao PDR to China and other trade partners, enhancing regional connectivity and tourism.	Reduce dependency on road freight and passenger transport.	Infrastructure and transport project	Completed in 2021	Freight and passenger transport	CO_2	2016	Lao-China Railway Corporation, Belt and Road Initiative	300 kt CO_2e/year
Electric Vehicles (EVs)	Promotion of EV use with a target of 30% of the national fleet by 2030; includes development of EV charging stations and incentives for adoption.	Reduce fossil fuel consumption and transport emissions.	Policy incentives and infrastructure	Ongoing	Passenger and commercial vehicles	CO_2	2017	Ministry of Energy and Mines (MEM), private sector	30 kt CO_2e/year
Biofuel Use	Development of biofuel production facilities with a goal of biofuels meeting 10% of transport fuel demand by 2030.	Reduce reliance on imported petroleum products.	Public-private partnership and projects	Limited progress	Transport fuel	CO_2	2022	Premium Alternative Fuel Helimax	29 kt CO_2e/year
Energy Efficiency in Transport	Reduction of final energy consumption in transport sector by 10% by 2030 through efficiency measures and energy-saving policies.	Reduce energy demand and improve efficiency.	Regulation and public awareness	No active projects	Transport sector	CO_2	N/A	Ministry of Energy and Mines (MEM)	280 kt CO_2e/year

6. Summary of greenhouse gas emissions and removals in accordance with the common reporting table 10 emission trends –summary

Category	**Year**	**GHG Emissions (t CO_2e)**	**Removals (t CO_2e)**	**Net Emissions/Removals (t CO_2e)**	**Notes/Source**
us Rapid Transit	2024	25,000	N/A	25,000	Asian Development Bank (ADB) Report, MPWT progress report.
Laos-China Railway	2023	300,000	N/A	300,000	Ministry of Public Works and Transport (MPWT),

					operational statistics from Lao-China Railway Limited Company .
Electric Vehicles	2024	30,000	N/A	30,000	MEM reports and EV import/export data.
Biofuels	2023	29,000	N/A	29,000	Project documentation from Premium Alternative Fuel Helimax.
Energy Efficiency	2030	280,000	N/A	280,000	National Energy Strategy report by MEM.

7. Information on projections of greenhouse gas emissions and removals under a 'with measures' scenario a,b

Scenario	Year	Projected GHG Emissions (t CO_2e)	Projected Removals (t CO_2e)	Net Emissions/Removals (t CO_2e)	Description
Bus Rapid Transit (BRT)	2030	25,000	N/A	25,000	The Vientiane Capital Sustainable Urban Transport Project to establish BRT reduces emissions.
Lao-China Railway	2030	300,000	N/A	300,000	Electrified high-speed railway reducing emissions and promoting trade and tourism.
Electric Vehicles (EVs)	2030	30,000	N/A	30,000	Increase in EV usage supported by national policies and charging infrastructure development.
Biofuels	2030	29,000	N/A	29,000	Premium Alternative Fuel Helimax project producing biofuels to replace petrol.
Energy Efficiency	2030	280,000	N/A	280,000	10% reduction in energy consumption compared to the business-as-usual scenario.

8. Information on projections of greenhouse gas emissions and removals under a 'with additional measures' scenario

Scenario	Year	Projected GHG Emissions (t CO_2e)	Projected Removals (t CO_2e)	Net Emissions/Removals (t CO_2e)	Description
Enhanced BRT Expansion	2030	15,000	N/A	15,000	Expansion of the Bus Rapid Transit (BRT) system to include additional routes and use of electric buses.
Expanded EV Penetration	2030	50,000	N/A	50,000	Enhanced incentives and infrastructure to increase the adoption of electric vehicles nationwide.
Biofuel Production Boost	2030	40,000	N/A	40,000	Increased investment in biofuel production to achieve 10% of transport fuel usage in Lao PDR.

Rail Connectivity Upgrade	2030	400,000	N/A	400,000	Additional electrified railway lines and improved cargo/passenger capacity for emission reductions.

9. Information on projections of greenhouse gas emissions and removals under a 'without measures' scenario

Scenario	Year	Projected GHG Emissions (t CO_2e)	Projected Removals (t CO_2e)	Net Emissions/Removals (t CO_2e)	Description
Current Business-as-Usual	2030	1,500,000	N/A	1,500,000	Emissions from the continued use of fossil fuel-based vehicles without intervention or promotion of EVs.
Railway Delayed Integration	2030	450,000	N/A	450,000	Without the completion of the Lao-China Railway, the sector misses potential emission reductions.
No EV Adoption	2030	700,000	N/A	700,000	Lack of EV adoption leads to reliance on conventional vehicles, increasing transport sector emissions.
Biofuel Development Stalled	2030	500,000	N/A	500,000	No progress on biofuel projects keeps dependency on petroleum fuels, failing to reduce emissions effectively.
Energy Efficiency Lacking	2030	400,000	N/A	400,000	Failure to improve energy efficiency in transportation systems results in higher energy demand and emissions.

10. Projections of key indicators (a,b)

Sector	Indicator/Target	Achievements	Notes/Remarks
Transport	Completion of Vientiane Bus Rapid Transit (BRT) Project	63% completion as of 2023; expected emission reductions of 25,000 t CO_2e/year upon project finalization.	Construction delays due to limited resources and unforeseen challenges. Potential for additional funding required.
Transport	Laos-China Railway operational	Fully completed in 2021; reduced emissions by 300,000 t CO_2e/year; passenger traffic increased by 103.7% in 2023.	Serves as a major driver of regional connectivity and economic growth.
Transport	Electric Vehicle (EV) penetration	The target 2025 of 20,000 EVs was already been exceeded by 22.13% and compared 2030 target of 200,000 EVs was achieved only 12.2%.	Limited charging infrastructure and high upfront costs remain major challenges.
Transport	Biofuel production	Ongoing project with 1% capacity achieved; target to produce 500,000 liters/day by 2030 remains uncertain.	Only one operational biofuel plant; requires increased private sector engagement and policy support.
Transport	Energy efficiency in transport systems	No major projects initiated; regulation on energy efficiency	Growing urbanization and reliance on fossil fuels pose challenges to achieving the

		(e.g., air conditioning) 90% complete.	10% reduction in energy demand.

11. Key underlying assumptions and parameters used for projections

Parameter/Assumption	Details
Completion timelines for transport projects	Assumes the timely completion of the Vientiane BRT project and Laos-China Railway without further delays.
Daily waste and passenger data accuracy	Relies on consistent data collection from the Lao-China Railway and transport agencies for accuracy in GHG emission calculations.
EV adoption growth	Assumes progressive policies and incentives to increase EV adoption to meet 30% of the national vehicle fleet as EVs by 2030.
Charging infrastructure expansion	Expansion of EV charging stations nationwide to facilitate increased EV usage and overcome barriers in rural and underserved areas.
Regulatory support for biofuels	Assumes additional policies and financial incentives to develop biofuel plants and increase production from 1% to meet the 10% transport fuel substitution target by 2030.
Urbanization trends	Takes into account increasing urbanization and its impact on public transportation demand and GHG emissions, focusing on reducing fossil fuel dependency.
Energy efficiency measures	Assumes gradual implementation of energy-efficient regulations, with potential delays due to limited technical capacity and financial constraints in implementation.
Funding commitments	Relies on consistent international financial aid and loans, including from ADB, EIB, and the OPEC Fund, to support transport sector targets and infrastructure development.
Passenger and goods transport trends	Accounts for growth in passenger and goods transportation volumes along the Laos-China Railway and other major projects to estimate emissions reductions and economic impacts.

12. Information necessary to track progress on the implementation and achievement of the domestic policies and measures implemented to address the social and economic consequences of response measures

Policy/Measure	Objective	Key Indicators	Social Impacts	Economic Impacts	Tracking Mechanism
Vientiane BRT Project	Improve urban mobility and reduce GHG emissions in Vientiane.	Percentage of construction completed, number of passengers served annually, reduction in GHG emissions (t CO_2e).	Enhanced accessibility for urban residents; improved public transportation options.	Reduced fuel dependency; cost savings for commuters; employment opportunities in construction and maintenance.	Monthly progress reports; project completion status; data from traffic management systems.
Laos-China Railway	Facilitate regional trade, reduce	Number of passengers and freight	Better regional connectivity; increased	Boosted trade and tourism; increased GDP	Annual passenger and freight reports;

	emissions, and support economic development.	transported annually; reduction in GHG emissions (t CO_2e/year).	access to economic opportunities; reduced traffic congestion.	contribution; long-term infrastructure investments.	operational data from railway authorities.
EV Adoption (National Target: 30% EVs)	Transition to a cleaner national vehicle fleet to reduce emissions.	Number of EVs registered; number of charging stations installed; reduction in GHG emissions (t CO_2e/year).	Improved air quality in urban areas; reduced noise pollution; enhanced public health.	Reduced fuel import dependency; development of EV-related industries and infrastructure; economic incentives for EV buyers.	Vehicle registration data; energy consumption data from EVs; progress on charging infrastructure expansion.
Biofuel Initiative	Reduce fossil fuel dependency through biofuel production.	Biofuel production capacity (liters/day); share of biofuels in total transport fuel consumption.	Job creation in biofuel production facilities; reduced reliance on imported fuels.	Improved energy security; diversification of energy sources; potential reduction in fuel costs.	Production data from biofuel plants; periodic reports from biofuel regulatory authorities.
Energy Efficiency in Transport	Achieve a 10% reduction in final energy consumption by 2030.	Reduction in transport sector energy consumption; implementation of energy efficiency regulations.	Lower energy costs for transport sector stakeholders; better resource utilization.	Reduced operational costs for industries and transportation; minimized strain on national energy supply.	Periodic energy audits; monitoring of regulatory compliance; reports on energy consumption trends in the transport sector.

3.7.3. CTF for AFOLU sector

1. Structured summary: Description of selected indicators

	Description		
Indicator to select progress (a)	**Information for the reference point(s), level(s), baseline(s), base year(s) or starting point(s), as appropriate (b)**	**Updates in accordance with any recalculation of the GHG inventory, as appropriate (b)**	**Relation to NDC (c)**
Reduced emissions from deforestation and forest degradation, foster conservation, sustainable management of forests, buffer zones, and enhancement of forest carbon stocks.	Baseline data: 1,100,000 t CO_2e/year (2020–2030); Average annual GHG emissions as the key indicator. Estimated reductions: 3,204,614 t CO_2e (2019–2021) or 1,068,205 t CO_2e/year (Promoting REDD+ Project).	Assessment for 2022–2024 projects under MRV shows expected reductions of 5,000,000 t CO_2e (1,666,667 t CO_2e/year). Combined projects are estimated to achieve 18,200,000 t CO_2e reductions (1,820,000 t CO_2e/year).	Meets and exceeds the unconditional target of 1,100,000 t CO_2e/year for 2020–2030. Requires improved MRV capacities for annual/bi-annual monitoring of project contributions.

Increased forest cover to 70% of land area (i.e., 16.58 million hectares) through reduced deforestation, forest degradation, conservation, and sustainable management of forests.	Baseline: Forest cover was 48% (2010) and increased to 57% (2022) or 13,142,040 hectares. Additional 13% (approximately 3.4 million hectares) required to meet the target. Approximately 6,245,493 hectares identified as potential forest areas.	Current forest cover progress achieved via 20 projects under implementation (2024). Net emissions in 2022 were about 58,911,000 t CO_2e, as reported by NFI3.	Conditional target under the NDC. Requires forest rehabilitation and restoration to achieve 70% forest cover by 2030 or 2035 (National Forest Strategy).
Adjusted water management in lowland rice cultivation for climate-smart agriculture.	Conditional target: Adjust water management for 50,000 hectares. From 2019–2022, managed an average of 96,468 hectares/year, exceeding the target.	Annual irrigated area: 94,043 ha (2019), 96,193 ha (2020), 99,238 ha (2021), and 97,917 ha (2022). Contributed by 11 projects under the Department of Irrigation.	Exceeds the conditional NDC target of 50,000 hectares for adjusted water management in lowland rice cultivation. Stakeholder engagement and workshops address challenges and ensure continuous improvement.

2. Structured summary: Definitions needed to understand NDC

	Definitions
Definition needed to understand each indicator:	
{Indicator}	4.5%/year average CO_2 emissions through reduced emissions from deforestation and forest degradation, foster conservation, sustainable management of forests, and enhancement of forest carbon stocks, Increased forest cover to 70% of the total land area (i.e., to 16.58 million hectares) through reduced emissions from deforestation and forest degradation, forest conservation, sustainable management of forests, and enhancement of forest carbon stocks or REDD+, 50,000 hectares using adjusted water management practices in lowland rice cultivation
Any sector or category defined differently than in the national inventory report	
Sector	Agriculture, Forestry, and Other Land Use (AFOLU).
Category	Forestry sector (including deforestation, forest degradation, afforestation, reforestation, and sustainable forest management).
Category	Agriculture sector (e.g., adjusted water management in lowland rice cultivation).
Definition needed to understand mitigation co-benefits of adaptation actions and/or economic diversification plans:	
{Mitigation co-benefit(s)}	Mitigation co-benefits are emission reductions achieved indirectly as a result of adaptation measures, such as forest restoration (e.g., through REDD+) or improved agricultural practices (e.g., adjusted water management).
Definition needed to understand mitigation co-benefits. benefits of adaptation actions and/or economic diversification plans:	Mitigation co-benefits in this context focus on actions like promoting sustainable forest management, increasing forest cover, and adjusting water use in agriculture to achieve both mitigation and resilience goals.

Any other relevant definitions	REDD+ (Reducing Emissions from Deforestation and Forest Degradation) – A framework to incentivize forest conservation and sustainable management while reducing emissions.
{...}	

3. Structured summary: Methodologies and accounting approaches – consistency with Article 4, paragraphs 13 and 14, of the Paris Agreement and with decision 4/CMA.1

NDC			**Description or reference to the relevant section of the BTR**
Transport NAMA	Accounting approach, including how it is consistent with Article 4, paragraphs 13–14, of the Paris Agreement (para. 71 of the MPGs)		
	Accounting for anthropogenic emissions and removals in accordance with methodologies and common metrics assessed by the IPCC and adopted by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement:	Each methodology and/or accounting approach used to assess the implementation and achievement of the target(s), as applicable (para. 74(a) of the MPGs)	Emission reductions in AFOLU sector: 18,200,000 t CO_2e reductions over the 10-year NDC implementation period (2020–2030), with a combination of projects exceeding the unconditional target of 1,100,000 t CO_2e annually. Methods based on IPCC Guidelines and satellite monitoring systems.
		Each methodology and/or accounting approach used for the construction of any baseline, to the extent possible (para. 74(b) of the MPGs)	Baselines were constructed using satellite imagery for forest cover monitoring, national forest inventory (NFI) data, and project-level MRV systems in collaboration with Japanese experts.
		If the methodology or accounting approach used for the indicator(s) in table 1 differ from those used to assess the implementation and achievement the target, describe each methodology or accounting approach used to generate the information generated for each indicator in the tables 4 and 5 (para. 74(c) of the MPGs)	Methodologies align with REDD+ and IPCC standards; no significant differences reported between project-level and national-level accounting for forest-related indicators.
		Any conditions and assumptions relevant to the achievement of the NDC under Article 4, as applicable and available (para. 75(i) of the MPGs)	Assumptions include the continuation of existing funding and policies for forest restoration and sustainable land use management, as well as consistent

			implementation of mitigation projects like REDD+.
		Key parameters, assumptions, definitions, data sources and models used, as applicable and available (para. 75(a) of the MPGs	Parameters include forest cover data (57% as of 2022), GHG reductions from forest conservation and agriculture. Data sources include satellite images, NFI, and project MRV systems. Models used include IPCC emission factors.
		IPCC Guidelines used, as applicable and available (para. 75(b) of the MPGs	IPCC 2006 Guidelines and Good Practice Guidance for Land Use, Land-Use Change, and Forestry (LULUCF).
		Report the metrics used, as applicable and available (para. 75(c) of the MPGs)	Metrics include t CO_2e/year for emission reductions, forest area in hectares (ha), and adjusted water management area for agriculture.
		For Parties whose NDC cannot be accounted for using methodologies covered by IPCC guidelines, provide information on their own methodology used, including for NDCs, pursuant to Article 4, paragraph 6, of the Paris Agreement, if applicable (para. 1(b) of annex II to decision 4/CMA.1)	Lao PDR uses IPCC Guidelines but supplements with national forest inventory and project-specific MRV approaches for additional accuracy.
		Provide information on methodologies used to track progress arising from the implementation of policies and measures, as appropriate (para. 1(d) of annex II to decision 4/CMA.1)	Progress tracked through project-level MRV systems, periodic forest mapping, and annual evaluations of adjusted agricultural practices.
		Where applicable to its NDC, any sector-, category- or activity-specific assumptions, methodologies and approaches consistent with IPCC guidance, taking into account any relevant decision under the Convention, as applicable (para. 75(d) of the MPGs	Forestry sector: REDD+ methodologies, sustainable land use, and satellite monitoring. Agriculture sector: adjusted water management practices to reduce emissions and improve efficiency.
		For Parties that address emissions and subsequent removals from natural disturbances on managed	Forest restoration and management projects

		lands, provide detailed information on the approach used and how it is consistent with relevant IPCC guidance, as appropriate, or indicate the relevant section of the national GHG inventory report containing that information (para. 1(e) of annex II to decision 4/CMA.1, para. 75(d)(i) of the MPGs)	include monitoring and reporting emissions/removals from natural disturbances like fires and deforestation, aligning with IPCC guidance.
		For Parties that account for emissions and removals from harvested wood products, provide detailed information on which IPCC approach has been used to estimate emissions and removals (para. 1(f) of annex II to decision 4/CMA.1, para. 75(d)(ii) of the MPGs)	Not specifically addressed in the provided data; standard IPCC guidelines for harvested wood products are assumed.
		For Parties that address the effects of age-class structure in forests, provide detailed information on the approach used and how this is consistent with relevant IPCC guidance, as appropriate (para. 1(g) of annex II to decision 4/CMA.1, para. 75(d)(iii) of the MPGs)	Forest cover age-class structure accounted for indirectly through national forest inventory and satellite imagery analyses.
		How the Party has drawn on existing methods and guidance established under the Convention and its related legal instruments, as appropriate, if applicable (para. 1(c) of annex II to decision 4/CMA.1)	Guidance from the UNFCCC, REDD+, and IPCC reports form the basis for methodologies used.
		Any methodologies used to account for mitigation co- benefits of adaptation actions and/or economic diversification plans (para. 75(e) of the MPGs)	Adaptation projects (e.g., water management for rice cultivation) have provided mitigation co-benefits by reducing emissions and improving land-use efficiency.
		Describe how double counting of net GHG emission reductions has been avoided, including in accordance with guidance developed related to Article 6 if relevant (para. 76(d) of the MPGs)	Double counting avoided by using centralized national reporting mechanisms and project-level MRV systems integrated with the national GHG inventory.
		Any other methodologies related to the NDC under Article 4 (para. 75(h) of the MPGs	Methodologies align with NDC reporting requirements, combining REDD+ frameworks, IPCC Guidelines, and national forest strategies.
	Ensuring methodological consistency, including on baselines, between the	Explain how consistency has been maintained in scope and coverage, definitions, data sources, metrics, assumptions and methodological approaches including on baselines, between the communication and implementation of NDCs (para. 2(a) of annex II to decision 4/CMA.1)	Consistency maintained through alignment with IPCC Guidelines, UNFCCC methodologies, and regular national

	communication and implementation of NDCs (para. 12(b) of the decision 4/CMA.1):		inventory updates, ensuring accurate baseline data.
		Explain how consistency has been maintained between any GHG data and estimation methodologies used for accounting and the Party's GHG inventory, pursuant to Article 13, paragraph 7(a), of the Paris Agreement, if applicable (para. 2(b) of annex II to decision 4/CMA.1) and explain methodological inconsistencies with the Party's most recent national inventory report, if applicable (para. 76(c) of the MPGs)	Methodologies and data sources from the national GHG inventory (e.g., NFI and satellite imagery) are consistently applied across all NDC-related accounting and reporting processe

4. Structured summary: Tracking progress made in implementing and achieving the NDC under Article 4 of the Paris Agreement

	Reference point(s), level(s), baseline(s), base year(s) or starting point(s){MPGs, p. 67, 77(a)(i)}	Implementation period of the NDC covering information for previous reporting years and the most recent year, including the end year or end of period {MPGs, p. 68, 77(a)(ii–iii)}						Target level	Target year or period	Progress made towards the NDC, as determined by comparing the most recent information for each selected indicator, including for the end year or end of period, with the reference point(s), level(s), baseline(s), base year(s) or starting point(s) (paras. 69–70 of the MPGs)
		2019	2020	2021	2022	2023	2024			
Indicator(s) selected to track progress towards the implementation and/or achievement of the NDC under Article 4 of the Paris Agreement[c]: {MPGs, p. 65, 77(a)}										
{Indicator}										
Reduced emissions from deforestation and forest degradation, foster conservation, sustainable management of forests, buffer zones of national parks and other preserves, and enhancement of forest carbon stocks.	42,758	1,068	1,068	1,068	1,068			1,100	2030	Significant contribution from REDD+ and I-GFLL project, with 3,204,614 t CO_2e removed between 2019-2020
Where applicable, total GHG emissions and removals consistent with the coverage of the NDC {MPGs, p. 77(b)}	10689.5									
Contribution from the LULUCF sector for each year of the target period or target year, if not included in the inventory time series of total net GHG emissions and										

removals, as applicable {MPGs, p. 77(c)}										
Forest cover increase to 70% of total land area	48% (2010) to 57% (13.14 million ha) in 2022					Forest Cover at 57%		16.58 million ha	2030/2035	Forest cover increased by 9% between 2010-2022; 27.1% potential forest land (6.25 million ha) identified for restoration
Agriculture - Adjusted water management practices in lowland rice cultivation	50,000 ha NDC target		Avg. of 96,468 ha per year achieved, exceeding the target by almost 2x					50,000 ha	2030	Water management practices exceeded the NDC target, with a total of 94,043 ha in 2019 and 97,917 ha in 2021

5. Structured summary: Mitigation policies and measures, actions and plans, including those with mitigation co-benefits resulting from adaptation actions and economic diversification plans, related to implementing and achieving a nationally determined contribution under Article 4 of the Paris Agreement (a, b)

Name (c)	Description (d,e,f)	Objectives	Type of instrument (g)	Status (h)	Sector(s) affected	Gases affected	Start year of implementation	Implementing entity or entities	Estimates of GHG emission reductions (kt CO_2eq) (j, k)
Promoting REDD+ through Governance, Forest Landscapes and Livelihoods in Northern Lao PDR	A project focusing on sustainable forest management, forest conservation, and reducing deforestation and degradation in Northern Laos.	Reduce deforestation, enhance carbon stocks, and support local livelihoods through improved forest governance.	Project-level initiative	Completed (2019–2021)	Forestry	CO_2	2019	DoF, FIPD, and Japanese experts	3,204.614 kt CO_2eq removed (1,068.205 kt CO_2eq annually)
Scaling up Lao PDR Emission Reductions Program (I-GFLL)	Focused on improved governance, forest management, and landscape restoration in 6 provinces in Northern Laos.	Achieve emission reductions through improved governance and sustainable forest management practices.	Program-level initiative	Ongoing (2021–2027)	Forestry	CO_2	2021	DoF, MAF, and international partners	10,000 kt CO_2eq over project lifetime
Lao Landscapes and Livelihoods Project (LLL)	Project aimed at improving protected area management, promoting sustainable forest use, and building natural capital in selected landscapes.	Promote sustainable livelihoods, landscape restoration, and biodiversity conservation while contributing to national GHG reduction targets.	Project-level initiative	Ongoing (2021–2027)	Forestry, biodiversity	CO_2	2021	DoF, MAF, and ODA donors	Expected 10,000 kt CO_2eq over project lifetime
Adjusted Water Management in Lowland Rice Cultivation	Promotion of water management practices in rice cultivation to reduce GHG	Reduce methane emissions from rice paddies and improve agricultural	Agricultural practice reform	Ongoing (2019–2022)	Agriculture	CH_4	2019	Department of Irrigation, MAF	Exceeded target, averaging 96,468 ha/year (target:

	emissions and improve efficiency.	water efficiency.							50,000 ha/year)
National Forest Strategy	Strategy to increase forest cover to 70% of total land area (16.58 million hectares) through conservation, restoration, and afforestation.	Enhance forest cover, conserve biodiversity, and improve carbon sequestration capacity.	Policy and strategic planning	Ongoing (target: 2030)	Forestry, biodiversity, land use	CO_2	2020	Ministry of Agriculture and Forestry (MAF), supported by multiple national and international organizations	Incremental forest cover increases from 57% (2022) to 70% by 2030

6. Structured summary: Summary of greenhouse gas emissions and removals in accordance with the common reporting table 10 emission trends –summary

Category	Year	GHG Emissions (t CO_2e)	Removals (t CO_2e)	Net Emissions/Removals (t CO_2e)	Notes/Source
National Emissions (Overall)	2022	58,911,000	-	58,911,000	Based on NFI3 (National Forest Inventory data).
Promoting REDD+ (Northern Laos)	2019–2021	-	3,204,614 (total, 3 years)	-	Annual average removal of 1,068,205 t CO_2e.
I-GFLL Project	2021–2027	-	10,000,000 (total, 7 years)	-	Expected total removals over project lifespan.
Lao Landscapes and Livelihoods (LLL)	2021–2027	-	10,000,000 (total, 7 years)	-	Expected removals aligned with NDC commitments.
Adjusted Water Management in Rice	2019–2022	Reduction of CH_4 emissions in 96,468 ha/year	-	Reduction exceeded NDC target for agriculture.	
National Forest Strategy (Forest Cover)	2022	-	Additional removals via increased forest cover from 57% (2022) to 70% (2030 target).	-	Requires restoration of 3.4 million hectares to achieve target.
Total Expected Contribution (2020–2030)	2020–2030	-	18,200,000	-	Combined removals from forestry and agricultural initiatives exceed the NDC unconditional target.

7. Information on projections of greenhouse gas emissions and removals under a 'with measures' scenario a,b

Scenario	Year	Projected GHG Emissions (t CO_2e)	Projected Removals (t CO_2e)	Net Emissions/Removals (t CO_2e)	Description

Business-as-Usual (BAU)	2020–2030	70,000,000/year (estimated)	-	70,000,000/year	Projected emissions without mitigation measures in place, assuming continued deforestation, forest degradation, and unchanged agricultural practices.
With Measures: Promoting REDD+	2020–2030	-	18,200,000 (cumulative over 10 years)	-51,800,000 (reduced net emissions)	Includes reductions from deforestation prevention, forest conservation, and REDD+ projects implemented nationwide.
With Measures: Adjusted Water Management	2020–2030	Reduction of CH_4 from 96,468 ha/year	-	-	Methane emissions reduced due to improved water management in rice cultivation. Exceeds target area for agricultural mitigation practices under NDC.
Forestry Sector: Increased Forest Cover	2022–2030	-	Additional 3.4 million ha restored	-	Target to achieve 70% forest cover (16.58 million ha) by 2030 through afforestation, reforestation, and improved forest management practices.
Overall with Measures (Projected)	2020–2030	Reduction from BAU baseline (~20–30%)	~18,200,000 (forest sector only)	~50,000,000/year by 2030	Combines forestry, agriculture, and land-use measures with sustained emission reductions and increased carbon sequestration to meet/exceed NDC targets

8. Information on projections of greenhouse gas emissions and removals under a 'with additional measures' scenario

Scenario	Year	Projected GHG Emissions (t CO_2e)	Projected Removals (t CO_2e)	Net Emissions/Removals (t CO_2e)	Description
Business-as-Usual (BAU)	2020–2030	70,000,000/year	-	70,000,000/year	Emissions scenario without implementation of mitigation or additional measures.
With Measures	2020–2030	~20–30% reduction from BAU	18,200,000 cumulative (forestry)	~50,000,000/year by 2030	Reduction achieved through REDD+ projects, adjusted water management in agriculture, and existing reforestation efforts under the NDC.
With Additional Measures	2022–2030	~40% reduction from BAU	~25,000,000 cumulative (forestry)	~42,000,000/year by 2030	Includes enhanced forest restoration, large-scale afforestation, expanded agricultural practices, and strengthened MRV systems for annual/bi-annual performance tracking.
Enhanced Forest Restoration	2022–2030	-	~6,800,000 additional	-	Additional forest areas restored or reforested to

and Afforestation			hectares (target)		achieve >70% forest cover, exceeding the NDC goals.
Improved Agricultural Practices	2022–2030	Expanded methane reduction in rice fields	-	-	Scaling up water management practices and promoting low-emission crops to achieve deeper reductions in methane emissions.
National Emission Reductions (Total)	2020–2030	~50% reduction from BAU	25,000,000 cumulative (all sectors)	~35,000,000/year by 2030	Combining enhanced measures across all sectors (forestry, agriculture, energy) to exceed NDC conditional and unconditional targets.

9. Information on projections of greenhouse gas emissions and removals under a 'without measures' scenario

Scenario	Year	Projected GHG Emissions (t CO_2e)	Projected Removals (t CO_2e)	Net Emissions/Removals (t CO_2e)	Description
Without Measures (BAU)	2020–2030	70,000,000/year	-	70,000,000/year	Represents emissions in the absence of mitigation measures such as REDD+, reforestation, sustainable land use, and water management in agriculture.
Deforestation and Degradation	2020–2030	Increasing by 5% annually	-	Increasing annually	Without measures, deforestation and forest degradation would continue, leading to an annual increase in emissions and a loss of natural carbon sinks.
Agriculture (Rice Cultivation)	2020–2030	Methane emissions stable or increasing	-	Stable or increasing	Without intervention, methane emissions from rice cultivation would remain constant or rise slightly due to expanding agricultural activities.
Forestry Sector	2020–2030	-	Decreasing	-	Without restoration and conservation, forest carbon sequestration would decline, reducing the ability to offset emissions.
Net Impact	2020–2030	Increasing annually	-	~70,000,000/year or more	Without measures, there would be no significant reductions in emissions or improvements in removals, resulting in worsening emissions trends and missed NDC targets.

10. Projections of key indicators (a,b)

Sector	Indicator/Target	Achievements	Notes/Remarks

Forestry	Unconditional Target: Reduce 1,100,000 t CO_2e/year between 2020-2030	- Over 10 projects implemented (USD 190.5 million as of 2023).	Exceeds the 2030 unconditional target.
		- 3,204,614 t CO_2e removed (2019-2021); 1,068,205 t CO_2e/year (via "Promoting REDD+ through Governance, Forest Landscapes and Livelihoods in Northern Lao PDR").	
		- 5,000,000 t CO_2e reductions expected (2022-2024) or 1,666,667 t CO_2e/year (MRV pending).	
		- Combined total: 18,200,000 t CO_2e reductions (2020-2030) or 1,820,000 t CO_2e annually.	
	Key Projects	- I-GFLL Project: Emission reductions through improved governance and forest landscape management in six northern provinces.	Annual or bi-annual monitoring recommended to ensure sequestration performance.
		- Lao Landscapes and Livelihoods Project (LLL): USD 57 million (2021-2027); expected reductions: 10,000,000 t CO_2e.	
	Conditional Target: Increase forest cover to 70% of total land area (~16.58 million hectares) by 2030	- Forest cover increased from 48% (2010) to 57% (2022), or 13.14 million hectares.	Rehabilitation and restoration of potential forest areas (~6.25 million hectares) critical to achieving the target.
		- 13% more land (~6.25 million hectares) required to meet the 2030 target.	
		- Net emissions in 2022: 58,911,000 t CO_2e (NFI3 data).	
Agriculture	Conditional Target: Adjust water management on 50,000 hectares of lowland rice cultivation	- Average annual area with adjusted water management: 96,468 hectares (2019-2022).	Contribution from 11 projects under the Department of Irrigation, MAF.
		- Annual irrigated areas (dry season):	
		- 94,043 ha (2019)	
		- 96,193 ha (2020)	
		- 99,238 ha (2021)	
		- 97,917 ha (2022).	
		- Exceeded target by nearly 2 times.	
	Key Projects/Workshops	- 11 ongoing projects contributing to adjusted water management.	Demonstrates successful implementation and stakeholder engagement.
		- Workshops organized to address challenges in agriculture and water management practices.	

11. Key underlying assumptions and parameters used for projections

Parameter/Assumption	**Details**
Forest Cover Increase Target	Forest cover to increase from 57% (2022) to 70% by 2030 (16.58 million hectares total).
Baseline Emissions	Net emissions reported at 58,911,000 t CO_2e in 2022 (NFI3 data).
Emission Reduction Target (Unconditional)	1,100,000 t CO_2e/year (2020-2030).
Emission Reduction Target (Conditional)	Exceed 1,820,000 t CO_2e/year through additional forestry and agricultural measures.
Forest Rehabilitation and Restoration Potential	6.25 million hectares identified as potential forest areas for restoration.
Agricultural Emissions	Reduction in methane emissions through adjusted water management in lowland rice cultivation.

Water Management in Agriculture	Annual average area with adjusted practices: 96,468 hectares (2019-2022).
GHG Inventory Data Sources	National Forest Inventory (NFI3), satellite imagery for forest cover, and MRV systems for project-level data.
Project Implementation Success	More than 20 projects completed or ongoing under Official Development Assistance (ODA) and international support.
Funding Availability	Total funding for emission reduction projects exceeded USD 190.5 million as of 2023.

12. Information necessary to track progress on the implementation and achievement of the domestic policies and measures implemented to address the social and economic consequences of response measures

Policy/Measure	Objective	Key Indicators	Social Impacts	Economic Impacts	Tracking Mechanism
REDD+ Implementation (Northern Lao PDR)	Reduce emissions through improved forest governance and sustainable management.	- GHG reductions (t CO_2e) - Forest area conserved/restored (hectares).	Improved livelihoods through sustainable forest use and local community engagement.	Boosted funding and investment in forestry projects (~USD 190.5 million).	Annual monitoring via satellite imagery and MRV systems.
National Forest Strategy	Increase forest cover to 70% by 2030 through conservation and restoration measures.	- Forest cover percentage. - Area rehabilitated/restored (hectares).	Enhanced rural employment opportunities (afforestation/restoration activities).	Increased carbon sequestration to support climate finance opportunities.	Reports from FIPD, DoF, and international monitoring collaborations.
Water Management in Agriculture	Mitigate methane emissions through improved practices in rice cultivation.	- Area under improved water management (hectares).	Reduced water use improves resilience for farmers, especially smallholders.	Enhanced productivity and cost savings in irrigation practices.	Statistics collected from the Department of Irrigation, MAF.
Lao Landscapes and Livelihoods Project (LLL)	Enhance natural capital and sustainable livelihoods through improved landscape management.	- GHG reductions (t CO_2e). - Landscape restoration area.	Livelihood improvement through access to sustainable forest products and income diversification.	Long-term investments in eco-tourism and forestry-based economies.	Project-level MRV and periodic socioeconomic evaluations.
Official Development Assistance (ODA) Programs	Support sustainable development and climate resilience through international cooperation.	- Number of projects implemented. - Total funding disbursed.	Capacity-building for local stakeholders and improved institutional frameworks.	Significant investment in local economies through project-related activities.	Quarterly and annual reporting by implementing agencies, aligned with NDC tracking.

3.7.4. CTF for WASTE sector

1. Structured summary: Description of selected indicators

Indicator to select progress (a)	Information for the reference point(s), baseline(s), base year(s) or starting point(s), as appropriate (b)	Updates in accordance with any recalculation of the GHG inventory, as appropriate (b)	Relation to NDC (c)
Daily municipal waste processing (tons/day).	Baseline: 406 tons/day (average 2019–2023); Target: 500 tons/day by 2030.	Updated based on data from VUDAA and municipal records.	Unconditional target for sustainable municipal solid waste management in Vientiane Capital.
Emissions reductions from MBT facility.	Baseline: No operational facility; Projected reduction: 40,000 t CO_2e/year by 2030.	Pending updates upon facility completion and operation start.	Conditional target for achieving annual GHG reductions of 40,000 t CO_2e from 2020–2030.
Number of waste management projects.	15 projects identified as of 2023, totaling $98 million in financing.	Updated with annual data from public and private sector stakeholders.	Supports both conditional and unconditional NDC targets through various waste-to-resource and recycling initiatives.

2. Structured summary: Definitions needed to understand NDC

	Definitions
Definition needed to understand each indicator:	
{Indicator}	Sustainable municipal waste management capacity (tons/day); GHG reductions (t CO_2e/year).
Any sector or category defined differently than in the national inventory report	
Sector	Waste sector, focusing on solid waste management and waste-to-resource activities.
Category	Municipal solid waste management; waste-to-resource innovations.
Category	Municipal solid waste management; waste-to-resource innovations.
Definition needed to understand mitigation co-benefits of adaptation actions and/or economic diversification plans:	
{Mitigation co-benefit(s)}	Improved waste management reduces CH_4 and CO_2 emissions; creates green jobs; improves urban cleanliness.
Definition needed to understand mitigation co-benefits. benefits of adaptation actions and/or economic diversification plans:	Improved waste management reduces CH_4 and CO_2 emissions; creates green jobs; improves urban cleanliness.
Any other relevant definitions	Includes public and private sector involvement in waste management projects; green city development guidebooks.
{...}	

3. Structured summary: Methodologies and accounting approaches – consistency with Article 4, paragraphs 13 and 14, of the Paris Agreement and with decision 4/CMA.1

NDC			Description or reference to the relevant section of the BTR

Transport NAMA	Accounting approach, including how it is consistent with Article 4, paragraphs 13–14, of the Paris Agreement (para. 71 of the MPGs)		
	Accounting for anthropogenic emissions and removals in accordance with methodologies and common metrics assessed by the IPCC and adopted by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement:	Each methodology and/or accounting approach used to assess the implementation and achievement of the target(s), as applicable (para. 74(a) of the MPGs)	Waste management reductions of 40,000 t CO_2e/year target tracked through Vientiane's Mechanical and Biological Treatment (MBT) Facility and sustainable municipal waste practices.
		Each methodology and/or accounting approach used for the construction of any baseline, to the extent possible (para. 74(b) of the MPGs)	Baseline established from average waste processing of 406 tons/day (2019–2023), compared to the NDC target of 500 tons/day.
		If the methodology or accounting approach used for the indicator(s) differs from those used to assess the implementation and achievement of the target, describe each methodology or accounting approach used (para. 74(c) of the MPGs)	Methodology includes project-specific reductions for MBT facility and manual collection of emissions reductions from public/private sector initiatives.
		Any conditions and assumptions relevant to the achievement of the NDC under Article 4, as applicable and available (para. 75(i) of the MPGs)	Assumes timely completion of the MBT facility, supportive regulatory frameworks, and increased waste collection efficiency.
		Key parameters, assumptions, definitions, data sources and models used, as applicable and available (para. 75(a) of the MPGs)	Parameters include daily waste processing rates (tons/day), project timelines, and GHG reduction estimates. Data sources include VUDAA and IPCC-based emissions factors.
		IPCC Guidelines used, as applicable and available (para. 75(b) of the MPGs)	IPCC 2006 Guidelines applied for waste sector GHG accounting.
		Report the metrics used, as applicable and available (para. 75(c) of the MPGs)	Metrics include tons of waste processed daily and t CO_2e reduced annually.
		For Parties whose NDC cannot be accounted for using methodologies covered by IPCC guidelines, provide information on their own methodology used, if applicable (para. 1(b) of annex II to decision 4/CMA.1)	Lao PDR supplements IPCC guidelines with project-level assessments and public-private project data.
		Provide information on methodologies used to track progress arising from the implementation of policies and measures (para. 1(d) of annex II to decision 4/CMA.1)	Progress tracked through average daily waste collection, MBT facility readiness, and waste-to-resource activities.
		Where applicable to its NDC, any sector-, category- or activity-specific assumptions, methodologies and approaches consistent with IPCC guidance (para. 75(d) of the MPGs)	Assumptions include project completion timelines and improved regulatory environment for waste management.

		How the Party has drawn on existing methods and guidance established under the Convention and its related legal instruments, if applicable (para. 1(c) of annex II to decision 4/CMA.1)	Guidance from IPCC and national waste management strategies.
		Ensuring methodological consistency, including on baselines, between the communication and implementation of NDCs (para. 12(b) of the decision 4/CMA.1):	Consistency maintained through alignment with IPCC Guidelines and collaboration with public-private entities.
		For Parties that address the effects of age-class structure in forests, provide detailed information (para. 1(g) of annex II to decision 4/CMA.1)	Not applicable to energy sector.
		How the Party has drawn on existing methods and guidance established under the Convention and its related legal instruments, if applicable (para. 1(c) of annex II to decision 4/CMA.1)	Guidance from UNFCCC and IPCC reports used to align renewable energy tracking and MRV systems with national targets.
		Any methodologies used to account for mitigation co-benefits of adaptation actions and/or economic diversification plans (para. 75(e) of the MPGs)	Mitigation co-benefits tracked via clean cook stove adoption, which reduces GHG emissions and improves household energy efficiency.
		Describe how double counting of net GHG emission reductions has been avoided, including in accordance with guidance developed related to Article 6 if relevant (para. 76(d) of the MPGs)	Double counting avoided through centralized national reporting mechanisms and project-level MRV systems.
		Any other methodologies related to the NDC under Article 4 (para. 75(h) of the MPGs)	Renewable energy and energy efficiency methodologies align with national inventory reporting requirements and the NDC targets.
	Ensuring methodological consistency, including on baselines, between the communication and implementation of NDCs (para. 12(b) of the decision 4/CMA.1):	Ensuring methodological consistency, including on baselines, between the communication and implementation of NDCs (para. 12(b) of the decision 4/CMA.1):	Consistency maintained through IPCC Guidelines, UNFCCC frameworks, and renewable energy project reports.
		Explain how consistency has been maintained between any GHG data and estimation methodologies used for accounting and the Party's GHG inventory, pursuant to Article 13, paragraph 7(a), of the Paris Agreement, if applicable (para. 2(b) of annex II to decision 4/CMA.1) and explain methodological inconsistencies with the Party's most recent national inventory report, if applicable (para.	Consistency maintained through IPCC Guidelines, UNFCCC frameworks, and renewable energy project reports.

		76(c) of the MPGs)	

4. Structured summary: Tracking progress made in implementing and achieving the NDC under Article 4 of the Paris Agreement

	Unit, as applicable	Reference point(s), level(s), baseline(s), base year(s) or starting point(s){MPGs, p. 67, 77(a)(i)}	Implementation period of the NDC covering information for previous reporting years and the most recent year, including the end year or end of period {MPGs, p. 68, 77(a)(ii–iii)}	Progress made towards the NDC, as determined by comparing the most recent information for each selected indicator, including for the end year or end of period, with the reference point(s), level(s), baseline(s), base year(s) or starting point(s) (paras. 69–70 of the MPGs)
			2019	
Indicator(s) selected to track progress towards the implementation and/or achievement of the NDC under Article 4 of the Paris Agreement[c]: {MPGs, p. 65, 77(a)}				
Implementation of 500 tons/day sustainable municipal solid waste management project	ton/d	N/A	N/A	N/A
Mechanical and Biological Treatment Facility in Vientiane	t CO_2e/year	40,000 t CO_2e/year reduction (conditional target)	N/A	Anticipated reduction of 47,826 t CO_2e annually, Total expected reduction: 1,100,000 t CO_2e
Waste-to-resource regulatory environment	N/A	Regulatory framework lacking	N/A	The absence of regulatory support is a major barrier to waste reduction and waste-to-resource conversion, especially in low-income areas.
Waste collection and management	N/A	Low-income communities and metropolitan regions underserved	N/A	The absence of regulatory support is a major barrier to waste reduction and waste-to-resource conversion, especially in low-income areas.
Public and private waste reduction projects	USD	15 projects identified	N/A	Large-scale waste collection and management projects are planned, while smaller-scale projects are being implemented, contributing to NDC targets.

Biomass energy installed capacity	MW / GWh/year	300 MW target	N/A	Biomass contributes 37.3% of NDC target; further projects in progress

5. Mitigation policies and measures, actions and plans, including those with mitigation co-benefits resulting from adaptation actions and economic diversification plans, related to implementing and achieving a nationally determined contribution under Article 4 of the Paris Agreement (a, b)

Name (c)	Description (d,e,f)	Objectives	Type of instrument (g)
Sustainable Municipal Waste Management	Daily waste processing capacity in Vientiane; aim for 500 tons/day by 2030.	Improve waste collection and reduce emissions.	Infrastructure Projects
Mechanical and Biological Treatment Facility	Advanced waste management and treatment facility for Vientiane.	Reduce landfill GHG emissions.	Infrastructure Projects
Green and Clean Waste Guidebooks	Guidebooks for public awareness campaigns on sustainable waste management.	Increase awareness and promote green practices.	Educational Campaigns
Waste-to-Resource Initiatives	Small- and large-scale projects converting waste to resources, totaling $98M funding.	Enhance resource recovery and recycling.	Public-Private Initiatives

6. Summary of greenhouse gas emissions and removals in accordance with the common reporting table 10 emission trends -summary

Category	Year	GHG Emissions (t CO_2e)	Removals (t CO_2e)
Municipal Solid Waste Management	2023	40,000	0
Mechanical and Biological Treatment	2023	Estimated at 1,100,000 over project life (23 years)	0
Public-Private Waste Projects	2023	Varied by project	0
Waste Guidebooks/Public Awareness	2023	Indirect impact	0

7. Information on projections of greenhouse gas emissions and removals under a 'with measures' scenario a,b

Scenario	Year	Projected GHG Emissions (t CO_2e)	Projected Removals (t CO_2e)
Municipal Solid Waste Management (Vientiane)	2030	40,000	0
Mechanical and Biological Treatment Facility	2030	~47,826/year	0
Waste-to-Resource Projects	2030	Varied	0

Public Awareness and Guidebooks	2030	Indirect	0

8. Information on projections of greenhouse gas emissions and removals under a 'with additional measures' scenario

Scenario	Year	Projected GHG Emissions (t CO_2e)	Projected Removals (t CO_2e)
Advanced Waste-to-Energy Projects	2030	20,000	0
Extended Mechanical and Biological Treatment Facility	2030	~47,826/year	0
Private Sector-led Recycling Initiatives	2030	10,000	0
New Municipal Composting Programs	2030	Indirect Impact	~5,000

9. Information on projections of greenhouse gas emissions and removals under a 'without measures' scenario

Scenario	Year	Projected GHG Emissions (t CO_2e)	Projected Removals (t CO_2e)
Current Waste Management Practices	2030	60,000	0
No Mechanical Biological Treatment Facility Implementation	2030	100,000	0
Limited Recycling and Composting	2030	80,000	0

10. Projections of key indicators (a,b)

Sector	Indicator/Target	Achievements	Notes/Remarks
Waste	Sustainable municipal solid waste management (500 tons/day)	406 tons/day (81% of the target achieved from 2019-2023)	Mechanical and Biological Treatment Facility could meet target but faces delays.
Waste	Reduction of 40,000 t CO_2e/year by 2030	81% achieved based on current capacity (2019-2023)	Regulatory and infrastructure challenges persist; public-private partnerships critical.

11. Key underlying assumptions and parameters used for projections

Parameter/Assumption	Details
Sustainable Waste Management Implementation	Assumes a daily capacity of 500 tons/day in Vientiane by 2030.
Mechanical and Biological Treatment Facility	Project expected to reduce 1,100,000 t CO_2e over 23 years.
Policy and Regulatory Framework	Limited regulatory support for waste-to-resource activities poses challenges to achieving targets.
Waste Collection Coverage	Assumes gradual improvements in coverage, especially in low-income communities and metropolitan areas.
Public-Private Partnerships	Includes planned large-scale and smaller-scale projects to meet sectoral NDC targets.

Financial Investments	USD 98 million allocated across 15 identified projects as of early 2023.
Public Awareness and Engagement	Development of guidebooks for green waste management to enhance public participation and environmental outcomes.

12. Information necessary to track progress on the implementation and achievement of the domestic policies and measures implemented to address the social and economic consequences of response measures

Policy/Measure	Objective	Key Indicators	Social Impacts
Sustainable Municipal Solid Waste Management	Achieve 500 tons/day waste management in Vientiane by 2030.	Daily waste managed (tons/day).	Improved cleanliness and public health.
Mechanical and Biological Treatment Facility	Reduce emissions by 40,000 t CO_2e/year.	Annual GHG reductions (t CO_2e/year).	Employment opportunities during project execution.
Green Waste Management Awareness Campaigns	Promote public awareness of green waste management.	Number of guidebooks distributed.	Increased public participation in waste reduction.

CHAPTER IV: Information Related to Climate Change Impact and Adaptation Under Article 7 of the Paris Agreement

4.1. Impacts, risk and vulnerabilities, as appropriate

4.1.1. Historical climate in Lao PDR

4.1.1.1. Temperature

The temperature in the Lao PDR varies across different regions, depending on the elevation of the terrain. On average, the temperature drops by 1.7 degrees Celsius for every 300 meters of elevation. In mountainous areas, especially in the northern, eastern, and plateaus area, the average annual temperature is about 20°C, while the plains areas, the temperature is higher, averaging around 25–27°C. The mountainous areas, particularly in the northern provinces of Lao PDR, have a lower average temperature compared to the plateaus and plains in the southern part of the country. The lowest temperatures are found in the northern provinces and highland areas along the border with Vietnam, including the provinces of Borikhamxay, Khammouane, Savannakhet, and Salavan

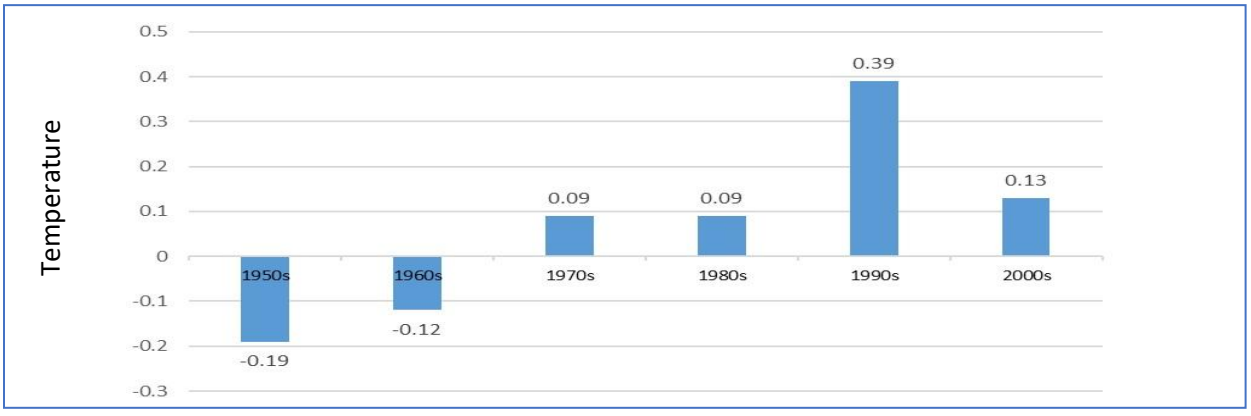


Figure 22: Temperature variation in Lao PDR from 1950 – 2000

The temperature started to drop to the lowest level between November and February. The hottest months are between March and May, with an average temperature of 26°C. January is the coldest month, especially in the Luang Prabang province, which has an average temperature of 20.5°C, the lowest being 0.8°C. Vientiane has an average temperature of 20.5°C, with the lowest being 3.9°C, and Champasak province has an average temperature of 23.9°C, with the lowest being 8.2°C. Compared to the average annual temperature, the month of May has the highest average temperature, with Luang Prabang province at 28.1°C and Vientiane city at 39.4°C [79]. According World Bank data, the average temperature in the Lao PDR has increased by approximately 1 degree Celsius over the past century. Specifically, between the years 1901 and 1985, the average temperature did not exceed 24 degrees Celsius. However, during the period from 1985 to 2020, the temperature rose significantly above 24 degrees Celsius[80].

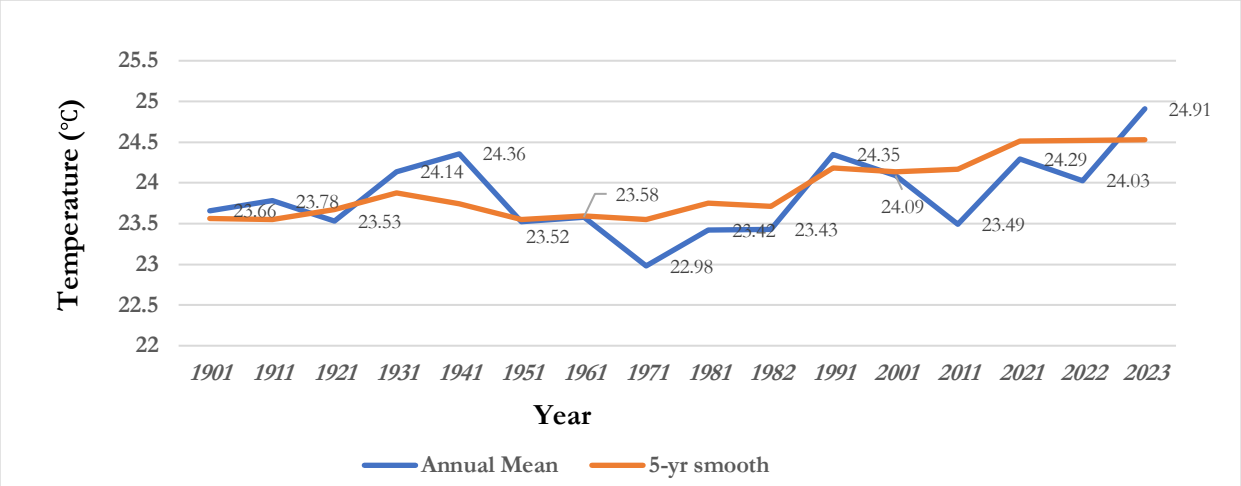


Figure 23: Trends in average mean temperature of Lao PDR from 1901 – 2023

4.1.1.2. Precipitation

Lao PDR is characterized by a tropical climate, influenced by the southeast monsoon which brings 70% of annual rainfall and high humidity. There are two distinct seasons: the rainy season, or monsoon, from May to mid-October and the dry season from mid-October to April. Average rainfall can be as high as 3,000 millimeters (mm) per year. Mean annual temperatures of 20°C was observed in the northern and eastern mountainous areas and the plateaus, whereas temperatures are higher in the plains at 25-27°C.

Considering on the country's altitude, Lao PDR can be divided into three different climatic zones.

1) The northern mountainous areas, above 1,000 meters in altitude, have a temperate and hilly sub-tropical climate with a mean rainfall between 1,500 and 2,000mm. These areas are quite dry and cooler compared to the rest of the country;
2) The central mountainous areas are tropical monsoonal climates with altitudes ranging from 500 to 1,000m. This area is experiencing a rise in temperature and has an average annual rainfall between 2,500 and 3,500 millimeters per year;

[79] Asian Development Bank (2023). Report on Risk Assessment and Climate Resilience: A Value Chain Approach to Climate-Smart Agriculture in the Lao PDR

[80] https://climateknowledgeportal.worldbank.org/country/lao-pdr/climate-data-historical?utm_source=chatgpt.com

3) The lowland area has an average annual rainfall ranging from 1,500 to 2,000 millimeters. This area is located along the Mekong River and its tributaries, and it is residence for more than 50 % of the country's population.

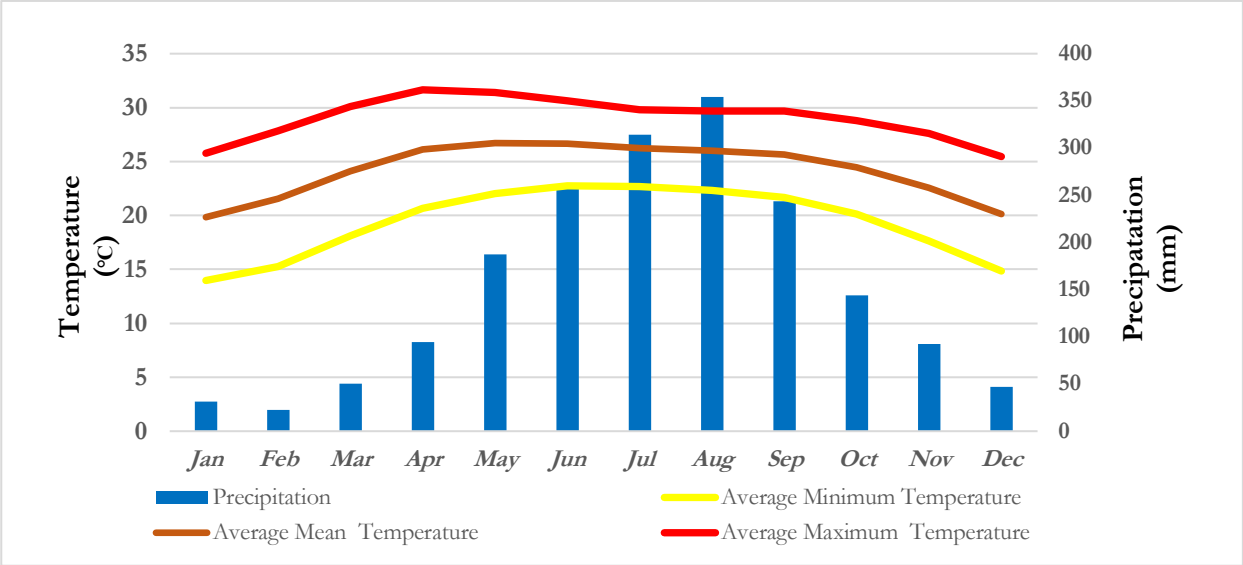


Figure 24 : Temperature and average mean precipitation

The rainfall data from 1901 to 2022 (Figure 25) present an increasing trend in rainfall amounts. Between 1961 and 1985, the average annual rainfall was about 1,850 mm per year (100 mm higher than the previous decades). The rainfall amount was less than 1,750 mm per year in 1990. However, the rainfall amounts significantly increased during the period from 2001 to 2011, reaching approximately 1,900 mm per year[81]. (Figure 26) shows that in the central region, including Vientiane, Xieng Khouang, Xaysomboun, Borikhamxay, and Khammouane provinces) and the southern region (including Champasak, Sekong, and Attapeu provinces), the average annual rainfall exceeded 2,500 mm during the period from 1980 to 2022. However, over the next 30 years, rainfall is projected to increase at a rate of between 10 mm and more than 30 mm per year in the southern provinces of the Lao PDR. Rainfall is expected to increase in Sekong, Attapeu, Champasak, and in some areas along the border with Vietnam in Khammouane and Saravane provinces.

[81] https://climateknowledgeportal.worldbank.org/country/lao-pdr/climate-data-historical?utm_source=chatgpt.com

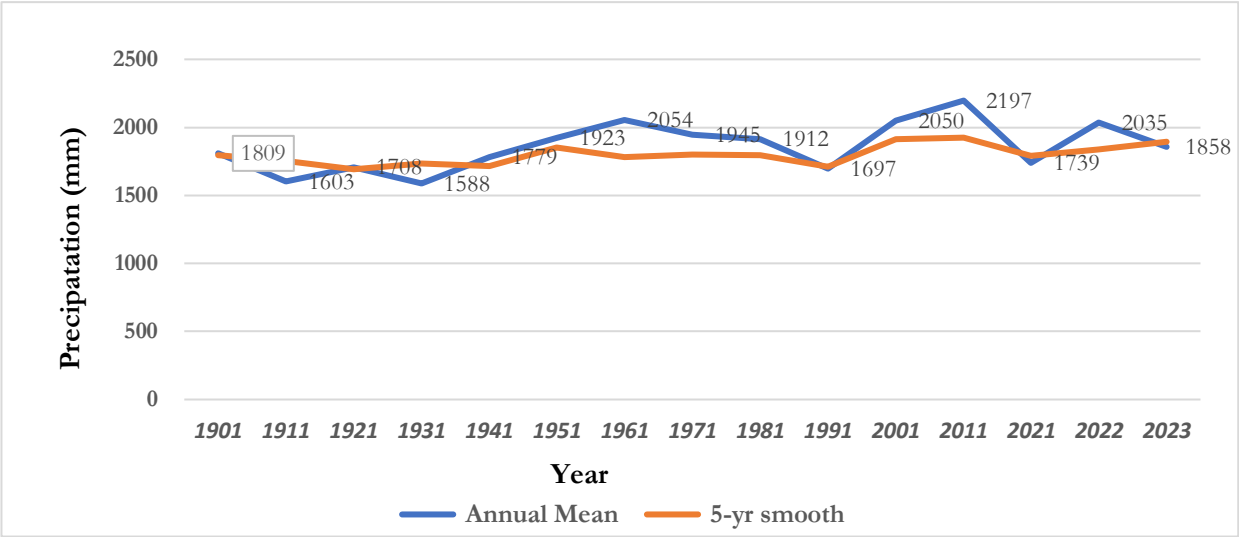


Figure 25: Trends in annual mean precipitation of Lao PDR from 1901 – 2023

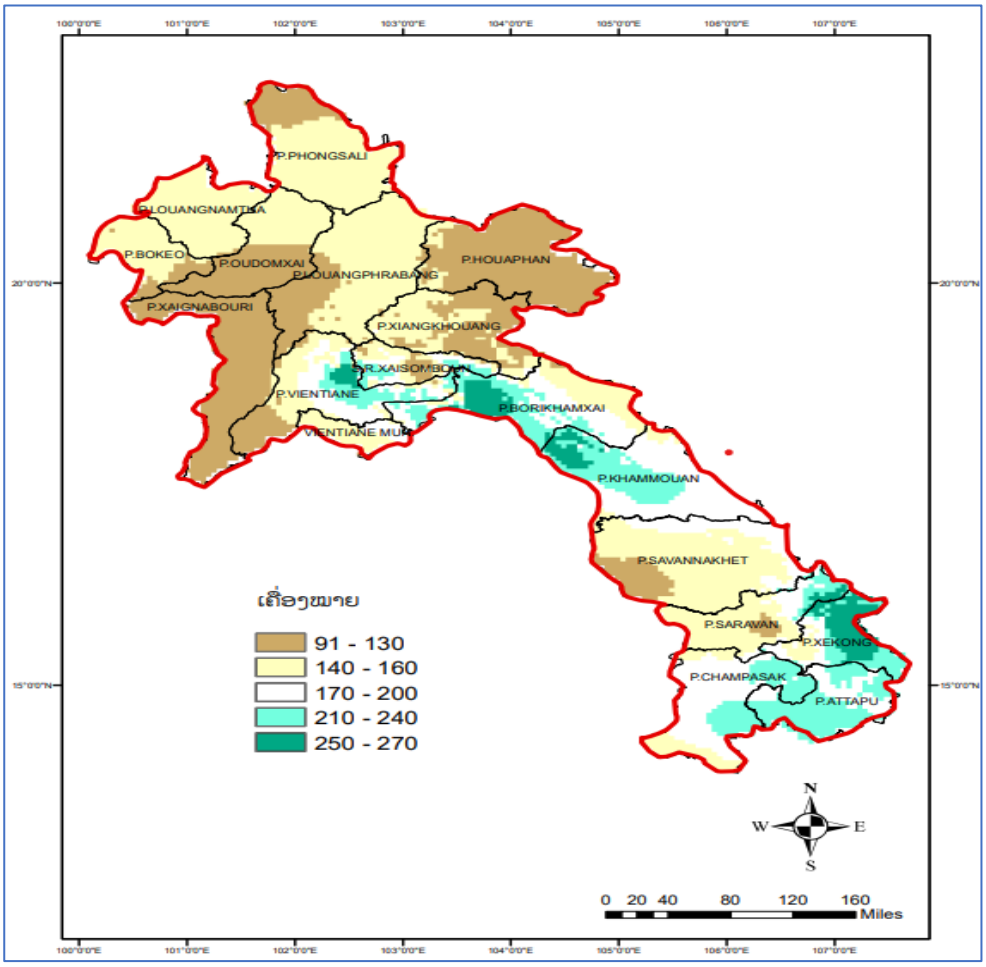


Figure 26: Trends in average rainfall (mm) by provinces from 1980-2022

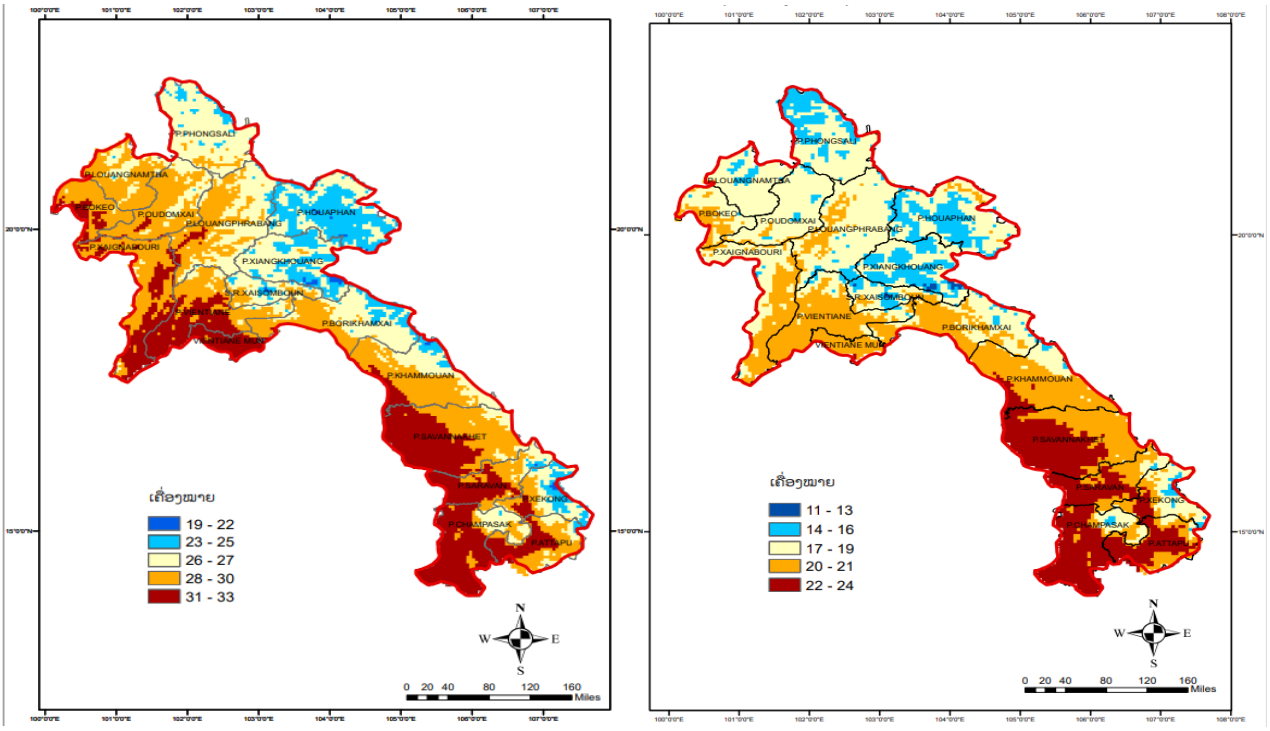
4.1.2. Projected climate change trends in the future for the Lao PDR

4.1.2.1. Temperature

a). Temperature projection under the RCP2.6 climate scenario

Climate change is primarily caused by the release of greenhouse gases into the atmosphere, which results in the gradual increase of the Earth's average temperature each year — a phenomenon known as global warming. This leads to more frequent and severe natural disasters such as storms, floods, droughts, wildfires, rising sea levels, and others. These impacts affect ecosystems and living organisms that depend on nature for shelter and food, and they also hinder socio-economic development.

According to projections by the Department of Meteorology and Hydrology, Ministry of Natural Resource and Environment, and the Department of Agricultural Land Management, Ministry of Agriculture and Forestry shown that the average maximum and minimum temperatures over the next 30 years will escalate in all regions of the Lao PDR. As a result, the dry season in each year is expected to last longer than before, leading to changes in planting seasons, especially in the northern region. The maximum temperature is projected to increase by between 0.4 to 0.8 degrees Celsius, while the minimum temperature is expected to increase by more than 0.8 degrees Celsius (Figures 27).



(Map 01) **(Map 02)**

Figure 27: Trend of maximum temperature (Map:01) and Minimum temperature (Map:02) during the period 1980–2022[82].

b). Temperature projections under the RCP4.5 and RCP8.5 climate scenarios

Regarding climate change projection report for the Lao PDR, it is expected that temperatures will continue to escalate in the future, especially in the eastern region, which will experience higher temperatures both in the short term (2021–2050) and in the long term (2051–2099) under the

[82] DCC. 2025. National Adaptation Plan (NAP), Lao PDR, Page: 24

RCP4.5 and RCP8.5 climate scenarios[83]. Under the RCP 4.5 climate scenario in the short term (2021–2050), the average maximum temperature is projected to escalate by 0.98 to 1.35 degrees Celsius. In the northern region of the country, temperatures are expected to increase more than in the southern region (Figure 28). For the long term (2051–2099), or around the year 2080, the average maximum temperature is projected to increase by 2.0 to 2.65 degrees Celsius. The northern region will experience a greater increase compared to the south. For example, Luang Prabang, Phongsaly, and Houaphanh provinces are expected to see temperature increases of up to 2.65 degrees Celsius (Figure 29).

Source: DCC, 2025

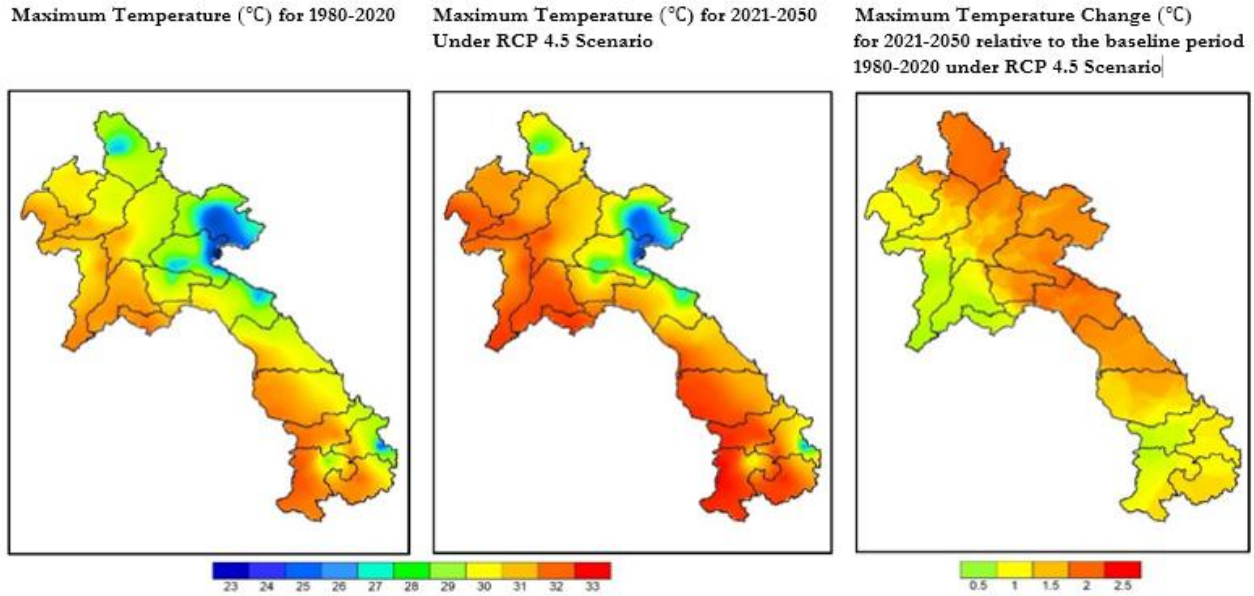


Figure 28: Changes in Maximum Temperature in the Past (1980–2020) and in the Future (2021–2050) under RCP 4.5[84]

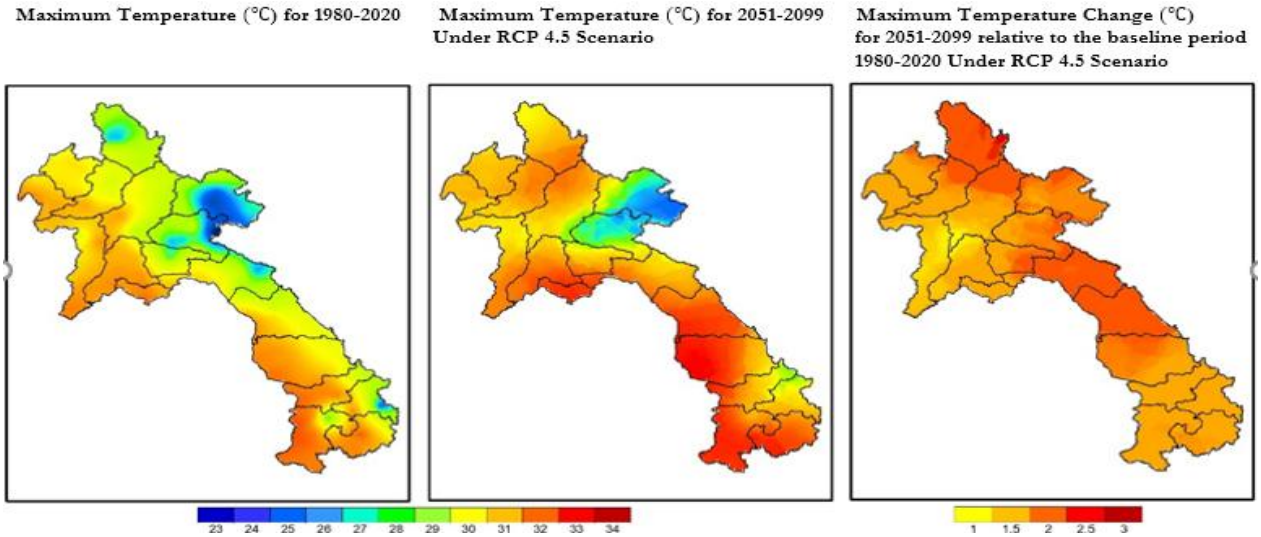


Figure 29: Changes in Maximum Temperature in the Past (1980–2020) and in the Future (2051–2099) under RCP 4.5[85]

[83] MONRE (2016). Report on climate change from historical data, vulnerability, and adaptation for the Lao PDR

[84] DCC. 2025. National Adaptation Plan (NAP), Lao PDR, Page: 25

[85] DCC. 2025. National Adaptation Plan (NAP), Lao PDR, Page:25

Under the RCP 8.5 climate scenario in the short term (2021–2050), the average maximum temperature is projected to increase by 1.2 to 1.6 degrees Celsius. Notably, Phongsaly Province, located at the northernmost part of the Lao PDR, could experience a temperature increase of up to 1.6 degrees Celsius (Figure 30). For the long term (2051–2099), the average maximum temperature is projected to rise by 3.55 to 4.5 degrees Celsius. The northern region is expected to experience higher increases compared to the southern region. For example, Phongsaly and Houaphanh provinces could see temperature increases of up to 4.5 degrees Celsius (Figure 31).

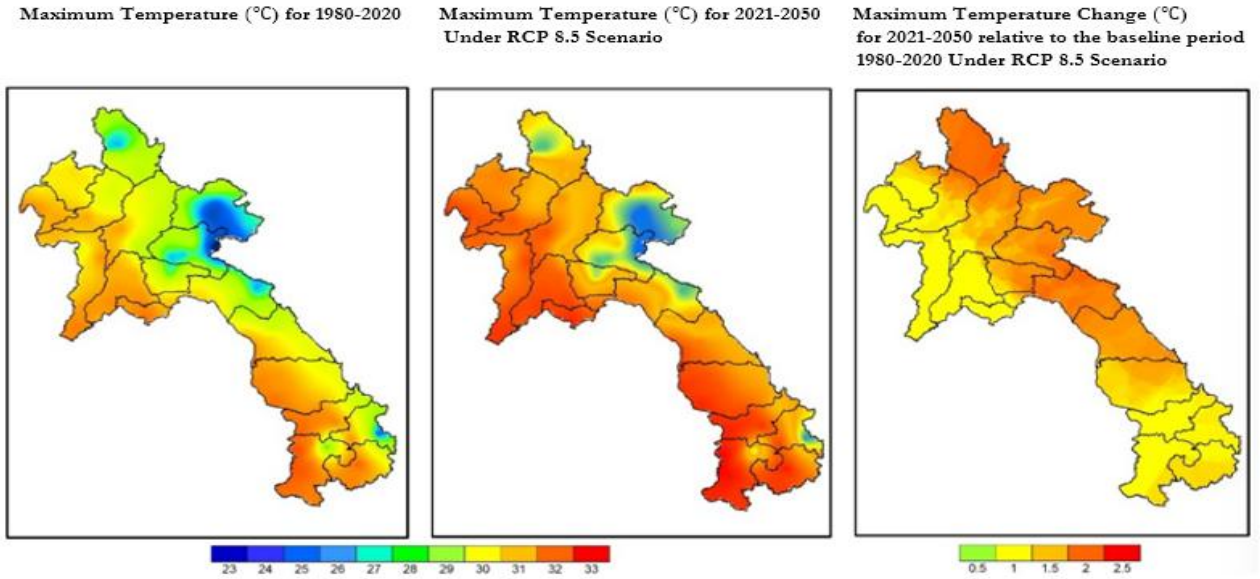


Figure 30: Changes in Maximum Temperature in the Past (1980–2020) and in the Future (2021–2050) under RCP 8.5[86]

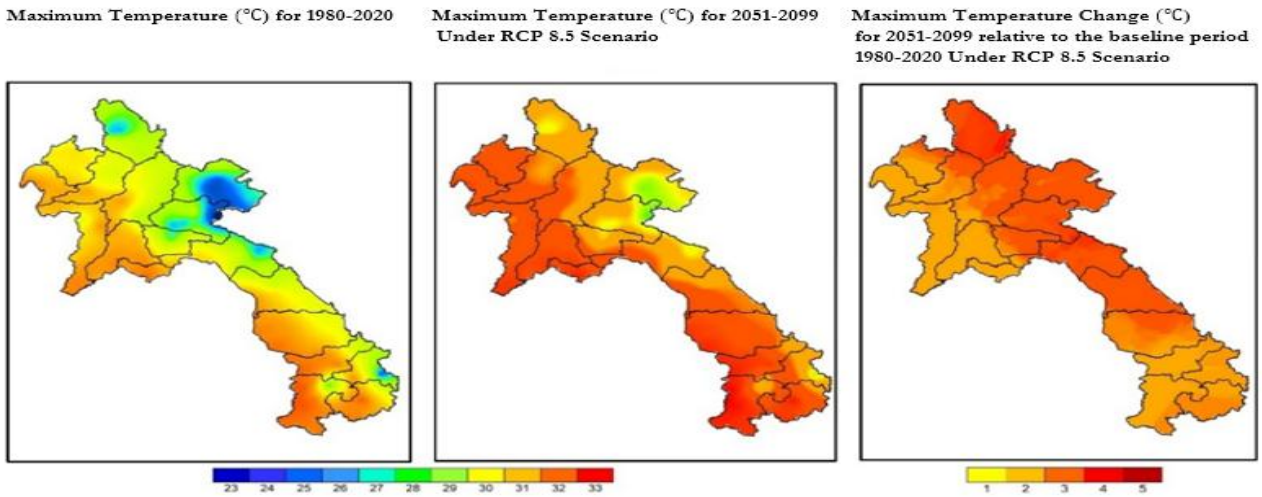


Figure 31: Changes in Maximum Temperature in the Past (1980–2020) and in the Future (2051–2099) under RCP 8.5

[86] DCC. 2025. National Adaptation Plan (NAP), Lao PDR, Page:28

The minimum temperature under the RCP 4.5 climate scenario shown that temperatures will escalate by approximately 1.05 to 1.4 degrees Celsius in several provinces, such as Phongsaly, Luang Namtha, and Bokeo, during the short term (2021–2050) compared to the baseline period of 1980–2020 (Figure 32). Under RCP 4.5, the change in minimum temperature ranges from 1.45 to 1.55 degrees Celsius in the northern region, including Phongsaly, Luang Namtha, Bokeo, Oudomxay, and Xayabouly, and between 1.0 to 1.15 degrees Celsius in the southern region (Saravane and Sekong). For the long-term period (2051–2099), the minimum temperature increases range from 2.4 to 2.5 degrees Celsius in the northern region and 2.0 to 2.2 degrees Celsius in the southern region (Figure 33)

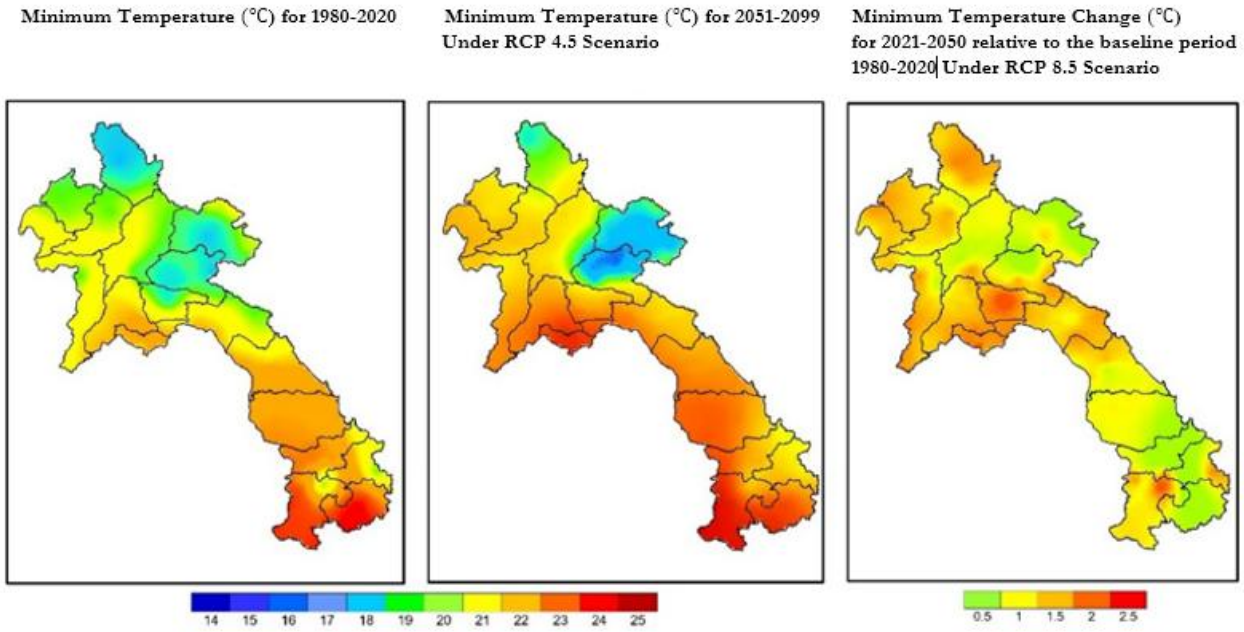


Figure 32: Changes in the minimum temperature over the past period (1980-2020) and in the future (2021-2050) **under RCP 4.5**

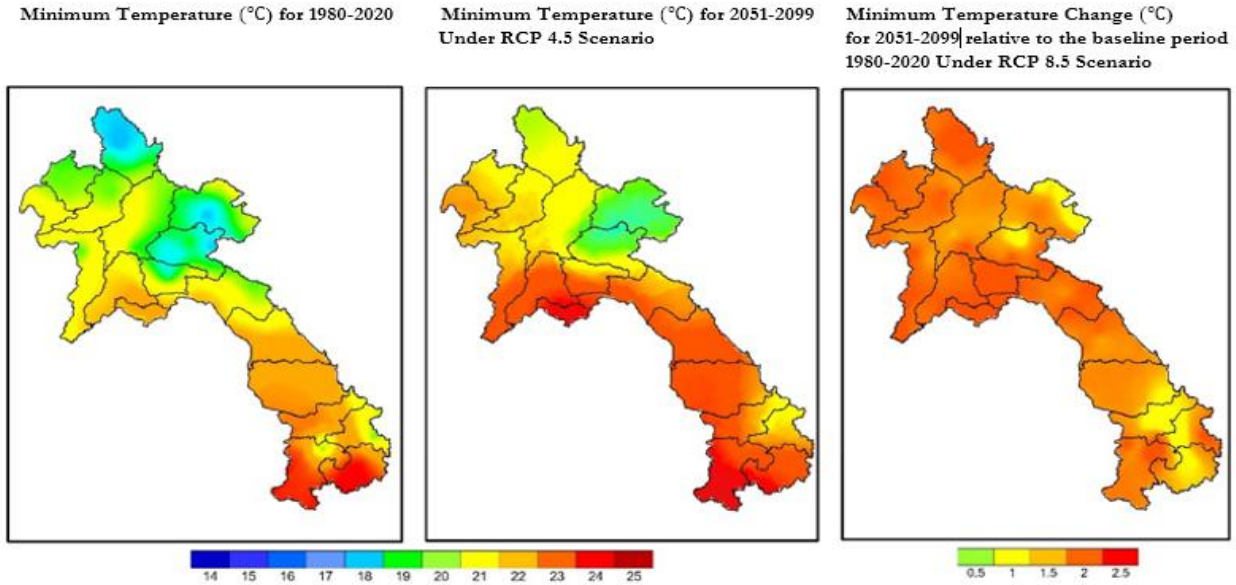


Figure 33: Changes in the minimum temperature over the past period (1980-2020) and in the future (2051-2099 under RCP 4.5

In the short term (2021–2050) under the RCP 8.5 scenario, the minimum temperature is projected to increase by 2.0 to 2.5 degrees Celsius in several provinces, including Phongsaly, Luang Namtha, and Bokeo (Figure 34). Under RCP 8.5, the change in minimum temperature in the northern region ranges from 1.45 to 1.55 degrees Celsius, while in the southern region (Saravane and Sekong), it ranges from 1.2 to 1.5 degrees Celsius. For the long-term period (2051–2099) under RCP 8.5, the temperature is expected escalate by 4.4 degrees Celsius, in Phongsaly and Huaphan provinces (Figure 35).

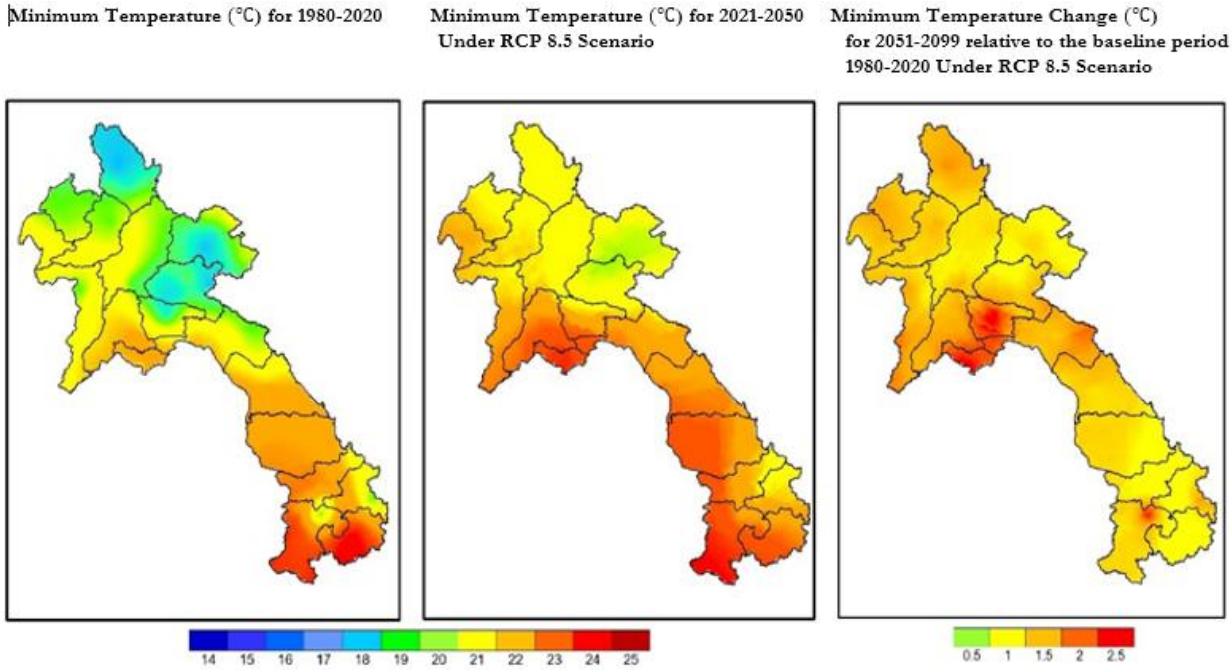


Figure 34: Changes in the minimum temperature over the past period (1980-2020) and in the future (2021-2050) under RCP 8.5

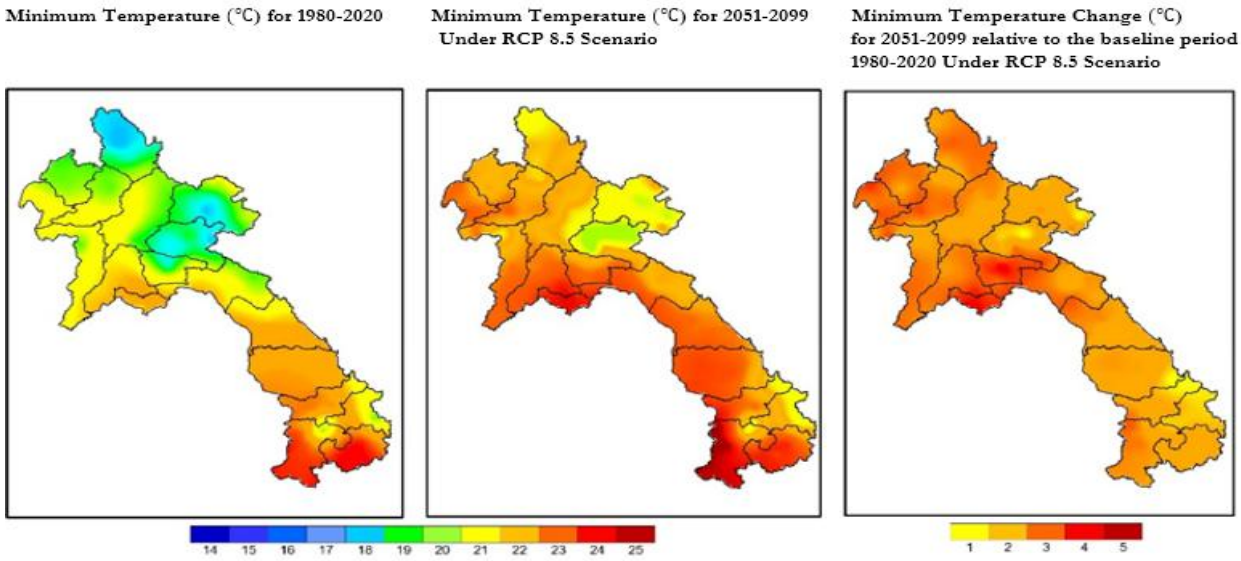


Figure 35: Changes in the minimum temperature over the past period (1980-2020) and in the future (2051-2099) under RCP 8.5

4.1.3. Impact, vulnerability and risk and hazard from climate change

4.1.3.1. Overview

In the 2023 Notre Dame Global Adaptation Initiative (ND-GAIN) Index, Lao PDR was ranked 137th out of 181 countries [87]. This ranking categorizes Lao PDR as a country with lower-middle readiness to respond to the impacts of climate change. The ranking highlights the country's vulnerability, which stems from a combination of geographic and socio-economic factors. The ND-GAIN Index estimated two core dimensions: Vulnerability (assessing the exposure, sensitivity, and adaptive capacity of a country to climate hazards), and Readiness - evaluating a country's ability to leverage investments and implement adaptation actions [88].

Nevertheless, based on climate scenario analysis from NASA-NEXGDDP, using the baseline period 1976–2020 and projections under RCP4.5 and RCP8.5 for the period 2021–2050, Lao PDR is identified as having moderate overall vulnerability to climate change, in which seven provinces are high vulnerability, particularly in districts within Savannakhet, Salavan, Sekong, and parts of Bolikhamxay, Khammouane, Champasak, and Attapeu provinces. Provinces classified as having moderate vulnerability include: Houaphan, Xieng Khouang, Sayabouly, Oudomxay, Bokeo, and parts of Phongsaly and Luang Namtha. Meanwhile, provinces with low to moderate vulnerability include Vientiane Province, the Vientiane Capital, and parts of Phongsaly, Sayabouly, Bolikhamxay, and Attapeu.

(Figure 36) shows that between 1990 and 2018, floods caused 72% of the total damage, primarily resulting from natural disasters. In addition, storms, droughts, and disease outbreaks also affected the population, accounting for 10%, 9%, and 8% of the damage, respectively.

[87] https://gain.nd.edu/our-work/country-index/

[88] World Bank & ADB, 2021: Climate Risk Country Profile, Lao PDR https://www.adb.org/publications/climate-risk-country-profile-lao-pdr

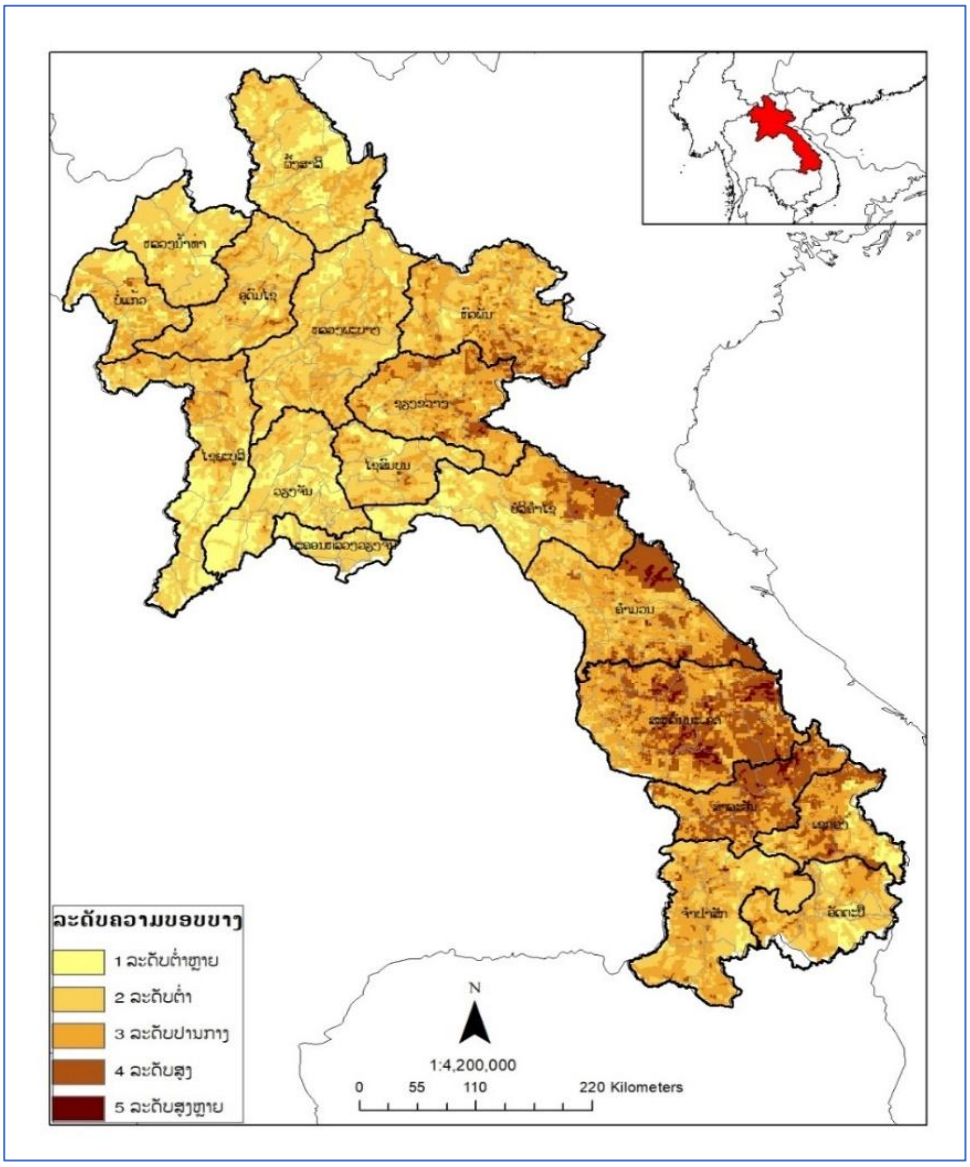


Figure 36: Map of Climate change vulnerability of Lao PDR[89]

4.1.3.2. Floods and severe climate change conditions

The Lao PDRis among the most vulnerable countries to flood risks, as evidenced by the INFORM Country Profile, which assigns the country a risk score of 9.1 out of 10 for flood-related hazards [90]. Beyond these projections, the impacts of climate change in Lao PDR are significantly pronounced at the subnational level, with variations across provinces and districts.

[89] DCC. 2025. National Adaptation Plan (NAP), Lao PDR, Page: 39

[90] Lao PDR, 2021: Inform Risk Country Profile, South-Eastern Asia https://drmkc.jrc.ec.europa.eu/Inform-Index/Portals/0/InfoRM/CountryProfiles/LAO.pdf?utm_source=chatgpt.com

In 2023, the Ministry of Natural Resources and Environment (MONRE) revised the national climate vulnerability mapping, updating the 2020 version to reflect more current data and risks. This update placed particular emphasis on climate vulnerability in the context of the National Adaptation Plan (NAP) development process. The revised assessment encompassed 18 provinces across the country [91].

Based on the risk and vulnerability assessment associated with climate change under this project, it is observed that flooding (specifically flash floods) is likely to occur if heavy rainfall persists continuously for two to three days. When integrating considerations from the economic and social spheres, alongside vulnerability and adaptive capacity in relation to flood risks, it becomes possible to delineate areas where flooding is most probable, and which will consequently face the most significant impacts, particularly in areas prone to drought. (Figure 37) reveals that the areas exhibiting the highest vulnerability are predominantly located in the central and southern regions, characterized by vast expanses of susceptible land. The provinces most vulnerable to flooding include Khammuan, Savannakhet, Saravan, and Champasak. Provinces with the very significant flood risk includes Champasak, Attapeu, Sekong, and Borikhamxay, and with moderate vulnerability encompass Borikhamxay, Xaysomboun, Xieng Khouang, Vientiane Province, and Vientiane Capital. In addition, some cities in the northern provinces also display a high degree of vulnerability.

[91] MONRE, 2020: Climate Change Vulnerability Assessment Report, Ministry of Natural Resource and Environment

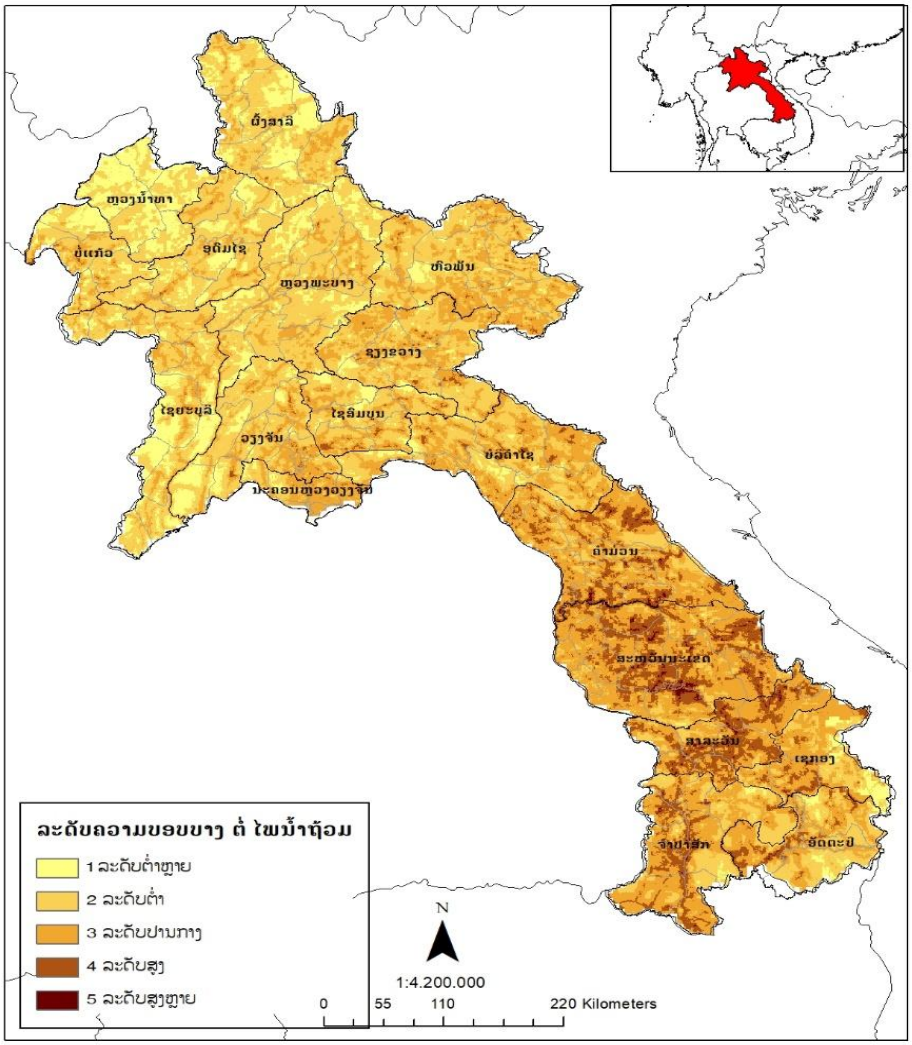


Figure 37: Mapping of Flood Risk and Vulnerability

The vulnerability assessment, which integrates risk with socio-economic factors, sensitivity, and adaptive capacity, indicates that areas with high exposure to storm events are predominantly located in Savannakhet and Salavan provinces (Figure 38). Additionally, elevated levels of storm incidence are observed in Khammouane province, as well as in certain parts of Borikhamxay, Sekong, Xaysomboun, and Xiengkhouang provinces. These findings highlight the spatial variability of storm-related vulnerabilities and underscore the need for targeted adaptation and disaster risk reduction strategies in the most affected areas.

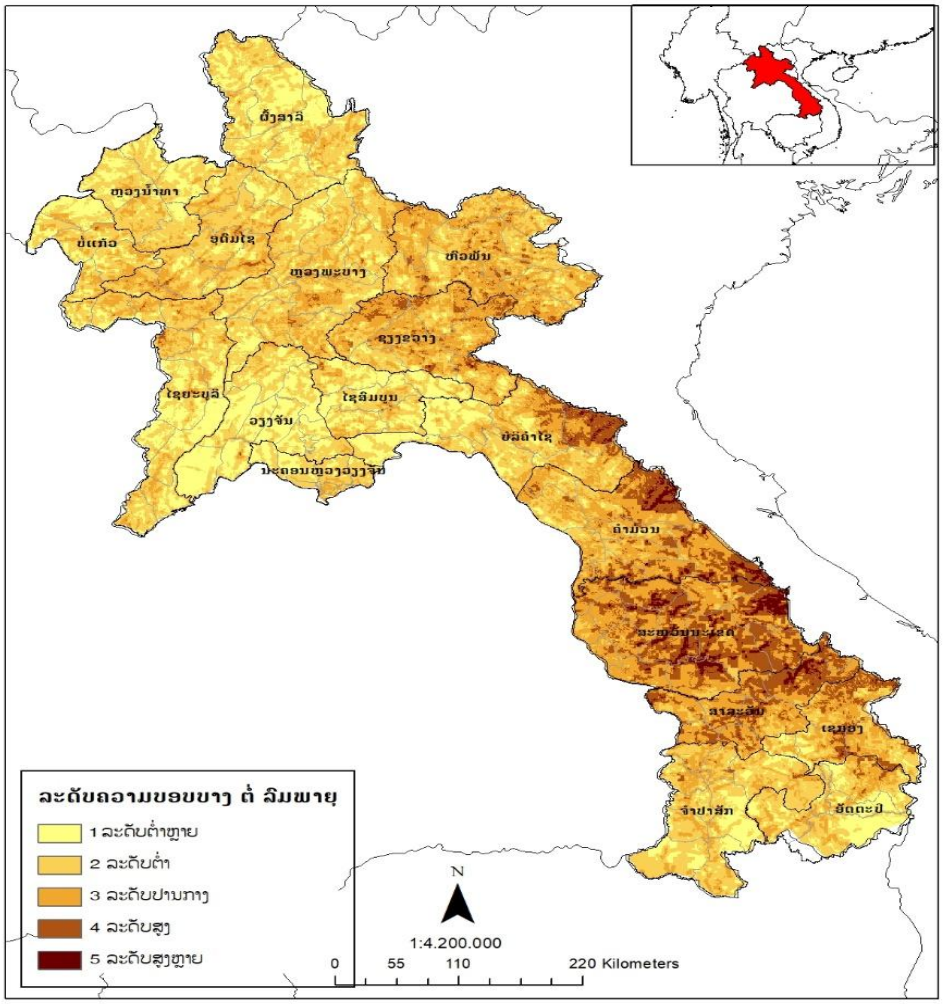


Figure 38: Mapping of storm risk and vulnerability

The area's most susceptible to landslides in Lao PDR are located in the eastern part of the country. Risk assessments indicate that high-risk and vulnerable zones are found in the provinces of Sekong and Salavan, as well as in some areas bordering Savannakhet, Khammouane, Bolikhamxay, Xaysomboun, and Xieng Khouang. In addition, various districts across the country have also been identified as having moderate to high levels of landslide vulnerability.

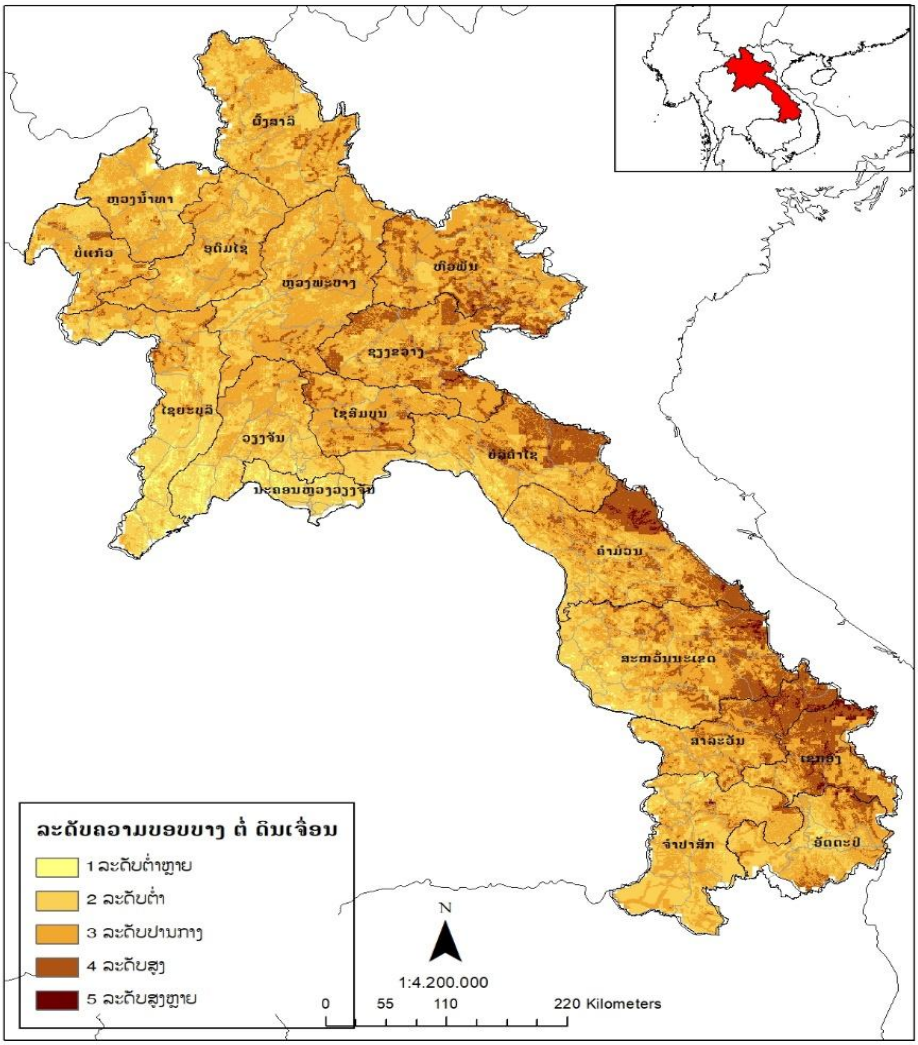


Figure 39: Mapping of landslide risk and vulnerability[92]

In 2009, typhoon Ketsana hit the southern part of Lao PRD, especially Attapeu, Saravan, and Xekong province. It damaged roads, irrigation networks, schools, hospitals, and government offices. The damage is estimated at 94.2 million dollars[93]. In 2011, Typhoons Haima and Nokten killed 41 people in 12 provinces and caused loss and damage of approximately US$ 200 million[94]. In 2013, Lao PDR experienced one of its worst natural disasters when five major monsoon storms hit the country between July and September. 12 provinces were severely flooded, affecting approximately 347,000 people. The damage and loss from the disaster was US$ 219 million [95]. In 2018, Lao PDR was severely affected by floods between July and September, including Tropical storm Son-Tinh, which triggered heavy rains and flooding in 13 provinces with 55 districts throughout the country. In addition, it was also affected by a breach in the Xe Pien-Xe

[92] DCC. 2025. National Adaptation Plan (NAP), Lao PDR, Page: 43

[93] ReliefWeb, 2009. Typhoon Ketsana caused 94.2 million dollars of damage in Lao. [Online] Available at: https://reliefweb.int/report/lao-peoples-democratic-republic/typhoon-ketsana-caused-942- million-dollars-damage-laos.

[94] Government of Lao PDR, 2018: Post-Disaster Needs Assessment 2018 Floods, Lao PDR

[95] Lao PDR, 2017. Lao PDR Country Profile. OCHA. June 23, 2017.

Nam Noy hydropower caused an unprecedented flash flood in Attapeu Province. The damage and loss from disaster were US$ 371.5 [96].

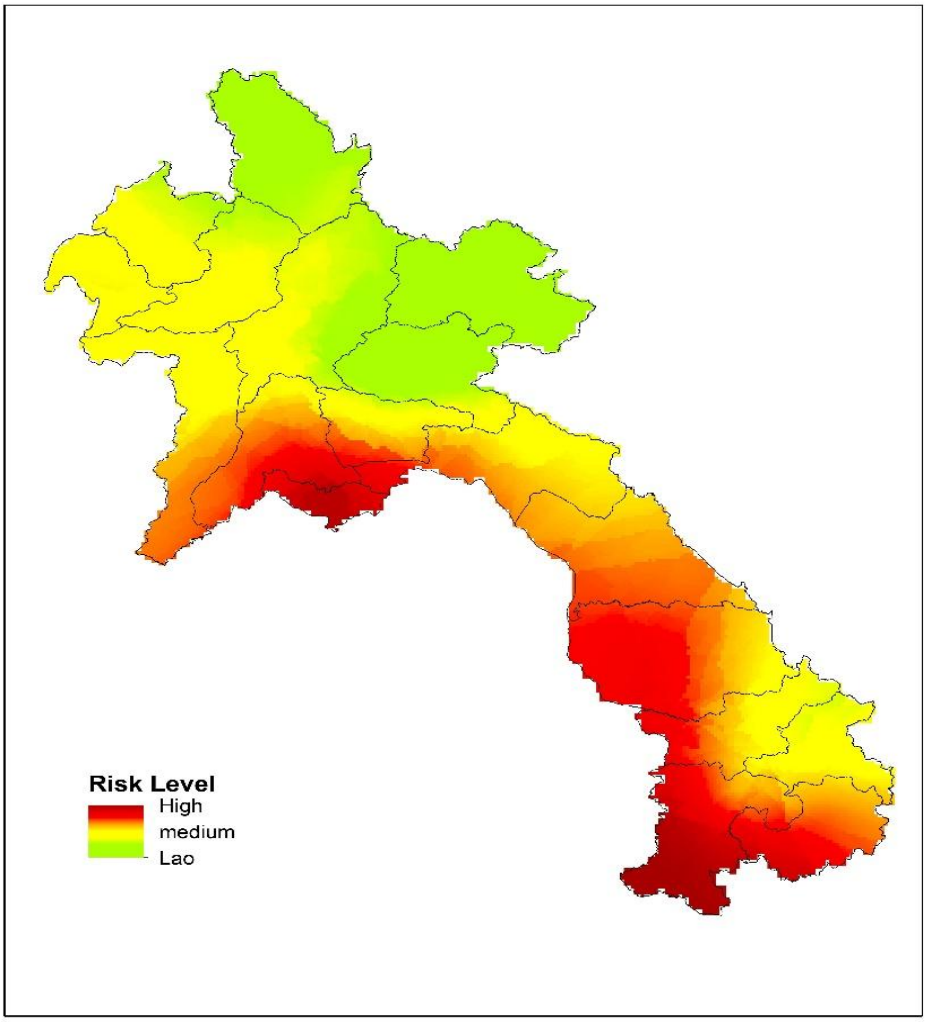


Figure 40: Map of Risk Related to Flood Hazards[97]

4.1.3.3. Drought and heatwave

The Lao PDR has encountered significant drought events in 2015, 2016, and 2019. Research findings indicate a correlation between drought occurrences and El Niño-Southern Oscillation (ENSO) events, with 71% of flood and drought incidents in Lao PDR coinciding with ENSO events[98]. In addition, the Lao PDR is projected to experience an increase in both the intensity and frequency of droughts in the future., The areas exhibiting high levels of risk and vulnerability to drought are predominantly located in the provinces of Savannakhet and Saravane. In addition, areas with elevated risks and vulnerabilities extend to specific areas within the provinces of Champasack, Sekong, Attapeu, Khammouane, Borikhamxay, Xieng Khouang, Sayabouly, Oudomxay, Vientiane, and Luang Namtha **[99].**

[96] Government of Lao PDR 2018: Post-Disaster Needs Assessment 2018 Floods, Lao PDR
[97] DCC. 2025. National Adaptation Plan (NAP), Lao PDR, Page: 45
[98] Sutton, W., Srivastava, J., Rosegrant, M., Koo, J., Robertson, R. (2019). Striking a balance: Managing El Niño and La Niña in Lao PDR's Agriculture. World Bank Group
[99] DCC. 2025. National Adaptation Plan (NAP), Lao PDR, Page: 44

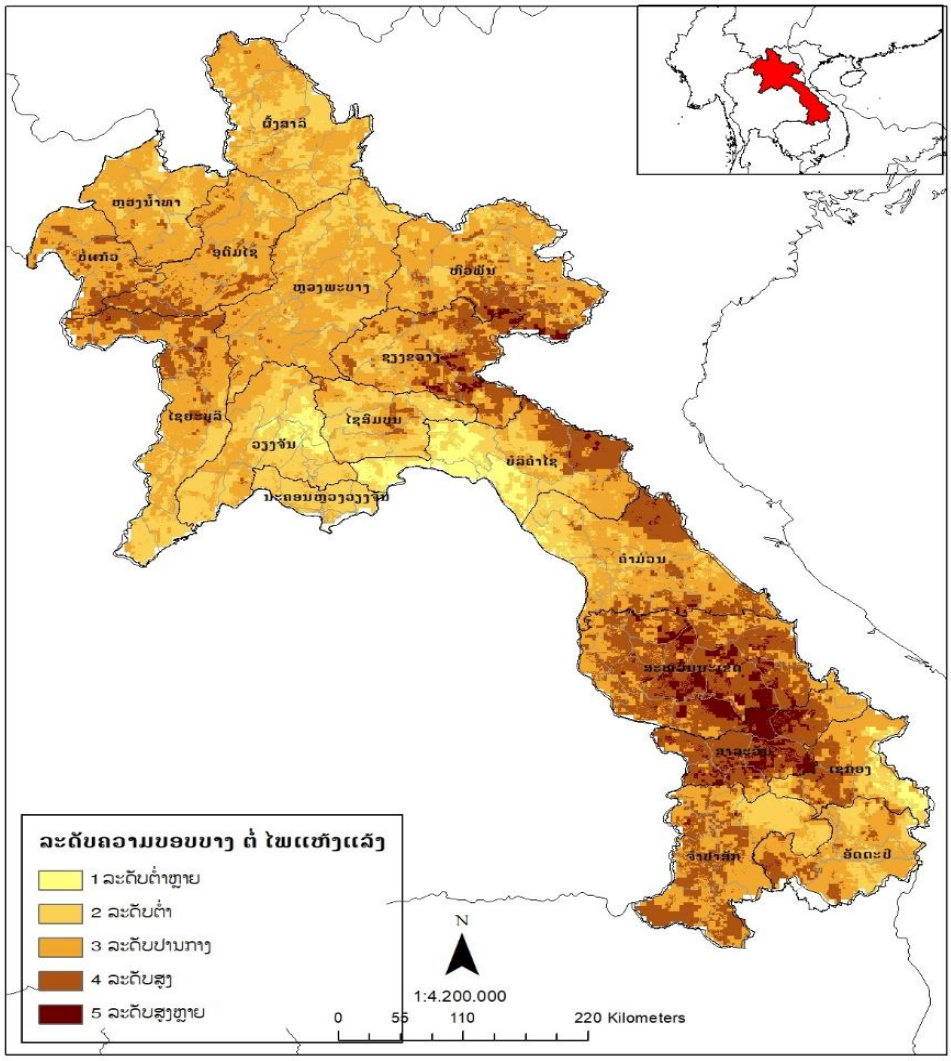


Figure 41: Areas with risk and vulnerability to drought

Over the past four decades, the Lao PDR has experienced five significant drought events, affecting more than 3 million people. A particularly severe drought occurred in 1998 during hot dry season, leading to extensive adverse effects on over 750,000 individuals. According to the World Bank's report highlighted that from 1995 and 2005, the occurrence of abnormal temperature fluctuations induced by climatic changes contributed to the escalation of drought frequency and intensity[100]. These treated and challenged to agricultural production and food security. In 2010, a severe drought occurred during the rainy season, from May to October. This event had a devastating impact on agricultural production for that year, resulting in a serious food shortage in southern Lao PDR, affecting approximately 85,000 people[101]. This drought occurred following Typhoon Ketsana, which had previously devastated agricultural production areas, homes, and key infrastructure — particularly in the southern provinces. The disaster caused economic losses estimated at USD 58 million[102]. The drought also affected the hydrological

[100] World Bank (2011). Climate Risk and Adaptation Country Profile: Lao PDR Vulnerability, Risk Reduction, and Adaptation to Climate Change.
[101] GoL (2018). Post Disaster Needs Assessment (PDNA) 2018 Floods.
[102] GoL (2018). Post Disaster Needs Assessment (PDNA) 2018 Floods.

system, posing a threat to biodiversity and negatively impacting human health. It is estimated that approximately 188,000 households in Lao PDR are at risk of food insecurity due to droughts driven by climate change. These droughts are expected to become more frequent, prolonged, and intense in the future.

4.1.4. Impact of climate change by sectors

4.1.4.1. Agriculture sector

The agriculture sector has played a crucial role in boosting the national economy and supporting the livelihoods of local communities. Rice cultivation occupies a large portion of agricultural land, with about 80% of farmers relying on farming for their income. However, food self-sufficiency remains vulnerable to climate-related challenges, such as floods and droughts. In addition, soil erosion in upland areas has reduced agricultural productivity and caused the depletion for forestry [103]. Climate change indirectly affects agricultural activities by impacting water availability, seasonal patterns, the breakdown of organic matter in soil, erosion, and changes in pest and disease patterns. It also causes damage to arable land due to extreme weather events like flooding and drought. Furthermore, climate-related changes—such as fluctuations in carbon dioxide levels, precipitation, and temperature—can influence crop growth and development [104]. Escalation temperatures and more frequent and intense rainfall events can negatively affect agricultural systems and agribusiness value chains, reducing both the quantity and quality of crop yields and altering water requirements for crops. Shifts in seasonal rainfall have also led to increased erosion, sediment buildup, the loss of farmland, crop failure, and damage to irrigation and water storage systems. Meanwhile, more frequent droughts have decreased surface water levels, caused waterlogging, hindered land cultivation, and reduced water availability[105]. Moreover, climate change—especially flooding—has contributed to the spread of foot-and-mouth disease among livestock, as animals consumed contaminated water and fecal matter from communities suffering from dysentery or diarrhea. Extended dry spells, rising temperatures, and abnormal weather patterns have also triggered food insecurity and hunger [106].

4.1.4.2. Forestry and land use planning sector

Climate change has a major impact on the forest sector, which is vital for the Lao population's food supply and livelihoods. Shifts in rainfall and temperature patterns, along with changes in soil moisture levels, have hindered natural forest regeneration, reduced biodiversity, and weakened essential ecosystem functions. Altered precipitation trends may also threaten the survival of plant and animal species, especially young trees and seedlings[107]. In addition, increasing temperatures are likely to lead to more frequent forest fires, pest outbreaks, and disease infestations in forest areas. These environmental changes may intensify the effects of extreme flooding events, often caused by soil erosion[108]. Such floods have affected various economic and social sectors in Laos, with agriculture and forestry—encompassing crops, livestock, fisheries, and irrigation bearing 57 % of total damages. Still, the direct impact on forests has been comparatively less severe. Flash floods have mostly struck the mountainous forest areas, while slower, stagnant floods have damaged farmland along rivers and floodplains. Though some trees

[103] FAO & GEF (2016). Strengthening agro-climatic monitoring and information system to improve adaptation to climate change and food security in Lao PDR
[104] WB & ADB (2021). Climate Risk Country Profile, Lao PDR
[105] Mackay, P & Phoumphone, K (2023). Climate Risk & Vulnerability Assessment, Vientiane Capital, Laos
[106] PIL (2022). Climate Change Sector System and Vulnerability in the Public Health and Wash Sectors, Lao PDR.
[107] Lao PDR, 2011. Climate Risk and Adaptation Country Profile, Vulnerability, Risk Reduction, and Adaptation to Climate Change, Lao
[108] EU (2011). Managing Climate Change Risks for Food Security in Lao PDR

near streams and valleys were impacted, the stagnant water in lowland areas generally lacked the strength to uproot them. The World Bank Group's Country Partnership Strategy Progress Report (2018) has highlighted ongoing unsustainable practices, such as unregulated legal and illegal logging, which threaten the long-term health of forests and rural communities—especially under the pressures of climate change. The expansion of rubber plantations has also reduced income variety for farmers, making them more vulnerable to environmental and economic shocks and further diminishing ecosystem biodiversity[109]. Moreover, the growing frequency and severity of extreme weather events—such as floods—are expected to degrade both the quality and quantity of forest and fallow land products essential to livelihoods. These events may also result in soil erosion, damage to watersheds, and significant landslides. The risk of forest fires is projected to rise due to prolonged droughts and higher temperatures. Additionally, the shift in climate patterns is likely to cause further biodiversity loss, including the disappearance of native plant and animal species.

4.1.4.3. Public works and transport sector

Extreme weather events like floods can have a major impact on essential infrastructure, including roads, drainage systems, housing, healthcare facilities, and infrastructure related to food production, water management, and electricity. In Lao PDR, the public works and transportation sector is especially vulnerable to flooding and riverbank erosion. For example, the road network faces high risks due to limited maintenance and exposure to climate hazards. Floods, often triggered by tropical storms, have damaged around 20% of the country's roadways. In 2009, Typhoon Ketsana struck southern Laos, affecting roads, irrigation systems, schools, and hospitals, with damages estimated at USD 94.2 million[110] while the 2011–2015 floods and landslides also damaged roads and bridges valued at USD327,05[111]. Flooding also seriously affected river-related infrastructure and flood protection systems along the Mekong, Nam Khan, and Nam Nguem rivers. Major damage was recorded in Vientiane Capital and the provinces of Luangprabang, Xayaboury, and Khammuane. In 2018, flash floods damaged 9,853 kilometers of roads and 656 meters of bridges—786 meters of which were completely destroyed. Around 2,085 vehicles, including trucks, motorcycles, and farming vehicles, were also affected—mainly in Attapeu, after the collapse of the Xe Pian-Xe Namnoy saddle dam due to heavy rainfall[112]. Other affected infrastructure included slope protections, dikes, embankments, floodgates, ports, and navigation aids. Overall, 3,000 meters of riverbank protection, 4,400 meters of embankments, 22 floodgates, and 8 ports were damaged. The estimated cost of the disaster was about 116.9 billion Lao kip. The floods also had a serious impact on water, sanitation, and hygiene (WASH) services in both urban and rural areas, with estimated damages and losses reaching 69.9 billion Lao kip. Recovery for the WASH sector is expected to cost 68.2 billion Lao kip. In the urban water supply sector, 31 systems in 12 provinces suffered physical damages worth 7.1 billion Lao kip and incurred losses of 7.7 billion Lao kip, totaling 14.8 billion Lao kip. This disruption affected 289,774 individuals across 54,600 households. To restore services and carry out emergency repairs, approximately 6.3 billion Lao kip is needed for short-term recovery.

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[109] Brown, P. R., Afroz, S., Chialue, L., Chiranjeevi, T., El, S . Williams, L. J. (2018). Constraints to the capacity of smallholder farming households to adapt to climate change in South and Southeast Asia. Climate and Development, 0(0), 1–18. URL: https://www.tandfonline.com/doi/abs/10.1080/17565529.2018.1442798

[110] ReliefWeb (2009). Typhoon Ketsana caused 94.2 million dollars of damage in Lao. https://reliefweb.int/report/lao-peoples- democraticrepublic/typhoon-ketsana-caused-942-million-dollars-damage-laos

[111] Vongphachan (2017). Mainstreaming Disaster and Climate Risk into the Road Sector in Lao PDR

[112] GoL (2018). Post Disaster Needs Assessment (PDNA) 2018 Floods. Retrieved from https://laopdr.un.org/en/12913-2018-floodspost-disaster-needs-assessment

4.1.4.4. Energy and mine sector

The energy and mine industries face numerous climate, technological, and human-caused risks that could disrupt electricity supply or lead to a long-term power shortage. The increasing frequency of these hazards poses potential challenges for the power sector in Lao PDR, particularly since hydropower relies on consistent environmental water flows[113]. A Post Disaster Need Assessment revealed that climate-related hazards, such as flooding, have caused significant damage to the electricity sector across all provinces. The total damage amounted to 45.3 billion kip, with 43.2 billion kip in transmission line damage and 3.1 billion kip in infrastructure destruction. The damage was mainly caused by faults and collapsed poles in distribution lines, while landslides impacted transmission lines and substations[114]. On a community level, heavy rainfall during floods damaged distribution grids in all provinces, affecting power supply to 1,091 villages[115]. The Asian Development Bank (ADB) also emphasized that climate change likely intensifies these risks and poses a major threat to power generation in Lao PDR. Climate variability can negatively impact hydropower operations, including risks related to generation sensitivity to fluctuating rainfall and evaporation patterns. Additionally, increased sedimentation can reduce reservoir storage, while the risk of extreme flooding could threaten dam structures[116]. Climate change has significantly affected the mining sector, particularly in terms of operations and profitability. Rising temperatures and extreme weather events, such as flooding and droughts, can disrupt mining operations, causing delays and damaging equipment and infrastructure. Water shortages further complicate the mining sector's ability to secure adequate water for operations[117]. Climate-related disasters can also damage infrastructure like roads, bridges, and ports, indirectly impacting mining activities. Heavy rainfall can worsen erosion, destabilizing slopes near open-pit mines, disrupting land transportation routes, and hindering the delivery of essential materials like steel, timber, cement, hydrochloric acid, and fuel. Meanwhile, rising temperatures increase energy demand and strain transmission networks, reducing production and profits. Higher temperatures also raise the risk of heat-related illnesses, accidents, injuries, and fatalities[118].

4.1.4.5. Education sector

Climate-related events, especially floods, have had a profound impact on the education sector in Lao PDR. These floods have severely affected 229 public schools, causing an estimated loss of 20.4 billion kips. In the hardest-hit area of Savannakhet Province, schools were submerged for up to two months, damaging classrooms, restrooms, and key infrastructure like walls and foundations. Educational resources such as teacher's manuals, textbooks, furniture (desks, chairs, blackboards), and electronics (computers and printers) were destroyed. Teachers also reported the loss of uniforms, teaching materials, musical instruments, and sports equipment, while many families faced displacement and the loss of their homes[119]. The floods significantly disrupted students' attendance, impacting both boys and girls in rural, remote, and urban areas. In rural regions, rising water levels made rivers impassable due to the lack of bridges, and children often stayed home to assist their families when homes or crops were damaged. Other climate-related hazards, like cold spells, heatwaves, diseases, and landslides, have also affected children across

[113] GoL (2018). Post Disaster Needs Assessment, Lao PDR
[114] GoL (2018). Post Disaster Needs Assessment, Lao PDR
[115] GoL (2018). Post Disaster Needs Assessment, Lao PDR
[116] ADB (2019). Energy Sector Assessment, Strategy and Road Map, Lao PDR.
[117] Lao PDR (2010). Economic, Social and Environmental of Investments in mining, Lao PDR
[118] Cheuchard, R & Nelson, J (2010). Adapting to climate change: A guide for the Mining Industry
[119] GoL (2018). Post Disaster Needs Assessment (PDNA) 2018 Floods. Retrieved from https://laopdr.un.org/en/12913-2018- floodspost-disaster-needs-assessment

both rural and urban areas, with cold weather presenting a particularly unique challenge in rural regions. Additionally, boys in remote rural areas were found to miss school more frequently due to climate-related disasters[120]. Droughts have worsened water scarcity in local communities, negatively affecting the daily lives of both students and teachers. In rural areas, droughts have worsened poverty, as insufficient water supplies hinder agricultural productivity. This often forces students to drop out of school to assist with farming or to migrate for work to support their families.

Children are especially vulnerable to the effects of climate change, as they are physically less capable of withstanding and surviving events such as floods, storms, and extreme weather. They are largely dependent on adults for protection during such crises. The Post-Disaster Needs Assessment (PDNA) highlighted a lack of preparedness among schools and communities, which may have led to inadequate protection for children and other vulnerable members [121].

4.1.4.6. Water resource sector

Climate change significantly affects the hydrological cycle, influencing rainfall patterns in terms of quantity, frequency, intensity, and duration. Rainfall tends to increase during the wet season and decrease in the dry season, leading to natural disasters. Some regions have been experiencing prolonged droughts, while others face frequent heavy rains that result in floods. These changes impact the economy, society, and natural resources, particularly agriculture, industry, and the energy sector, which plays a vital role in national development. Power exports have contributed to the country's recent economic growth, accounting for 26% of total exports in 2017. The energy sector is highly dependent on water resources, with the potential for hydropower development estimated at 26,000 megawatts (MW). As of 2019, there were 78 power plants with a combined capacity of 9,972 MW, with hydropower making up approximately 80% of total generation capacity. However, climate change threatens the stability of hydropower production, jeopardizing energy security and exports. It is expected that the financially viable hydropower potential will reach its limit by 2030, and by 2040, hydropower's share of total generation may decrease to around 77% [122]. Climate change also poses a risk to groundwater resources. As climate conditions change, the depletion and degradation of groundwater could limit local communities' access, threatening food security and livelihoods. Rapid socio-economic development, combined with the depletion of surface water due to both climate change and human activities, has led to a significant increase in groundwater demand in the Mekong River Basin[123]. In addition, flooding in the Mekong River Basin and its tributaries is a common issue, resulting in damage to infrastructure, loss of life, and destruction of property. The basin's complex hydrological system means that rainfall in different areas can have varied impacts downstream, and local floodplains play a crucial role in mitigating floodwaters. By 2018, the damages from floods were expected to increase by a factor of 5-10 annually due to ongoing and planned development in the basin, particularly in floodplain areas[124]. Along with floods, urban communities in Laos within the Mekong Basin also face seasonal droughts, worsened by changes in precipitation patterns and

[120] Save the Children (2017). Education Against the Odds: Impacts of Hazards and Disasters on Access and Equality of Education in Lao PDR

[121] GoL (2018). Lao PDR Post Disaster Needs Assessment Report

[122] MONRE (2023). National Strategy on Climate Change towards 2030

[123] IU, J., Chen, D., Mao, G., Irannezhad, M., Pokhrel, Y (2020). Past and Future Changes in Climate and Water Resources in the LancangMekong River Basin: Current Understanding and Future Research Directions, a). School of Environmental Science and Engineering, Southern University of Science and Technology, Shenzhen 518055, China b). Regional Climate Group, Department of Earth Science, University of Gothenburg 40530, Sweden C). Department of Civil and Environmental Engineering Michigan State University, East Lansing MI 48824, USA.

[124] http://www.fao.org/nr/water/aquastat/basins/mekong/mekong-CP_eng.pdf

recent dam constructions. In 2019, a shortened monsoon season caused severe droughts, bringing the water levels in the Mekong River to their lowest in 60 years and threatening agricultural productivity throughout the lower Mekong River Basin[125].

4.1.4.7. Health sector

Flooding impacts the health sector both directly and indirectly. Direct impacts include damage to healthcare infrastructure such as hospitals and health centers. Indirect effects involve an increase in waterborne diseases, such as E. coli and Salmonella, which cause diarrhea, due to the contamination of water and sanitation systems. Additionally, diseases like Melioidosis and leptospirosis, which are common in the region, may spread during the rainy season, especially if floods worsen. Other health problems caused by floods include eczema, muscle spasms, and respiratory issues[126]. Rising temperatures have expanded the geographic range of malaria. Studies indicate that increased humidity and temperature during the rainy season create favorable conditions for malaria breeding in Lao PDR. The malaria death rate stands at 8%, and it remains a public health concern. In the previous year, there was a significant malaria outbreak. In 2006, the infection rate was 96.9 per 100,000 people. In 2010, there were 22,890 malaria cases, and by 2013, the number had risen to 44,171 cases with 95 deaths. While malaria primarily affects urban areas, rural regions of Lao PDR also saw a surge in cases in 2009. Climate change, particularly rising temperatures and increased rainfall, may accelerate the spread of malaria. Most malaria cases occur during the rainy season from December to October. Studies show a high incidence of malaria during this period, with its spread influenced by factors like regional temperature, rainfall, and humidity, particularly in the northern and central areas[127]. Malnutrition is another serious public health issue in Lao PDR. In 2012, 43.8% of children under 5 suffered from stunting, while 26.5% were underweight and 6.4% experienced wasting. Climate change, including rising temperatures, water shortages, and droughts, negatively impacts crop production and food systems, worsening the situation, especially for vulnerable groups at greater risk[128]. The World Health Organization (WHO) warns that climate change could undermine progress in reducing health risks in Lao PDR. Malaria remains a significant threat, with forecasts predicting an increase of about 400,000 people at risk by the 2040s and 2070s under various emissions scenarios (RCP2.6 to RCP8.5). Dengue fever transmission is also expected to rise, though the increase may be less pronounced under the RCP2.6 scenario compared to RCP8.5.

4.1.4.8. Tourism sector

The climate impacts on the tourism industry varied by province, depending on the type of hazard, such as flooding. The damage to the private sector was significantly greater than that to the public sector. In general, the tourism sector's losses during floods were primarily due to lost revenue when businesses had to close, staff were laid off, and wages were lost. Tourism operators also faced higher operational costs, additional expenses for providing access to tourist sites (e.g., temporary bridges), and increased utility costs like electricity while the disease widespread damage to rice crops across the country may have raised operational costs for hotels and restaurants. The climate effects on the tourism sector also caused significant hardships for individuals and families working in or running the affected facilities. Many tourism establishments along rivers and waterways suffered damage as embankments overflowed during storms and floods. Community-based tourism projects and homestays were particularly vulnerable after such disasters, as they often lack the resources to survive the crisis or funds to

[125] http://www.mrcmekong.org/news-and-events/news/drought-continues-to-hit-mekong-countries-risking-stress-on-crop-productionwater-shortage/

[126] WHO (2015). Climate and Health Country Profile, Lao People's Democratic Republic

[128] MoH (2017). National Strategy on Climate Change and Health Adaptation to 2025

rebuild. In Lao PDR, examples include the community-based tourism project in Nam Et Phou Louey, Huaphanh National Protected Area, and six homestays in Ban Mai, Sanamxay, Attapeu[129]. Regarding gender differences in the impact of floods, women working in the tourism industry often hold lower-paying jobs, such as housekeeping in hotels and guesthouses. When a facility shuts down, these positions are typically the first to be cut, while male managers are more likely to retain their jobs during the disaster. As a result, women are at greater risk of seeking more dangerous work or resorting to unsafe migration

4.2. Adaptation priorities and barriers

4.2.1. Adaptation priority

The National Adaptation Planning (NAP) [130] has been prioritized in nine (9) sectors, including 1). Agriculture, 2). Forestry and Land-use Planning, 3). Public Works and Transport, 4). Energy and Mine, 5). Education, 6). Water Resources, 7). Health, 8). Tourism, and 9). Labor and Social Welfare. The NAP process aims to support the National Strategy on Climate Change towards 2030, the NDC (2021), the 9th Five-Year National Socio-Economic Development Plan (NSEDP) as well as the resolution of the National Assembly on adopting of the government's report on the implementation of the NSEDP for 2022 and the direction of the plan for 2023. The methodologies applied in developing the Lao PDR's NAP was based on the UNFCCC guideline. This involved the internal national processes, including a thorough review of relevant national climate policies, strategies, policy briefs, and other scientific reports, assessing risks and vulnerability, and prioritizing the adaptation options through various consultations with key stakeholders at the national and provincial levels. A methodological overview of the NAP process is presented in (Figure 42).

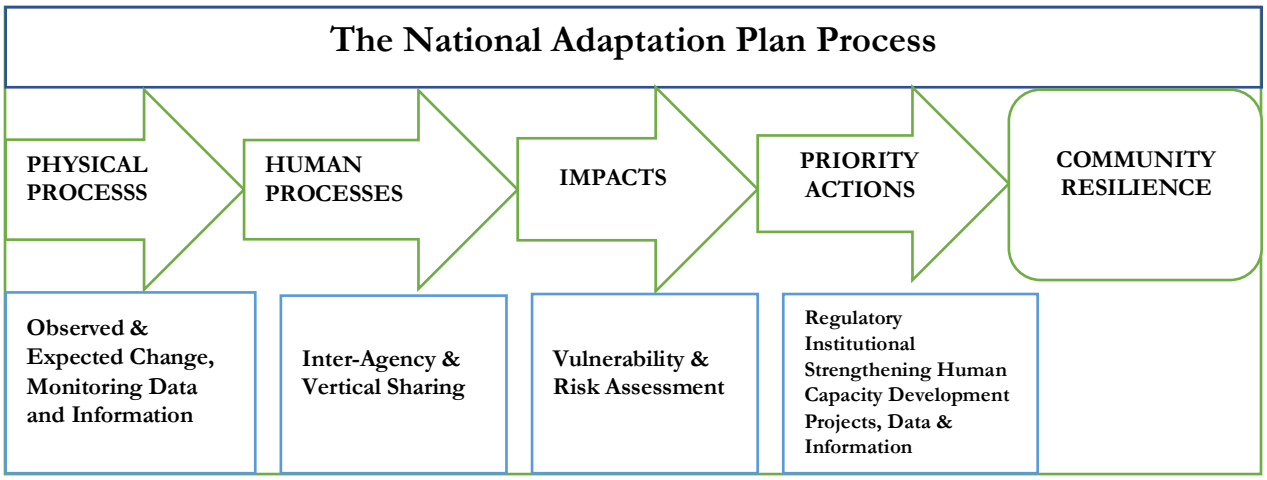

Figure 42: Overview of Lao NAP Process [131]

[129] MICT 2017. Statistical Report on Tourism in Lao PDR 2017
[130] DCC. 2025. National Adaptation Plan (NAP), Lao PDR
[131] DCC. 2025. National Adaptation Plan (NAP), Lao PDR

Table 34: Adaptative Strategies of Each Sector from 2025-2030 and 2030-2035

Agriculture Sector			
	Adaptive strategies	**2025-2030**	**2030-2035**
Strategy 01	Prevent agricultural food crop production impacts from climate hazards including floods, erosion of agricultural land and surface erosion	☑	☑
Strategy 02	Initiate research to apply new technology and techniques for improved climate resilient agricultural production	☑	☑
Strategy 03	Build human capacity on climate change adaptation within the agriculture and fishery sector	☑	☑
Strategy 04	Promote communication tools to raise awareness on climate risks for the agriculture sector	☑	☑
Strategy 05	Improve information management systems and strengthen the development of early warning systems within the agriculture sector	☑	☑
Strategy 06	Improving tools, mechanisms, and facilities for better preparedness	☑	☑
Forestry and Land-use Planning Sector			
	Adaptive strategies	**2025-2030**	**2030-2035**
Strategy 01	Development of sustainable agriculture in coordination with forest protection and land-use planning	☑	☑
Strategy 02	Promotion of tree plantation and forest restoration	☑	☑
Strategy 03	Linking infrastructure development with protection of forest and forest resources	☑	☑
Strategy 04	Stabilizing uncontrolled shifting cultivation by promoting integrated agriculture production and sustainable land management to control forest fires and reduce land degradation	☑	☑
Public Works and Transport Sector			
	Adaptive strategies	**2025-2030**	**2030-2035**
Strategy 01	Development of resilience infrastructure to prevent climate change impacts	☑	☑
Strategy 02	Development of smart city plans with environmentally friendly, and urban settlements, public works and transportation to be resilient to climate risks and disasters	☑	☑
Strategy 03	Developing road-bridge sectoral works to be effective, resilient to climate change, safe and sustainable	☑	☑
Energy and Mine Sector			
	Adaptive strategies	**2025-2030**	**2030-2035**
Strategy 01	Strengthening the resilience and adaptability to climate change of energy and mine sectors	☑	☑
Strategy 02	Promoting the use of clean and renewable energy in transportation, building and industrial sectors	☑	☑
Strategy 03	Promoting energy saving and conservation	☑	☑
Strategy 04	Integrating Sustainable Development Goals (SDG), climate resilience building and Green Growth (GG) into mineral and mining development plans	☑	☑

Education Sector			
	Adaptive strategies	**2025-2030**	**2030-2035**
Strategy 01	Strengthening educational organizations and personnel in climate change	☑	☑
Strategy 02	Development of curriculum and teaching materials on climate change in formal schools	☑	☑
Strategy 03	Development of curriculum and teaching materials on climate change for informal school	☑	☑
Strategy 04	Promoting education, and creating public awareness and participation on climate change	☑	☑
Strategy 05	Enhancing coordination and cooperation among parties	☑	☑
Water Resources Sector			
	Adaptive strategies	**2025-2030**	**2030-2035**
Strategy 01	Development of the integrated water resources management and river basin management plan, policy and guideline	☑	☑
Strategy 02	Protection and restoration of water and water resources (wetland, peatland, aquatic biodiversity, aquatic ecosystems and groundwater	☑	☑
Strategy 03	Improvement and development of water related infrastructure, information system and early warning systems	☑	☑
Strategy 04	Development of human resources	☑	☑
Health Sector			
	Adaptive strategies	**2025-2030**	**2030-2035**
Strategy 01	Strengthening and building the organizational and staff capacity	☑	☑
Strategy 02	Assessment of climate vulnerability and adaptation capacity in health sector	☑	☑
Strategy 03	Integrating risk monitoring and warning systems	☑	☑
Strategy 04	Research on climate change and health	☑	☑
Strategy 05	Building resilience to climate change and sustainability of technology and infrastructure	☑	☑
Strategy 06	Creating public health programs from climate change information	☑	☑
Tourism Sector			
	Adaptive strategies	**2025-2030**	**2030-2035**
Strategy 01	Promote eco-tourism value chains to preserve environmental and cultural integrity, benefit local communities economically, and promoting sustainable and green tourism practice	☑	☑
Strategy 02	Assess, create risk maps and adaptation plans to climate change and disasters specific to the tourism and culture sector, especially tourism resources and conservation tourism, including cultural, historical and natural tourism resources	☑	☑
Strategy 03	Improve, conserve and rehabilitate cultural, historical, and archaeological areas that are vulnerable to climate change or disasters	☑	☑

Strategy 04	Develop and offer sustainable and inclusive tourism products, e.g., homestays or eco-resorts.	☑	☑
Strategy 05	Incentive domestic or foreigner investors to construct or improve the climate resilience of tourism infrastructure.	☑	☑
Labour and Social Welfare Sector			
	Adaptive strategies	**2025-2030**	**2030-2035**
Strategy 01	Develop and strengthen prevention, risk reduction and disaster preparedness systems	☑	☑
Strategy 02	Develop and build strength for post-disaster recovery work	☑	☑
Strategy 03	Upgrade education and training on disaster risk reduction at the national and local levels	☑	☑
Strategy 04	Promote participation and inclusion of all stakeholders	☑	☑

4.2.2. Adaptation barriers and challenge

Lao PDR has been facing various barriers and challenges in achieving climate change adaptation . The main barriers and challenge are highlighted in (Table 35) [132] [133] [134] [135]

Table 35: Adaptation barriers and challenge

Categories	Barriers and challenge
Data and Information	a) Limited high-quality data of the meteorology, hydrology, agronomic, pest, disease, and health data to produce accurate weather forecasting, seasonal forecasting, climate projection, cropping calendar, and early warning system; b) Lack of an integration knowledge platform on climate change information and data for sharing and accessing among government agencies, national organizations, CSOs, and international organizations; c) Limited data and information for producing the National Adaptation Planning (NAP,) National Communication (NC), National Determination Contribution (NDC), and Biennial Transparency Report (BTR);
Coordination	a) Lack of explicit coordination between various government agencies, international organizations, Civil Society Organizations (CSO), and private sectors;
Technical Capacity	a) Limited institutional capacity, inadequate staffing, and ineffective management tools in addressing climate change; b) Limited accessibility to appropriate technology
Financial Resource	c) Lack of financial resources and unclear mechanisms for accessing climate financial; d) Absence of monitoring and evaluation framework and system for climate finance monitoring
Stakeholder Engagement	a) Lack of private sector, financial institute, and insurance company engagement in addressing climate change and disasters;

[132] DCC. 2025. National Adaptation Plan (NAP), Lao PDR
[133] MOSL (2021): National Strategy on Disaster Risk Reduction (NSDRR) 2021-2030
[134] DCC. 2025. National Adaptation Plan (NAP), Lao PDR
[135] MONRE, 2023: Nationally Determined Contributions Implementation Plan of Lao PDR

	b) Lack of clarity in scope of work, roles and responsibility in addressing climate change; c) Ineffective mainstreaming of climate change into development plans
Policies, and strategy dissemination	e) Although Lao PDR has developed various policies, guidelines, decrees, and strategies on climate change, the dissemination and enforcement at the local level were inconsistency.

4.3. Adaptation strategies, policies, plans, goals, and actions to integrate adaptation into national policies and strategies

4.3.1. Policies, plans, and strategy framework

Since the 7th Five-Year National Socio-Economic Development Plan (NSEDP) (2011-2015), followed by the 8th (2016-2020) and 9th (2021-2025) plans, these documents have included climate change as a key objective. They have also outlined socio-economic development strategies that promote green and sustainable growth. The NSEDPs determine measures to build resilience, alleviate climate change impact, and encourage green growth by investing in green sectors. These plans aim to diversify the economy and shift towards a more circular economy. In addition, they emphasize addressing climate change by reducing pollution, minimizing waste incineration that emits greenhouse gases, and formulating strategies to respond to and manage disaster and emergency events effectively[136].

Since 1990, the Government of Laos has been negotiating the United Nations Framework Convention on Climate Change (UNFCCC) and officially joined the Convention in 1995. It later became a party to the Kyoto Protocol on greenhouse gas emissions control in 2003 and the Paris Agreement on Climate Change in 2016.

Since 2009, Lao PDR has determined policies and developed significant documents for climate change adaptation. Simultaneously, climate change adaptation has been integrated into the national socio-economic development plan in each phase.

The **National Adaptation Programme of Action** (NAPA) was approved in 2009. It outlined adaptation goals and priorities for the agricultural, forestry, water resources, and health sectors for the 2010-2020 period.[137] Despite many of these priorities remaining unaccomplished, they remain as being considered nationally crucial. These include early warning systems (EWS), programs to enhance the resilience of crop varieties and animal species to climate change, and ensuring sustainable water resources usage.

Building on the National Climate Change Strategy (2010), the **Climate Change Action Plan** was developed in 2011. Its goal was to identify key initiatives, proposed projects and activities, and leading or responsible agencies. It aimed to assist stakeholders from the national to the local level in implementing, monitoring, and reporting in a coordinated manner. The action plan supplemented the strategy's vision and guiding principles with four key initiatives: 1) strengthening institutional and human resource capacities on climate change, 2) enhancing adaptive capability for coping with climate change, 3) reducing greenhouse gas emissions, and 4) strengthening education and raising public awareness about climate change.

The revision of the new **National Strategy on Climate Change towards 2030** was recently

[136] GoL (2021). Lao PDR 2nd Voluntary National Review: Main Message. https://sustainabledevelopment.un.org/content/documents/277122021_Main_Message_Lao_PDR.pdf. p. 1.

[137] GoL(2009). Lao PDR National Adaptation Programme of Action (NAPA). https://www.adaptation-undp.org/sites/default/files/downloads/Lao_pdr_napa.pdf

endorsed in 2023[138]. This strategy aims to bolster capacity across several areas, including legal frameworks, institutions, technology, human and financial resources, economics, cooperation and coordination, research, information exchange, education, and climate change awareness. It outlines six primary objectives underpinned by three strategies and nine programs. These objectives include the effective integration of climate change mitigation, resilience, and adaptation into national, sectoral, and local policies, strategies, programs, and projects.

In 2020, the GoLPDR ratified the **National Disaster Risk Reduction Strategy** (2021-2030). This strategy aims to expand the application of the Disaster Management Law, enacted in 2019, and to execute regional and global disaster risk reduction policies and strategies. It takes into account various natural disasters like floods, droughts, landslides, fires, and disease outbreaks[139]. According to the strategy, the National Disaster Management Committee (NDMC) is required to be established at all levels in order to task with coordinating early warning, preparedness, emergency response, and recovery activities. In case of a severe disaster occurring, the NDMC has a role to collaborate and coordinate with the relevant line ministries, organizations, and local authorities, Provincial and District Disaster Management Committee (PDMC and DDMC) to respond to extreme events[140]. Moreover, the Disaster Management Fund has been established at all levels in response to the emergency events. This fund was set up according to the Decree on Disaster Management Fund approved by the national government in 2023.

Sectoral plans also are in existence, for example, Lao PDR has been working on the **National Forestry Strategy** since 2005. This strategy categorizes forests into production, conservation, protection, regeneration, and degraded forests. It set goals for the forestry sector, such as stabilizing shifting cultivation by 2005, eradicating it by 2010, and improving forest cover and quality. Recognizing forestry as a key sector in addressing climate change in Lao PDR, the strategy aims to increase forest cover to 70% of the country's land area by 2025. This goal, intended to foster the development of carbon sinks and maintain it thereafter, is expected to mitigate the risk of floods, prevent land degradation, and reduce greenhouse gas emissions **[141].**

Natural Resources and Environment Strategy 2016-2025 and **Vision** 2030 emphasize the objective of "green, clean, beautiful, rich in natural resources on the basis of green economic growth for sustainable development"[142]. The strategy identifies priority targets such as planning and managing the sustainable use of natural resources like land, water, wetlands, forests, biodiversity, and minerals. It promotes maintaining sustainable environmental quality in urban and rural areas and increasing Lao PDR's capacity to adapt to climate change and mitigate the effects of natural disasters.

The **National Green Growth Strategy**, adopted in 2019, aims to integrate green growth into national, sectoral, and local planning, shifting Lao PDR's long-term development away from reliance on natural resources, particularly mining, forestry, and water resources, and graduating from the Least Developed Country (LDC) status, and becoming a developing country with high middle income according to the green-sustainable direction and achieving the Sustainable Development Goals (SDGs) in 2030[143].

[138] GoL (2023). National Strategy on Climate Change toward 2030
[139] GoL (2020). National Disaster Risk Reduction Strategy to 2030: MLSW
[140] CFE-DM (2021). Lao PDR Disaster Management Reference Handbook
[141] GoL (2005). National Forestry Strategy: MAF
[142] GoL (2016). Natural Resources and Environment Strategy 2016-2025 and Vision 2030: MONRE
[143] GoL (2018). The National Green Growth Strategy to 2030:

The **National Water and Water Resources Strategy**, is currently approved in 2023, addresses water necessities, including the governance of fundamental water use. It outlines the government's direction and decision-making regarding water resource management, encompassed in eight programs. These programs tackle key challenges in the water sector, such as integrated river basin management, water resources protection and restoration, groundwater management, and international cooperation, among others[144]

The **National Housing and Urban Development Strategy**, approved in 2023 by the Ministry of Public Works and Transport (MPWT). The strategy underlines the necessity for city development and the establishment of urban development strategies at all levels, tying in with the national direction. It outlines objectives, policies, and programs for the urban sector, aligning with MPWT's long-term plans. The strategy aims to develop all urban areas, reduce the development gap between urban and rural areas, strengthen urban management authorities, and encourage civil society and private sector participation in urban development. It also generally addresses responses to climate change impacts in line with the SDGs[145]

The Government of Lao PDR adopted the **National Action Plan on Gender Equality 2021-2025**. This action plan is designed to respond to gender issues, which covers several goals, such as the implementation of quotas to promote the participation of women and girls in various sectors, the plan also sets indicators on the number of participants, including female leadership positions in the field of climate change and disaster risk reduction, such as 30% of women have participated in the creation and implementation of national policies and programs on climate change, 30% of women are the members of the national and local committees in disaster prevention, 40% of women have participated in disaster prevention and response training, and 50% of women have trained in energy- saving and sustainable agricultural technology.

Lao PDR has enhanced its legal framework to support the implementation of climate change strategies in national and sectoral development plans. The country enacted the **Decree on Climate Change** in 2019, which is its first specific legal framework addressing climate change. The Decree outlines principles, regulations, and measures for climate change adaptation and mitigation. It also delegates the responsibility of managing climate change activities and coordinating with relevant ministries, organizations, and local authorities to the Ministry of Natural Resources and Environment (MoNRE)[146]. It also emphasizes on the importance of the climate change mainstreaming into the national socio-economic development plan of sectors at all levels.

The **Law on Environmental Protection**, which was revised in 2012, acts as the cornerstone of the country's environmental legislation. This law includes provisions for environmental protection and restoration, alongside guidelines for environmental and social management and monitoring. Its primary focus is on fostering sustainable socio-economic development, preserving biodiversity, and controlling pollution[147].

In 2019, the country enacted its inaugural **Law on Disaster Management**. This legislation delineates principles and measures for efficient, effective, and contemporary disaster management. It prioritizes quick and clear dissemination of information and aims to minimize the impact of disasters on health, life, property, the environment, and infrastructure. It also outlines

[144] GoL (2010). National Water Resources Strategy: MONRE
[145] GoL (2023). Draft of the National Housing and Urban Planning Strategy
[146] GoL (2019). Climate Change Decree. https://data.Lao.opendevelopmentmekong.net/dataset/decree-on-climate-change-lao-pdr-2019
[147] GoL (2012). Law on Environmental Protection

recovery, restoration, and rebuilding efforts following a disaster and links with the region and the international community to contribute to the socio-economic development in the green and sustainable manner and national security [148].

The **Law on Meteorology and Hydrology** was updated in 2017. It outlines principles, regulations, and measures for managing and monitoring meteorological and hydrological activities. The law aims to reduce the impact of natural disasters on life and property and to ensure quick and accurate provision of information. It also facilitates regional and international cooperation and contributes to green, sustainable socio-economic development and national security [149]

The amended **Law on Water and Water Resources** of 2017 provides a framework for managing, administering, protecting, and developing water resources. It also outlines measures for preventing water-related damage and restoring impacted areas. The law aims to ensure the quality, quantity, and sustainability of water resources to meet the needs of agricultural production, industry, and services. It also contributes to the protection of the natural and social environment, green and sustainable development, national security, and socio-economic development[150]

Finally, the **Law on Lao Red Cross**, established in 2017, has the objective of providing first aid to disaster victims and those who are poor, destitute, disadvantaged, orphans, disabled, or residing in remote areas. It includes provisions for emergency rescue and assistance to victims of natural or human-made disasters as well as contributing to the socio-economic development and national security.

The 2019 **Law on Gender Equality** sets out principles, regulations and measures on gender roles, which includes many articles that promote gender equality. This law embraces important fundamental principles of equality and addresses cultural norms that hinder the advancement of women. Importantly, this law specifies the integration of gender perspectives into legislation and policies across all sectors.

4.4. Progress on implementation of adaptation

4.4.1. Agriculture, forestry, and other land use sector (AFOLU)

Table 36: The Short-Term Implementation Progress for Agriculture Sector

Sector	**Agriculture, Forestry, and Other Land Use Sector**
Project Title	**Lao Landscapes and Livelihoods Project**
Duration	January 27, 2024 – September 30, 2027
Donors	World Bank
Total Project Budget	50 million USD
Implementation Partners	Department of Forestry (DOF)
Project Objective	To Promote Sustainable Forestry Management, Improve Protected Area Management and Enhance Livelihoods Opportunities in Selected Landscapes in Lao PDR.
Project Outcome	**Outcome 1: To promote sustainable forestry management**

[148] GoL (2019). Law on Disaster Management
[149] GoL (2019). Law on Disaster Management.
[150] GoL (2017) Law on Water and Water Resources

	Output 1.1: Landscape area with maintained or increased forest cover Hectare (Ha); **Outcome 2: To improve protected area management** Output 2.1: To enhance livelihoods opportunities in selected landscapes in Lao PDR; **Outcome 3: To enhance livelihoods opportunities in selected landscapes in Lao PDR** Output 3.**1:** Households or Economic interest Group engaged in traditional livelihood activities supported by the project **Outcome 4: Investing in Natural Wealth and Resilience in Forest Landscapes** Output 4.1: Forest area bought under management plans; Output 4.2: Land area under sustainable landscape management practice; Output 4.3: Net carbon dioxide equivalent emission (Metric ton); Output 4.4: Beneficiaries using extension or outreach services (Number); Output 4.5: Productive assess build and maintained for improved resilience; Output 4.6: Village conservation agreement approved and annually reported; Output 4.7: Tourism agreements signed between tourism operators, local villages and relevant PA and other management authorities in targets forest landscape; Output 4.8: Village entering partnership agreement with environmentally and socially sustainable tree plantation enterprises **Outcome 5: Livelihoods Opportunities from Sustainable Forest Landscapes** Output 5.1: Households using village Development Funds for forest-smart livelihoods activities; Output 5.2: Share of women members of the village Committees' LLL teams; Output 5.3: Share of target beneficiaries with a score Satisfied or above on project interventions (Percentage) **Outcome 6: Institutions, Incentive, and Information** Output 1: New or revised law, policies, and regulations drafted and submitted to relevant authorizes for approval (Number)

4.4.2. Water resource sector

Table 37: Implementation Progress for Water Resource Sector

Sector	**Water Resource Sector**
Project Title	**Integrated Water Resource Management and Ecosystem- based Adaptation (EbA) in Xebanghieng River Basin and Luangprabang City**
Duration	November 2022-December 2026 (On going)
Donors	GEF : 5,329,425 USD UNDP: 250,000 USD
Total Project Budget	5,579,452 USD
Implementation Partners	- Department of Water Resource (DWR), and UNDP

Project Objective	Promote Integrated Management of Sites in the Mekong River Basin for Increased Climate Resilience of Savannakhet Province and LungPrabang Communities Vulnerable to Floods and Droughts, which are expected to worsen under future scenarios
Project Outcome	**Outcome 1:** Enhance national and provincial capacities for integrated catchment management and integrated water resource management in target rural and urban communities; Output 1.1**:** Flood and drought risk maps of and an economic evaluation of urban ecosystem services and protective options produced for the Xe Bang Hieng River Basin and Luang Prabang City, respectively; Output 1.2: Integrated Climate-Resilience Flood Management Strategies development for for the Xe Bang Hieng River Basin and Luang Prabang City, supported by an updated hydrometeorological monitoring network, EWS and revised emergency procedures for the Xe Bang Hieng River Basin **Outcome 2:** Reduced flood risk through headwater conservation, Restoration and protective infrastructure, supported by climate-resilient and alternative livelihoods Output 2.1**:** Ecosystems conserved and restored through conservation zone management, Ecosystem-based Adaptation, and protective infrastructure, supported by innovative communication and knowledge management tools/technology; Output 2.2: Climate-resilient and alternative livelihoods promoted in headwater and lowland communities through Community Conservation Agreements (CCAs) and diversified livelihood opportunities. **Outcome 3:** Effective knowledge management and M&E through awareness /advocacy and monitoring of climate change impacts and adaptation opportunities in target rural and urban communities Output 3.1: Training and awareness/advocacy campaigns conducted to enhance knowledge management, M&E and information exchange on climate change impacts on agricultural production and socioeconomic conditions and lessons disseminated on community-based adaptive solutions; Output 3.2: Community-based water resources and ecological monitoring systems established, and community members trained in them operations and maintenance.

Table 38: Implementation Progress for Water Resource Sector

Sector	**Water Resource Sector**
Project Title	**Enhance Integrated Water Management and Climate Resilience in Vulnerable Urban Areas of the Mekong River Basin**
Duration	September 2021 – September 2025
Donors	ROK
Total Project Budget	4,286,730.85 USD

Implementation Partners	- Department of Water Resource (DWR), Ministry of Natural Resource and Environment (MONRE); UNDP
Project Objective	The project's objective is to strengthen the climate and disaster resilience of people and communities in vulnerable regions of Lao PDR and Cambodia through improved risk and vulnerability assessment and advancing an integrated approach to water resources management.
Project Outcome	**Outcome 1: Water related climate risks assessment in the priority river basins** Output 1.1**:** Climate risk and water resource management baseline examined Output 1.2: Detailed climate vulnerability and disaster risk assessments completed for the 3S and 4Ps river basins with a focus on two priority urban aeras **Outcome 2: Enabling environment for climate risk-informed Integrated water resources management developed** Output 2.1: Institutional and technical capacity for long-term climate resilience and integrated water resource management assessment in two priority urban areas; Output 2.2: Identify and prioritize adaptation and DRR actions to build preparedness and reduce long-term water-related climate risks; Output 2.3: Carry out capacity building to enhance risk-informed integrated water resources management and strengthen community disaster preparedness and EWS system; Output 2.4: Transboundary EWS systems strengthened in the border region between Cambodia and Lao PDR **Outcome 3: Investments in priority risk reduction measure to improve climate and disaster resilience in the Lower Mekong River Basin facilitate** Output 3.1: Identify bankable integrated climate adaptation and disaster risk reduction programming options for a regional multi-approach to increasing resilience in the urban areas of the transboundary region; Output 3.2: Develop and submit project proposal for submission to Green Climate Fund or similar, including development of necessary feasibility assessments.

4.4.3. Transport and urban development sector

Table 39: Implementation Progress for Transport and Urban Development Sector

Sector	**Transport and Urban Development Sector**
Project Title	**Vientiane Sustainable Urban Transport Project**
Duration	27 April 2023 – 30 April 2025
Donors	ADB Financing: 35,000,000 USD Co-Financing (ADB Administered): 16,840,000 USD Non-ADB Financing: 47,860,000 USD
Total Project Budget	99,700,000 USD

Implementation Partners	Department of Transport, Ministry of Public Works and Transport
Project Objective	Objective 1: Improve the Quality of Life in Vientiane by Improving Access and Mobility; Objective 2: Promote Greenhouse Gas Reduction, and Public-Private Partnership
Project Outcome	**Outcome 1: Improved Urban Transport Operations and Capacity in the Vientiane City Core Area** Output 1.1: A sustainable operating Vientiane transport organization; Output 1.2: An operating pilot public transport service (Shuttle bus loops) for Vientiane core area; Output 1.3: Traffic management sub-project implemented including car park, on-street parking, pedestrian facilities, traffic lights, road markings, and support for the traffic control center

4.4.4. Health sector

Table 40: Implementation Progress for Health Sector

Sector	**Health Sector**
Project Title	**Strengthening Climate Resilience of the Lao People's Democratic Republic (PDR) Heath System**
Duration	2024 - 2029
Donors	Green Climate Fund (GCF)
Total Project Budget	24,978,084 USD
Implementation Partners	- Ministry of Health - Save the Children International (SCI) Laos
Project Objective	Support the GoL to advance progress on its national climate change and health priorities and commitments by increasing the climate resilience of the health system and strengthening community capacity to management the current and anticipated health impacts of climate change.
Project Outcome	Outcome 1: The health system's governance and leadership is climate-resilience Output 1.1: Health strategies, polices, and guidelines are informed by climate change information **Outcome 2: Health information systems are improved to include climate and** weather data and used to track, prepare for, and reduce climate-related risk to health Output 2.1: Climate resilience health data system is strengthened Output 2.2: Utilization of the climate-resilient health data system is strengthened **Outcome 3: Health service delivery in rural provinces is improved and able manage** climate-related disease burden and determinants of health Output 3.1: Improve health worker competence and capacity to address health effects of climate change; Output 3.2: Rural health facility infrastructure is climate resilient and energy efficient

	Outcome 4: Communities respond to early warning, manage, and mitigate risk, and seek care appropriately Output 4.1: Improved knowledge of climate change impacts on health and increased community participant capacity in defining health and climate change priorities and gaps

4.5. Monitoring and evaluation of adaptation

Since Lao PDR ratified the UNFCCC in 1995 and the Kyoto Protocol in 2003 and committed to implementing the National Determined Contribution (NDC), the country has produced various policies, strategies, and guidelines and implemented projects addressing climate change adaptation and mitigation[151]. However, the country has no monitoring, evaluation, and reporting system, making it difficult to identify and assess the outcomes and effectiveness of policy and project implementation and to track financial expenditures[152].

4.6. Monitoring and evaluation of adaptation actions and processes

Under the National Adaptation Planning (NAP), The monitoring and reporting system is being established in compliance with the Lao PDR's obligations under the UNFCCC. The Ministry of Agriculture and Environment (MAE) will review and prepare an annual report on progress implementation. In this review, the MAE will closely coordinate with line ministries, local government, development partners, and international organizations. The final evaluation will evaluate the NAP's implementation's effectiveness, efficiency, consistency, and success. Specific responsibility shall be conducted as follows [153]

- Monitoring, reporting, and verification of the progress and implementation success of the climate change adaptation plan of the sector, encompassing integrating adaptation plan progress into the plans of the central and local sectors;
- Cooperation at the national, regional, and international levels;
- Develop and review the monitoring and evaluation system at the local, central, and sectoral levels;
- Prepare indicator definition sheet for each NAP indicator, including definition, targets, metrics, data sources, frequency of data collection, and methodology for analysis;
- Develop guidelines and training material for the application of the framework and provide process.

MAE is determined to commence the annual review and preparation of the NAP implementation progress report starting in 2025, followed by the mid-term review in 2028 and the final evaluation in 2031. The result of the final assessment will serve as foundation information for updating the subsequent version of the NAP. This comprehensive stock-taking will closely engage coordination between MAE and Line ministries, Local government entities, development partners, and international organizations.

4.7. Information related to averting, minimizing and addressing loss and damage associated with climate change impacts

4.7.1. Loss and damage in Lao PDR

Lao PDR has a mountain topographical in the northern part and floodplains within the remaining areas. Its climate is divided into two distinct seasons: the rainy season from May to October and

[151] DCC. 2025. National Adaptation Plan (NAP), Lao PDR
[152] MONRE.2024. Third National Communication on Climate Change
[153] DCC. 2025. National Adaptation Plan (NAP), Lao PDR

the dry season from November to April. The main hazards in Lao PDR encompassed flash floods, landslides, forestry and community fire, acute water shortage, wind storms and typhoons.[154]. This has destroyed various sectors, including agriculture, forestry and land use planning, water resources, energy and mine, industrial and commerce, public work and transportation, public health, education, and cultures [155]. Due to its geographical conditions and the country's location, Lao PDR has a high risk of natural disasters and climate change, such as floods, droughts, storms, landslides, epidemics, etc. These events are escalating and exacerbated by climate change, leading to significant loss and damage in various sectors, encompassing the Productive sector (agricultural: crops, livestock, fisheries, forestry, and irrigation; Industry and commerce, Tourism), Social sectors (housing and settlement, education, health, and nutrition, and culture), and Infrastructure sectors (Transport, electricity, water supply, and waterways).

(Figure 43) shows that flooding was the highest impacted to the population, accounting for 72 %, followed by Storm accounted for 10% while the impact from Drought, Epidemic/Plague, and House Fire to the population, accounting for 9%, 8%, and 1% respectively[156].

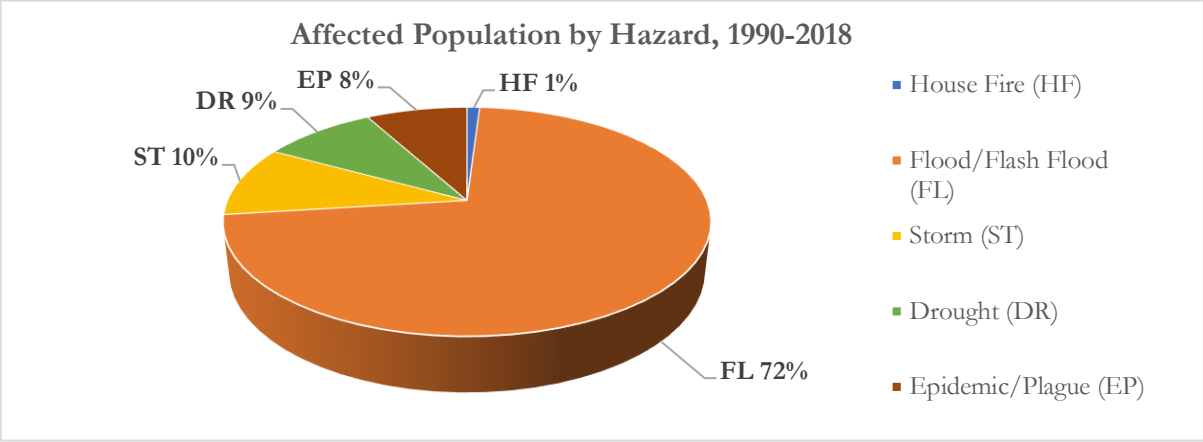

Figure 43:: Affected population by Hazard, 1990-2018

Between 2009 and 2019, communities across the Lao PDR have been increasingly affected by the adverse impacts of climate change, which have exacerbated poverty, deteriorated public health, and limited access to essential services and facilities such as education, healthcare, markets, agriculture, cultural resources, settlements, infrastructure, and tourism. Over the past decade, the country has suffered substantial economic losses and damages due to recurrent flooding and drought events. The estimated annual economic losses were approximately USD 94 million in 2009, USD 200 million in 2011, USD 219 million in 2013, and USD 371.5 million in 2018—an amount equivalent to 2.1 percent of the nation's projected gross domestic product (GDP) for 2018.

4.7.2. Lao PDR's efforts to address loss and damage

In addressing the loss and damage from disasters, The Lao PDR has developed the law on Disaster Management, Decree on Implementation and Movement of the Disaster Committee, National Financial Protection Strategy against Disaster Risks, National Strategy on Disaster Risk Reduction (2021-2030), and Early Warnings for All Road Map 2024-2027. These aims to align

[154] UNDP (2011). National Risk Profile of Lao PDR
[155] MONRE (2023). National Strategy on Climate Change toward 2030
[156] MoLSW, 2021. The National Strategy on Disaster Risk Reduction (NSDRR) 2021-2030

with the National Socio-Economic Development Plans, Sectoral plans in each period, and the Sendai Framework. The detailed of Law, Decree, Strategy, and Vision is presented as follows:

The Law on Meteorology and Hydrology [157]: This law was developed in 2017, aiming to prevent and reduce the impacts of natural disasters on the lives and properties of the state, the public, and individuals. Its purpose is to ensure timely and accurate data provisions that can be integrated at a regional and international level, contributing to national socio-economic growth. Its main content covers Meteorology and hydrological data, meteorology and hydrological station, construction of meteorology and hydrological station, data management and sharing of information; meteorology and hydrological station; construction of meteorology and hydrological station, data management and sharing of information, and meteorology and hydrological station, construction of meteorology and hydrological station, data management and sharing of information.

Law on Disaster Management [158]: This law was developed in 2020, aiming to surveillance and reduce disaster impact on health, state, and communal property, people, environment, and infrastructure, as well as recovery, restoration, and rehabilitation after disasters. It consists of **Disaster Prevention**, such as determining risk zones, mapping and developing an information system on risk, access, and use of information, risk assessment, risk reduction, disaster response preparedness, early warning, evacuation announcement, and prevention measures. In addition, it consists of disaster control, which ensures safety, emergency, exploration or search and rescue, and initial rapid damage. Moreover, it consists of **Post-Disaster Recovery,** such as need assessment, disaster recovery plans, disaster recovery operations, and post-recovery monitoring and inspection. Finally, it encompasses **Disaster Management Committees** include the central-level disaster management committee, provincial-level disaster management committee, district disaster management committees, and village disaster management committee. Engage with different stakeholders.

National Disaster Risk Reduction Strategy (2021-2030)[159]: This strategy was developed in 2021, aiming to 1). Disseminate and implement the Disaster Management Law, establish a disaster risk reduction system at the central and local levels, and coordinate disaster management and regional and internal cooperation; 2). Integrate DRR into development planning and implementation by mainstreaming DRR into sector plans and the National Socio-Economic Development Plan; 3). Progressively develop and implement provincial DRR Strategies and Plans and Local DRR plans in high-risk areas, alongside providing capacity building and resources for implementation; 4). Develop capacity, undertake risk mapping and assessment, manage and share disaster risk data and information efficiently within and between ministries and agencies, and meet international reporting requirements; 5). Build and maintain more resilient infrastructure to disasters and understand the sources of vulnerability in catastrophe to increase the resilience of the identified vulnerable groups and communities; 6). Reduce loss of life, property, and livelihoods from floods, storms, drought, and landslides through prevention action, early warning systems, and support community preparedness for rapid evacuation; 7). Expand national capacity for rapid and effective humanitarian response to disasters to reduce immediate suffering and loss of life; 8). Ensure the socio-economic needs of affected communities, physical reconstruction, and future resilience in compliance with the Sendai Framework Commitment to "Build back better"; 9). Clarify roles and responsibilities of the sectors in DRR, preparedness and response to different hazard types, and recovery in compliance with the DM law and sector mandates; 10).

[157] National Assembly, 2017: The Law on Meteorology and Hydrology, Vientiane Capital
[158] MLSW, 2020: The Law on Disaster Management, Ministry of Labor and Social Welfare
[159] MSLW, 2021: National Strategy on Disaster Risk Reduction (NSDRR) 2021 – 2030

Increase DRR capacity for civil servants and community leaders in a sustainable way by using training and education resources with Lao PDR; 11). Develop a new mechanism for engaging non-governmental stakeholders in DRR to support a whole-of-society approach by the Sendai Framework, including the private sector; and 12). Ensure sufficient state budget for regular DRR and disaster management activities within MLSW and other concerned ministries.

National Financial Protection Strategy against Disaster Risks (2022-2023)[160]: The strategy was developed in 2022, aiming to strengthen the resilience of Lao PDR by providing cost-effective financing for the prevention of, preparedness for, response to, and recovery from disaster and climate risks by ensuring the availability of funds when required. The main content covers current disaster risk financing in Lao PDR, Policy and legal framework, Institutional framework, data and analysis, public sector disaster and climate risk financing framework, private sector disaster, international cooperation, and public and private sector risk financing targets.

Early Warning for All Road Map 2024-2027 [161]: This road map was developed in 2024, aiming to provide the national and local governments with a structured blueprint for fortifying people-centric EWS in Lao PDR through targeted action and source allocation. This roadmap is developed under the leadership of the Department of Methodology and Hydrology, Ministry of Natural Resource and Environment (MONRE), Department of Social Welfare, and Ministry of Labor and Social Welfare (MLSW). The input was obtained from various consultation workshops with concerned stakeholders, including relevant line ministries, UN agencies, International Non-Governmental Organization (INGO), Read Cross Red Crescent, Donors, and Private Sectors. The main content of his road map covers four pillars such as 1). Disaster risk knowledge, 2). Detection, Observation, Monitoring, Analysis, and Forecasting of Hazards, 3). Warning Dissemination and Communication, and 4). Preparedness and Response Capabilities. In addition, it also included the coordination mandate, implementing entities, investment and funding arrangement, and Monitoring and Evaluation.

4.8. Cooperation, good practices, experience and lessons learned

4.8.1. International cooperation

International commitment: The Lao PDR ratified the UNFCCC in 1995, the Kyoto Protocol in 2003, and the Paris Agreement in 2016. Under this commitment, Lao PDR submitted the First National Communication (NC1), Second National Communication (NC2), and Third National Communication (TNC) in 2000, 2013, and 2024 to the UNFCCC, respectively, and the First Biennial Update Report (BUR) in 2020 aiming to address climate change adaptation and mitigation. In addition, to meet the national carbon neutrality and decarbonize net zero by 2050, Lao PDR updated the National Strategy on Climate Change towards 2030 in 2023, developed the National Green Growth Strategy of the Lao PDR till 2030 in 2018, and Submitted the Nationally Determined Contribution (NDC) of Lao PDR in 2021.

4.8.2. Good practices

Under the project of the "Building Climate Resilience of Urban Systems Through Ecosystem-Based Adaptation in the Asia-Pacific Region (EBA Lao PDR), Lao PDR has significantly reduced the vulnerability of impoverished urban communities especially in Phongsaly and Oudomxay provinces. The reason for selecting this project is that it represents a flagship example of climate adaptation in urban settings. It demonstrates how ecosystem-based approaches can effectively

[160] MoF, 2022: National Financial Protection Strategy against Disaster Risk (2022-2030), Ministry of Finance
[161] MONRE, 2024: Early Warning for All Road Map 2024 – 2027, Ministry of Natural Resource and Environment

reduce climate risks while supporting national adaptation priorities and sustainable urban development. Under this initiative, the Lao PDR has significantly reduced the vulnerability of impoverished urban communities, particularly in Phongsaly and Oudomxay provinces. The key intervention is highlighted as follows:

A.1. Livelihood activity in Phongsaly province[162]

The initial goal of the livelihood improvement activities is to support vulnerable people to adapt climate change applying ecosystem-based adaptation strategies, focusing on strengthening food security by promoting sustainable urban gardening practices and generating income through ecotourism and cultural tourism. It also aims to advance gender equal access to resources and opportunities. The key intervention included: (01). Improving the Ecosystem in Nong Kiaw Pond, (02). Integrating and promoting ecosystem-based adaptation in tourism sector; (03). Supporting urban gardening initiatives for vulnerable households. The detailed is highted as below:

Improving the Ecosystem in Nong Kiaw Pond: Prior to improve Nong Khiaw into a public park with a healthy ecosystem, as part of the social and environmental safe guards, the consultation meeting between local authorities and households taken place to avoid the negative consequence for project implementation. The key activity was clearing of waste and sediment from Nong Khiaw, including waste and grass removal, wastewater treatment, sediment removal, green space and decoration, and raising awareness. This was indirect beneficiaries nine (9) urban villages with the population 5,066 people.

(Before) **(After)**

Figure 44: Nong Khaiw pond before and after improvement

[162] DCC, 2024: Final Project Implementation Report, Building Climate Resilience of Urban Systems Through Ecosystem-Based Adaptation in the Asia-Pacific Region (EBA Lao PDR)

Integrating and promoting ecosystem-based adaptation in tourism sector: The tourism sector is one of the significant priorities in the Phongsaly's development plan on the account of creating employment opportunity and economic growth. By exploiting the natural beauty and cultural heritage site, tourism has turned a major sector for local communities' income generation. Recognizing this potential, integrating ecosystem-based adaptation (EbA) into the tourism sector has been prioritized as strategic initiative. The main purpose of this approach increases the resilience of both environment and local communities and ensure sustainable tourism practices in parallel with natural resources protection. The key intervention implementation includes promoting Nong Khiaw pond as a tourist attraction, decorating Chinese quarter as a tourist attraction, establishing tourist attraction at Phu Fa Mountain and biodiversity trail, night market, and making marketing plan for Phongsaly tourism promotion. This was directly benefit to nine (9) villages, covering 1,773 households with 5,066 people

Figure 45: Ming Khaun Stupa and Phu Fa Mountain

Supporting urban gardening initiatives for vulnerable households: In Phongsaly, various families are vulnerable to landslide, extreme cold temperature, and prolonged droughts, affecting their livelihoods and well-being, some households facing food insecurity due to agricultural production decrease in particular during the dry season. This activity aims to encourage people to use environmentally friendly vegetable growing techniques, ensure food security both in the rainy and dry season, improve generate income for some vulnerable people. The key intervention implementation includes selecting five (5) model families who practice environmentally friendly vegetable cultivation techniques to serve as trainers and role models for other households and supporting urban gardening for vulnerable households.

Figure 46: Wooden shade house

A.2. Livelihood improvement in Oudomxay province [163]

Generating income through plant seedlings, gardening, and tree plantation in Phu Hee Forest Conservation area [164]

Various family in Xay district has significantly impacted by the adversely impact of climate change, encompassing frequent flooding during the rainy season and serve droughts in the dry season, causing substantial damage to crops, homes, and livelihoods. These have been creating long-term challenge and peril for the local communities. Hence, it was imperative for this project to play an active role in fostering tree planting initiatives to alleviate the impact of flooding and drought. This activity aims to promote the use of environmentally friendly techniques for tree planting and vegetable cultivation, to unsure food security throughout both the rainy and dry season, and to increase income generate for vulnerable communities. The key intervention implementation included constructing 13 shedding houses to serve as learning centres for 256 vulnerable households, Establishing 13 vegetable cultivation and tree nurturing groups for vegetable growing, seedling production, and tree nurturing for the forest conservation area, Providing vegetable seeds, training on compost production, and guidance on vegetable cultivation for 256 vulnerable households during both rainy and dry seasons, Providing tree seeds, and offering on seedling nurturing and tree cultivation in Phu Hee Phi Forest Conservation Area to 256 vulnerable households. This was indirect beneficiaries for 250 vulnerable households.

Figure 47: A shade house in Huay Khoum

Develop an initiative concept for participatory ecotourism at Kat Village

Tourism has rapidly growth in Oudoxay province, especially in the Namkat area, becoming more ecotourism destination. Nevertheless, this sector has remains limited and dearth diversity. To increase better life of communities in parallel with retaining the tourism sustainability in this area, it is crucial to preserve the beauty of natural resources. Therefore, this initiative aims to stimulate the local economy, promote sustainability, and forest environmental conservation at Kat village as an ecotourism destination near Num Kat Yorla Pa. The main intervention implementation included surveying and determining walking trails for tourism in Kat village, Improving walking trails in Kad village, Providing training on participatory ecotourism tour guide

Figure 48: Paddy field in Kat Village

[163] DCC, 2024: Final Project Implementation Report, Building Climate Resilience of Urban Systems Through Ecosystem-Based Adaptation in the Asai-Pacific Region (EBA Lao PDR)

[164] DCC, 2024: Final Project Implementation Report, Building Climate Resilience of Urban Systems Through Ecosystem-Based Adaptation in the Asai-Pacific Region (EBA Lao PDR)

for another 20 vulnerable households, Establishing homestays for tourists with the participation of 10 vulnerable households, Providing training on guest acceptance and hospitality for selected 10 homestays, Providing training on traditional dance, Establishing local handicraft and product promotion program to attract tourists, Training on cooking local food, Identifying an area to be a buffer zone for wildfire. This was indirect beneficiaries for 20 vulnerable households.

Support Establish on Green School

Various schools in Xay district have received support and improvement in terms of equipment, infrastructure, and the teaching and learning system. These efforts have contributed to the overall development of the education sector in the province. Nevertheless, many school have yet to meet standards required to be classified as green schools to promote environmental sustainability and integrate eco-friendly practices into daily practices and sustainable agriculture initiatives. By turning to green schools, the project seeks to

Figure xx: Vegetable cultivation at Huay Khoum Secondary School

Figure 49: Green school garden

create a lasting impact on both the education system and the environment, provide the readiness students to become active participants in addressing climate change and environmental challenges. Hence, this project aims to integrate eco-friendly practices into school operations and engage students and staff in environmental conservation efforts. The main activities included Plan trees on school grounds to increase green space; Establish solid waste management by providing waste bins, waste segregating cages, and establishing a waste segregation system and waste bank; Establish vegetable gardens in schools to transfer knowledge on eco-friendly gardening and reduce food consumption expenditures for low-income teachers and students; Providing vegetable seeds, training on compost production, and guidance on vegetable cultivation during both rainy and dry seasons for students; Re-installing shedding houses at the Polytechnic College and Ethnic School; Providing vegetable seeds, training on compost production, and guidance on vegetable cultivation during the both rainy and dry season for students; Establishing solid waste management; and Establishing solid waste management by providing waste bins, waste segregating cages, and implementing a waste segregation system and waste bank to generate income for students.

4.8.3. Experience and lessons learned

A1. Experience and lesson learned in phongsaly province[165]

Integrating and promoting ecosystem-based adaptation in tourism sector

- Integrating Ecosystem-based Adaptation (EbA) into the tourism sector has significantly enhanced the environment and ecosystems of major tourist attractions, such as Phu Fa Mountain and the Old Chinese Quarter. These initiatives have boosted the natural appeal of these areas while also generating economic opportunities for nearby vulnerable households. By promoting sustainable tourism, the efforts have raised local awareness and understanding

[165] DCC, 2024: Final Project Implementation Report, Building Climate Resilience of Urban Systems Through Ecosystem-Based Adaptation in the Asai-Pacific Region (EBA Lao PDR)

of eco-friendly practices, empowering communities to actively participate in conservation efforts.;
- The improvements in the environment have directly benefited nearby vulnerable households by increasing opportunities in eco-tourism. As a result, the area is anticipated to attract more tourists in 2025 and beyond—particularly those who value environmentally friendly and sustainable travel. This rising interest in sustainable tourism offers a chance for continued economic development while also preserving natural resources.

Supporting urban gardening initiatives for vulnerable households
- Urban and suburban gardening projects have significantly helped vulnerable households lower their food costs by allowing them to grow their own produce, reducing reliance on external markets. These efforts are crucial for maintaining food security in cities, particularly during the dry season when food supplies may be scarce;
- Beyond enhancing food availability, tree planting initiatives can help tackle environmental challenges, especially when trees cared for by vulnerable households are used to rehabilitate and safeguard areas at risk of landslides. This creative strategy improved land management and strengthens resilience to climate-related threats such as landslides and floods.

A.2. Experience and learned in oudomxay province [166]

Generating income through plant seedlings, gardening, and tree plantation in Phu Hee Forest Conservation area
- The cultivation of vegetables has demonstrated significant value in reducing food expenditures among 256 vulnerable households. Through the practice of growing their own produce, these households have enhanced their food security and diminished their dependence on external food sources, resulting in a substantial decrease in their monthly food costs;
- Moreover, some households cultivate trees for the dual purposes of income generation and reforestation within the Phu Hee Phi Forest conservation area. These initiatives not only support local economic development but also enhance the ecological integrity of protected landscapes. Through tree cultivation, households contribute to ecosystem restoration while accessing alternative sources of income from the sale of trees and related products, thereby promoting sustainable livelihoods.

Green Urban School Initiative

The Green Urban School initiative has effectively incorporated environmental education and sustainability into the local school system. Schools generate income by selling vegetables and caring for trees, and this money is reinvested into education—improving school infrastructure, offering scholarships, or supporting eco-friendly programs. By involving students and the community in sustainable activities, the initiative fosters environmental awareness while also helping schools remain financially sustainable, creating positive outcomes for both education and the environment.

[166] DCC, 2024: Final Project Implementation Report, Building Climate Resilience of Urban Systems Through Ecosystem-Based Adaptation in the Asai-Pacific Region (EBA Lao PDR)

Chapter V: Information on Financial, Technology Development and Transfer and Capacity-Building Support Needed and Received under Article 9-11 of the Paris Agreement

5.1. Underlying assumptions, definitions and methodologies

With the adoption of the Paris Agreement, adopted at the COP21 (the 21st COP) to the UNFCCC in December 2015, all countries agreed on an Enhanced Transparency Framework (ETF) for action and support (Article 13), with built-in flexibility which takes into account Parties' different capacities and builds upon collective experience. The Paris Agreement, sets out a global action plan that puts the world on track to avoid dangerous climate change by limiting global warming to well below 2°C. It establishes that each individual Party should submit a Nationally Determined Contribution and revise it every five years in order to achieve the global goal of reducing greenhouse gas emissions.

In the context of the ETF, countries are expected to track and report progress towards achieving their NDCs, and communicate adaptation actions, including good practices, priorities, needs and gaps, so as to inform the global stock take under Article 14 of the Agreement. Besides submitting their National Communications every four years, signatory countries will be expected to submit BTR including a National Inventory Report every two years starting from December 2024, thus replacing the BUR.

Under this stand-alone BTR project, Lao PDR will receive support to prepare its First BTR and submit it to the UNFCCC by December 2024, in compliance with UNFCCC and PA reporting requirements and in alignment to national development goals, with built-in flexibility provided in light of its capacities. Moreover, the country will be supported to undertake a self-assessment and stocktaking exercise for the preparation of subsequent BTR.

Lao PDR is classified as Non-Annex I parties[167] in the UNFCCC. Non-Annex I Parties are mostly developing countries. Certain groups of developing countries are recognized by the Convention as being especially vulnerable to the adverse impacts of climate change, including countries with low-lying coastal areas and those prone to desertification and drought. Others (such as countries that rely heavily on income from fossil fuel production and commerce) feel more vulnerable to the potential economic impacts of climate change response measures. The Convention emphasizes activities that promise to answer the special needs and concerns of these vulnerable countries, such as investment, insurance and technology transfer.

According to Decision 18/CMA.1 of FCCC/PA/CMA/2018/3/Add.2[168], Developing country Parties should provide information on financial, technology transfer and capacity-building support needed and received under Articles 9, 10 and 11 of the Paris Agreement and information on the support needed and received for the implementation of Article 13 of the Paris Agreement and transparency-related activities, including capacity-building related to transparency in accordance with the MPGs. The outline of Chapter IV is described in below table.

[167] https://unfccc.int/parties-observers
[168] https://unfccc.int/sites/default/files/resource/CMA2018_03a02E.pdf

Table 41: Methodology for conducting financial, technology transfer and capacity -building

Outlines	Methodology
Section on national circumstances, institutional arrangements relevant to reporting on support needed and received	- Study the institutional arrangement relevant to reporting on support needed and received by review the laws and regulations relevant to climate change and ODA tracking/ reporting. - Conduct studies/assessments on technology needs covering both mitigation and adaptation by review Lao NDC and its implementation plan and Lao Strategy on Climate Change. - Conduct a consultation workshop with relevant stakeholders.
Description of underlying assumptions, definitions and methodologies	- Review the definitions and methodologies used to provide information on support needed and received described in the manual and user guide for tracking system including ODAMIS and DCC climate finance tracking system.
Section on financial support, technology development and transfer, and capacity- building support needed and received	Collect the information from existing tracking system including ODAMIS under the former MPI, and DCC climate finance tracking tool, the tool developed by other line ministries and other sources.
Report with relevant information, including on gender and climate change	- Review various existing policies and strategies relating to gender and climate change. - Conduct a consultation workshop with Lao Women Union (LWU).

BTR1 Chapter IV provides an assessment of the participation of women in climate change implementation and monitoring. This is to support the gender and climate change decision 3/CP.25, paragraph 11 "Encourages Parties to appoint and provide support for a national gender and climate change focal point for climate negotiations, implementation and monitoring. The data collection, assessment and reporting are presented below.

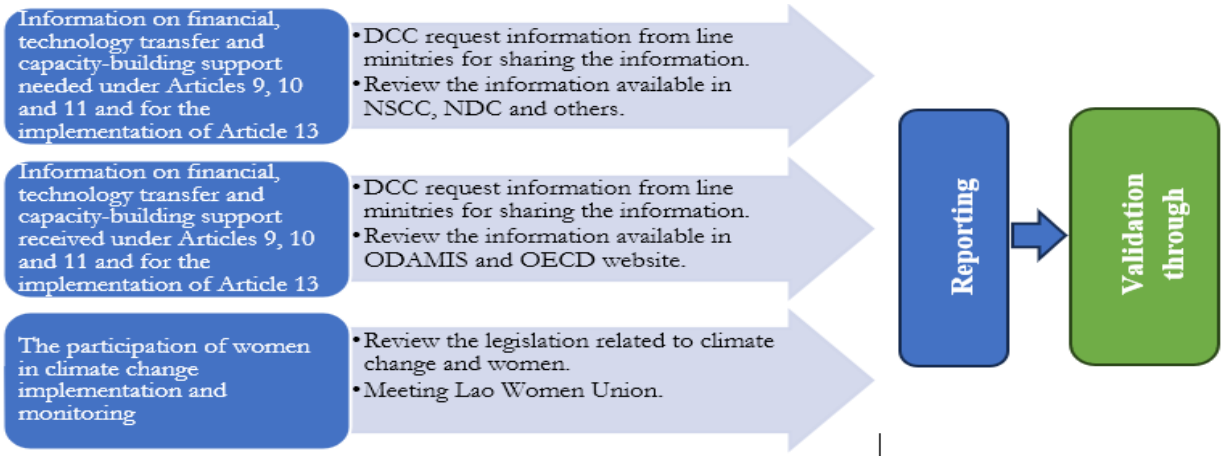

Figure 50:: Data collection, assessment and reporting process on financial, technology, development

5.2. Information on financial, technology development and transfer and capacity building supports needed by Lao PDR under Article 9,10, and 11 of the paris agreement

Information on financial, technology development and transfer, and capacity-building support needed under Articles 9, 10, and 11 of the Paris Agreement is prepared according to Decision 5/CMA.3 (Guidance operationalizing the modalities, procedures, and guidelines for the enhanced transparency framework referred to in Article 13 of the Paris Agreement)[169]**.** According to Decision 5/CMA.3, three Common Tabular Formats for reporting the information on financial, technology development and transfer, and capacity-building support needed under Articles 9, 10, and 11 of the Paris Agreement shall be prepared. Information on financial support required under Article 9 of the Paris Agreement will also include a description of how the support will contribute to NDC and to the long-term goals of the Paris Agreement.

Lao PDR has not yet developed the tools and mechanism for the report and is incorporating the needed elements of support in BTR; the assessment of the needs was carried out by reviewing the NSCC, NDC, Implementation Plan for NDC, and strategies of line ministries. The NSCC includes 9 Priority programs as follows:

1. Development and strengthening of capacity for climate change data and information management, reporting on status, events, and impacts of climate change;
2. Enhancement of resilience and adaptive capacity to climate change impacts of various infrastructures, manufactures, businesses, services, ecological systems, and communities, as well as overall risky and affected sectors;
3. Strengthening of monitoring, evaluation, and reporting processes on greenhouse gases;
4. Strengthening of sectorial capacity on greenhouse gas control and mitigation;
5. Development, utilization, and transfer of technologies;
6. Promotion of education, awareness raising, and public involvement in climate change;
7. Strengthening of capacity on climate finance;
8. Mainstream and enabling environment on climate change management;
9. Institutional strengthening and human resources development for climate change administration.

As per Paris Agreement Article 4, the 2020 NDC update builds upon the 2015 submission with a view to enhancing its ambition through the introduction of three national-level greenhouse gas (GHG) emissions scenarios, namely a baseline emissions scenario, an unconditional mitigation scenario to 2030, as well as a more ambitious conditional mitigation scenario to 2030 towards achieving net zero GHG emissions by 2050. 2015 NDC targets have been updated and extended, including to new sectors, while new national-level emission reduction targets have been formulated. The 2021 NDC also sets forth increased transparency and consistency between quantitative targets, new short-term objectives for climate change adaptation towards a strengthened measurement, reporting, and verification system, as well as the country's expression of interest to pursue voluntary cooperation to allow for higher ambition, in accordance with the Paris Agreement. Financing needs for implementation of mitigation measures towards the 2030 conditional targets have been estimated in the table below and amount to USD 4,762 Million in total, using local data when available or default values (US$/Unit) provided by UNEP DTU Partnership's Greenhouse gas Abatement Cost Model [170]**.**Information on financial, technology development and transfer and capacity-building support needed by Lao PDR under Articles 9,

[169] https://unfccc.int/sites/default/files/resource/cma3_auv_5_transparency_0.pdf
[170] GoL, 2021: Nationally Determined Contributions (NDC), Vientiane, Laos People's Democratic Republic.

10, and 11 of the Paris Agreement are presented in (Table 42), (Table 43), and (Table 44), respectively.

Table 42: Information on Financial Support Needed Under Article 9 of the Paris Agreement

	Sectors				
	01. Cross-cutting	**02. Cross-cutting**	**03. Other (specify)**	**04. Agriculture**	
Title of Programme	Development, management of data and information, reporting and Early Warning Systems for climate change		Health		
Programme description	- Development and management of data-information and statistics on climate change management -Monitoring, assessment and Development of climate and disaster risky and vulnerable maps (flood, drought, heatwave, etc.) -Development of Early Warning System (EWS), including hazards Monitoring, assessment, communication, reporting, Early Warning and emergency response on climate change -Development of the State of the climate change Report	Mainstream climate change adaptation in sectoral strategy and action plan, including through results-based management framework	Implement the Strategy on Climate Change and Health Adaptation to 2025	1) Promote climate resilience in farming systems and agriculture Infrastructure. 2) Promote appropriate technologies for climate change adaptation, including nature-based and circular economy solutions	Review and assessment of climate change vulnerability, risk, impacts and adaptation plan-alternatives for agriculture and food security
Time frame	2025-2030	2025	2025	Long term	2025-2030
Amount received (USD)	-				
Expected Financial Instruments	Grant				
Type of Support	Adaptation	Adaptation	Adaptation	Adaptation	Adaptation
Contribution to Technology Development and Transfer Objective (1 for yes, 0 for No)	1				
Contribution to Capacity building Objective (1 for yes, 0 for No)	1				

Whether the activity is anchored in a national strategy and/or an NDC	1	1	1	1	1
Expected Use, impacts and result					
Additional Information	NDC to 2030	NDC (2020)	NDC (2020)	NDC (2020)	NDC (2020)

Table 42: (Continuous)

	Sectors					
	05. Water and Sanitation	**06. Transport**	**07. Others (Specific)**	**08. Energy**		
Title of Programme			**Public health**			
Programme description	1) Strengthen water resource information systems for climate change adaption 2) Manage surface water, groundwater and wetland for climate change resilience 3) Increase water resource infrastructure resilience to climate change, including through nature-based solutions 4) Strengthen early warning systems in a timely manner	1) Increase the resilience of urban development and infrastructure to climate change, including through the use of green infrastructure and nature-based solutions 2) Promote ecosystem-based adaptation solutions	1) Increase the resilience of public health infrastructure and water supply system to climate change 2) Improve public health services for climate change adaptation and coping with climate change induced impacts.	1) Build resilience to climate change in hydropower sector through improved dam safety regulations and guidelines 2) Strengthen technical capacity to use new and innovative technologies to enhance climate resilience and sound management in energy sector 3) Promote multipurpose use of reservoirs to enhance resilience of surrounding communities and	13 GW total installed hydropower capacity (domestic and export use) in the country by 2030	Introduction of 50,000 energy efficient cook stoves

				maximize benefits for other sectors		
Time frame	**Long term**	**Long term**	**Long term**	**Long term**	2020-2023	2020-2023
Amount received (USD)						
Expected Financial Instruments	Adaptation	Adaptation	Adaptation	Adaptation	Mitigation	Mitigation
Type of Support						
Contribution to Technology Development and Transfer Objective (1 for yes, 0 for No)						
Contribution to Capacity building Objective (1 for yes, 0 for No)						
Whether the activity is anchored in a national strategy and/or an NDC	1	1	1	1	1	1
Expected Use, impacts and result					GHG mitigation target 2,500 kt CO_2e on average per year between 2020 and 2030	GHG mitigation target50 kt CO_2e on average per year between 2020 and 2030
Additional Information	NDC	NDC	NDC	NDC		

Table 42: (Continuous)

	Sectors
	9. Forestry
Title of Programme	
Programme description	Reduced emissions from deforestation and forest degradation, foster conservation, sustainable management of forests, buffer zones of national parks and other preserves, and enhancement of forest carbon stocks
Time frame	2020-2023

Amount received (USD)	
Expected Financial Instruments	
Type of Support	Mitigation
Contribution to Technology Development and Transfer Objective (1 for yes, 0 for No)	
Contribution to Capacity building Objective (1 for yes, 0 for No)	
Whether the activity is anchored in a national strategy and/or an NDC	1
Expected Use, impacts and result	GHG mitigation target 1,100 kt CO_2e/y average abatement between 2020 and 2030
Additional Information	

Table 43 : Information on Technology Development and Transfer Support Needed under Article 10 of the Paris Agreement

Sector	Subsector	Title of activity, programme, project or other	Programme, project desccription	Type of Support	Type of technology	Expected time frame	Use, impacts and estimated results	Additional Information
In information recorded								

Table 44: Information on Capacity-Building Support Needed under Article 11 of the Paris Agreement

	Sectors
	Energy
Title of Programme	Capacity Building for the Department of Energy Policy and Planning: Promoting Gender Mainstreaming, Innovative Technologies for CO_2 Emission Reduction in Coal Power Plants, and Developing Indicators for Data Collection to Support Sustainable and Efficient Electricity Generation, Renewable Energy Expansion, and Reduced Dependence on Coal
Programme description	1. Empower the Department of Energy, particularly in policy and planning, to integrate gender mainstreaming in the Energy sector and supports the adoption of innovative and new technologies designed to reduce CO_2 emissions from coal power plants. 2. Strengthens the development of indicators to systematically collect data reflecting the needs of both central governmental sectors and local communities to establishes a comprehensive database for planning efficient and sustainable electricity generation and transmission systems, aiming to reduce reliance on coal power plants while supporting the promotion of renewable Energy sources through evidence-based decision-making and resource allocation
Expected Time frame	2026-2023
Amount received (USD)	
Expected Financial Instruments	
Type of Support	Cross-Cutting

Contribution to Technology Development and Transfer Objective (1 for yes, 0 for No)	
Contribution to Capacity building Objective (1 for yes, 0 for No)	
Whether the activity is anchored in a national strategy and/or an NDC	
Expected Use, impacts and result	Defined indicators of energy needs and comprehensive database will be used for planning efficient and sustainable electricity generation with the application of renewable and clean Energy sources in the development of various industries, contributing to mitigation of CO_2 emissions to the atmosphere
Additional Information	Energy Development Plan 2021-2030

5.3. Information on financial, technology development and transfer and capacity building supports received by Lao PDR under article 9,10, and 11 of the paris agreement

Despite Lao PDR's transition to lower-middle-income country status, ODA remains relevant, but there has been a shift from grants to loans. Development finance beyond ODA increased between 2002 and 2013, from USD21 million to USD433 million and from 11% to 48% of total external development finance. Chinese assistance has grown rapidly. By 2012, China was as large a donor as Japan, the biggest Development Assistance Committee (DAC) donor [171]. About USD 1.5 billion is needed to implement mitigation actions, especially under the national strategy on climate change in Lao PDR. Just over USD 223 million in ODA flows supported climate change projects in Lao PDR in 2013-14, with a third (33%) on climate change mitigation directly and about 20% on both mitigation and adaptation[172].

The UN Partnership Framework (UNPF) 2017-2021 to Lao PDR includes three pillars. Pillar 1 on Inclusive growth, livelihoods, and resilience consists of an outcome for climate change, disaster management, and environmental outcomes. UN delivered USD 6,050,661, USD 9,603,242, USD 11,293, 629 and USD 8,525,818 in 2017, 2018, 2019, and 2020, respectively, and planned to deliver USD 14,277,353 in 2021 for the climate change, disaster management, and environment outcomes [173].

Information on financial, technology development and transfer, and capacity-building support received by Lao PDR under Articles 9, 10, and 11 of the Paris Agreement are presented in (Table 44), (Table 45), and (Table 46) respectively.

WB financed the portfolio in Lao PDR, which includes Studies/ Advisory Services and Analytics and 27 projects (as of 30 April 2021), totaling USD785 million. However, this overview does not explicitly give the figure for climate change finance.

ADB has committed loans, grants, and technical assistance totaling USD2.99 billion to the Lao PDR. However, this overview does not give the figure for climate change finance specifically.

[171] https://odi.org/en/publications/age-of-choice-lao-peoples-democratic-republic-in-the-new-development-finance-landscape/

[172] MONRE, 2020: The First Biennial Update Report, Lao PDR

[173] UN, 2021: 2020 Progress Report, Lao PDR-United Nations Partnership Framework 2017-2021 A Partnership for Sustainable Development

Table 45: Information on Financial Support Received under Article 9 under the Paris Agreement

	Title of Programme			
	01. HCFC Phase-out Management Plan Stage II	02. Agriculture for Nutrition (AFN)	03. Enhancing MAF's DOPF Capacity on Coordination, Monitoring, and Evaluation of Investment Projects Focusing on those with LENS2 Support	04. Institutional capacity building for PA and PF management and wildlife conservation
Programme description	This HCFC Phase-out Management Plan (HPMP) Stage II is developed to enable the Government of Lao People's Democratic Republic (Lao PDR) to meet the obligations towards Montreal Protocol and its Amendments. It was prepared by the Department of Pollution Control and Monitoring (DPCM), Ministry of Natural Resources and Environment with assistance of UNEP as the Leading Agency and UNDP as the Cooperating Agency. The objective of the HPMP Stage II reflects the commitment of Lao PDR to its obligation as a Party to the Montreal Protocol having in mind the socio-economic needs of the country. It aims to assist Lao PDR to meet HCFC consumption by 67.5% reduction from the baseline level by 1 January 2025 and to complete phase-out by 1 January 2030 with understanding that consumption between 2030 and 2040 (i.e., the servicing tail) may exceed zero in any year as long as the average calculated level of consumption over the ten-year period from 1 January 2030 to 1 January 2040 does not exceed 2.5 per cent of country baseline consumption.	The project will address food and nutrition security needs and will include profitable investment in nutrient-sensitive, climate-adapted agricultural development	Enhancing MAF's DOPF Capacity on Coordination, Monitoring, and Evaluation of Investment Projects Focusing on those with LENS2 Support	The objective of ICBF is the effective management of two conservation landscapes for sustaining and enhancing biodiversity in forest ecosystems, while supporting livelihoods of forest-dependent communities
Chanel	Multilateral	Multilateral	Multilateral	Multilateral
Time frame	2021-2024	2016-2022	2018-2021	2015-2022
Recipient Entity	MONRE	MAF	MAF	MAF
Implementing Entity	DCC	DOPC	DOPC	DOF
Amount received (USD)	86,400	#########	155,320	2,619,205
Financial Instruments	Grant	Grant	Loan	Loan
Status	Received	Received	Received	Received
Type of Support	Mitigation	Mitigation	Cross Cutting	Cross Cutting
Sector	Other (Natural resource management and environment		Agriculture and Forestry	Forestry
Contribution to Technology Development and Transfer	0	**1**	0	0

Objective (1 for yes, 0 for No)				
Contribution to Capacity building Objective (1 for yes, 0 for No)	1	1	1	1
Status of Activity	Ongoing	Completed	Completed	Completed
Use, impacts and result		Opportunities for improved climate change resilience	To strengthen the country systems for managing protected areas, for enforcing wildlife laws and for implementing environment and - social regulations	

Table 45: Continuous

	Title of Programme				
	05`. Integrated Conservation of Biodiversity and Forests (ICBF)	06. Greater Mekong Subregion Biodiversity Conservation Corridors Project Additional Financing (BCC-FIP)	07. Sustainable Forest and Land Management in the Dry Dipterocarp Forest Ecosystems of Southern Lao PDR (SAFE Ecosystem project)	08. Forest Carbon Partnership Facility (FCPF)	09. Agriculture for Nutrition phase 2 (AFN II)
Programme description	The objective of ICBF is the effective management of two conservation landscapes for sustaining and enhancing biodiversity in forest ecosystems, while supporting livelihoods of forest-dependent communities	The Project will enhance transboundary cooperation for preventing and mitigating fragmentation of biodiversity rich forest landscapes of the Cardamom Mountains and Eastern Plains Dry Forest in Cambodia, Triborder Forest areas located in southern Lao PDR	To facilitate a transformative shift towards sustainable land and forest management in the forested landscape of Savannakhet Province in order to secure the critical wildlife habitats, conserve biodiversity and maintain a continuous flow of multiple services including quality water provision and flood prevention	The Project Development Objective is to contribute to Lao PDR's efforts to design and implement a sound national REDD+ strategy	The Project Goal is to enable 28,000 vulnerable households living in the project area to improve their income by 20% by 2030
Chanel	Multilateral	Multilateral	Multilateral	Multilateral	Multilateral
Time frame	2015-2022	2017-2022	2016-2022	2014-2022	2023-2030
Recipient Entity	MAF	MAF	MAF	MAF	MAF

Implementing Entity	DOF	DOF	DOF	DOF	DOPC
Amount received (USD)	2,619,205	-	-	8,175,000	-
Financial Instruments	Loan	Grant	Grant	Grant	Grant
Status	Received	Received	Received	Received	Received
Type of Support	Cross Cutting	Cross Cutting	Cross Cutting	Cross Cutting	Cross Cutting
Sector	Forestry	Forestry	Forestry	Forestry	Forestry
Contribution to Technology Development and Transfer Objective (1 for yes, 0 for No)	0	1	0	0	1
Contribution to Capacity building Objective (1 for yes, 0 for No)	**1**	**1**	**1**	**1**	**1**
Status of Activity	Completed	Completed	Completed	Completed	Ongoing
Use, impacts and result	Project towards promoting biodiversity in forest ecosystems and the potential mitigation of and adaptation to climate change and the sustainable use of biodiversity resources	Climate-resilient sustainable forest ecosystems benefitting local livelihoods	Sustainable natural resources management enhanced through improved governance and community participation		Change adaptation infrastructures (irrigation /MUS) built and upgraded

Table 45: Continuous

	Title of Programme		
	10. Agriculture for Nutrition (AFN)	**11. Greater Mekong Subregion Biodiversity Conservation Corridors Project Additional Financing (BCC-FIP)**	**12. for Nutrition phase 2 (AFN II)**
Programme description	The project will address food and nutrition security needs and will include profitable investment in nutrient-sensitive, climate-adapted agricultural development	The Project will enhance transboundary cooperation for preventing and mitigating fragmentation of biodiversity rich forest landscapes of the Cardamom Mountains and Eastern Plains Dry Forest in	The Project Goal is to enable 28,000 vulnerable households living in the project area to improve their income by 20% by 2030

		Cambodia, Triborder Forest areas located in southern Lao PDR	
Type of Technology	The Project will promote "green technology," for sustainable land management and climate adaptation, with all interventions having a neutral or positive ("no regrets") effect on the ability of communities to adapt to climate change. A similar "no harm" principle applies to nutrition outcomes	Explore possibilities of improving market information services using mobile IT technology and private sector services in the clusters / villages or through local associations	To promote smallholder agricultural technology, linking nutrition to agriculture, building resilience to climate change, developing value chains and linking farmers to markets
Time frame	2016-2022	2017-2022	2023-2030
Recipient Entity	MAF	MAF	MAF
Implementing Entity	DOPC	DOF	DOF
Type of Support	Adaptation	Cross Cutting	Adaptation
Sector	Agriculture	Forestry	Agriculture
State of Activity	Completed	Completed	Ongoing
Use, Impact, and Estimated Results	Opportunities for improved climate change resilience	Climate-resilient sustainable forest ecosystems benefitting local livelihoods	Climate Change adaptation infrastructures (irrigation /MUS) built and upgraded
Additional Information	https://www.ifad.org/en/web/operations/-/project/2000001131	https://www.adb.org/projects/40253-036/main	https://www.ifad.org/en/web/operations/-/project/2000003760

Table 46: Information on Capacity-Building Support Received under Article 11 of the Paris

	Title of Programme			
	01. HCFC Phase-out Management Plan Stage II	**02.** Agriculture for Nutrition (AFN)	**03.** Enhancing MAF's DOPF Capacity on Coordination, Monitoring, and Evaluation of Investment Projects Focusing on those with LENS2 Support	**04.** Institutional capacity building for PA and PF management and wildlife conservation
Programme description	This HCFC Phase-out Management Plan (HPMP) Stage II is developed to enable the Government of Lao People's Democratic Republic (Lao PDR) to meet the obligations towards Montreal Protocol and its Amendments. It was prepared by the Department of Pollution Control and Monitoring	The project will address food and nutrition security needs and will include profitable investment in nutrient-sensitive, climate-adapted agricultural development	Enhancing MAF's DOPF Capacity on Coordination, Monitoring, and Evaluation of Investment Projects Focusing on those with LENS2 Support	

	(DPCM), Ministry of Natural Resources and Environment with assistance of UNEP as the Leading Agency and UNDP as the Cooperating Agency. The objective of the HPMP Stage II reflects the commitment of Lao PDR to its obligation as a Party to the Montreal Protocol having in mind the socio-economic needs of the country. It aims to assist Lao PDR to meet HCFC consumption by 67.5% reduction from the baseline level by 1 January 2025 and to complete phase-out by 1 January 2030 with understanding that consumption between 2030 and 2040 (i.e., the servicing tail) may exceed zero in any year as long as the average calculated level of consumption over the ten-year period from 1 January 2030 to 1 January 2040 does not exceed 2.5 per cent of country baseline consumption.			
Time frame	2021-2024	2016-2022	2018-2021	2015-2022
Recipient Entity	MONRE	MAF	MAF	MAF
Implementing Entity	DCC	DOPC	DOPC	DOF
Type of Support	Mitigation	Adaptation	Cross Cutting	Cross Cutting
Sector	Environment	Agriculture	Agriculture and Forestry	Forestry
State of Activity	Ongoing	Completed	Completed	Completed
Use, Impact, and Estimated Results		Opportunities for improved climate change resilience	To strengthen the country systems for managing protected areas, for enforcing wildlife laws and for implementing environment and social regulations	
Additional Information		https://www.ifad.org/en/web/operations/-/project/2000001131	https://laoepf.org.la/en/esf-documents-for-ewmp/lens2-projects/	https://laoepf.org.la/en/esf-documents-for-ewmp/lens2-projects/

Table 46: Continuous

	Title of Programme			
	05.	**06.**	**07.**	**08.**

	Integrated Conservation of Biodiversity and Forests (ICBF)	Greater Mekong Subregion Biodiversity Conservation Corridors	Forest Carbon Partnership Facility (FCPF)	Sustainable Forest and Land Management in the Dry Dipterocarp Forest Ecosystems of Southern Lao PDR (SAFE Ecosystem
Programme description	Areas located in southern Lao PDR	The Project will enhance transboundary cooperation for preventing and mitigating fragmentation of biodiversity rich forest landscapes of the Cardamom Mountains and Eastern Plains Dry Forest in Cambodia, Triborder Forest	The Project Development Objective is to contribute to Lao PDR's efforts to design and implement a sound national REDD+ strategy	To facilitate a transformative shift towards sustainable land and forest management in the forested landscape of Savannakhet Province in order to secure the critical wildlife habitats, conserve biodiversity and maintain a continuous flow of multiple services including quality water provision and flood prevention
Time frame		2017-2022	2014-2022	2016-2022
Recipient Entity		MAF	MAF	MAF
Implementing Entity		DOF	DOF	DOF
Type of Support		Cross Cutting	Mitigation	Adaptation
Sector		Forestry	Forestry	Forestry
State of Activity		Completed	Completed	Completed
Use, Impact, and Estimated Results		Climate-resilient sustainable forest ecosystems benefitting local livelihoods	Achieving the project objective will enable Lao PDR to participate in and benefit from the emerging performance-based payment system from REDD+ within the context of the UN Framework Convention on Climate Change	https://www.thegef.org/projects-operations/projects/6940
Additional Information		https://www.adb.org/projects/40253-036/main	https://projects.worldbank.org/en/projects-operations/project-detail/P125082 http://dof.maf.gov.la/fcpflao/en/overview/	

Table 46: Continuous

	Title of Programme			
				09. Agriculture for Nutrition phase 2 (AFN II)
Programme description				The Project Goal is to enable 28,000 vulnerable households living in the project area to improve their income by 20% by 2030
Time frame				2023-2030
Recipient Entity				MAF
Implementing Entity				DOPC
Type of Support				Adaptation
Sector				Agriculture
State of Activity				Ongoing
Use, Impact, and Estimated Results				Climate Change adaptation infrastructures (irrigation
Additional Information				https://www.ifad.org/en/web/operations/-/project/2000003760

5.4. Information on support needed and received by developing country parties for the implementation of article 13 of the paris agreement and transparency-related activities, including for transparency-related capacity-building

Information on the support needed and received by Lao PDR for the implementation of Article 13 of the Paris Agreement are presented (Table 48):

Table 47: Information on the Support Needed for the Implementation of Article 13 of the Paris Agreement

	Title of Programme	
	01. CBIT 2 (including Enhance capacity building on ETF tools)	**02.** Develop NDC tracking mechanism
Programme description	Aims to improve a national transparency system for domestic and international reporting in compliance with the requirement of the Enhanced Transparency Framework.	To facilitate NDC tracking
Time frame	2025-2027	2025-2027
Recipient Entity	MONRE	MONRE
Channel	Multilateral	Multilateral
Amount (USD)	2,700,000	200,000

State of Activity	Planning	Planning

Table 48: Information on the support received for the implementation of Article 13 of the Paris Agreement

	Title of Programme	
	Strengthening Lao PDR's institutional capacity to comply with the Enhanced Transparency Framework under the Paris Agreement	Preparation of the First Biennial Transparency Report (BTR)
Programme description	The CBIT Project aims to establish a national transparency system for domestic and international reporting in compliance with the requirement of the Enhanced Transparency Framework through two main components.	To strengthen institutional capacities to develop the First Biennial Transparency Report fulfilling the requirements provided in decision 18/CMA.1
Time frame	2020-2022	2024-2025
Recipient Entity	MONRE	MONRE
Channel	Multilateral	Multilateral
Amount (USD)	1,210,000	484,000
State of Activity	Completed	Ongoing
Expected use, impacts and estimated results	Strengthen Lao PDR's national capacity to track progress against actions identified in its NDC for domestic and international reporting requirements under the Enhanced Transparency Framework of the Paris Agreement	To support Lao PDR to prepare and submit its First Biennial Transparency Report (BTR) that complies with the United Nations Framework Convention on Climate Change (UNFCCC) and Paris Agreement
Additional information	https://www.cbitplatform.org/projects/strengthening-lao-pdrs-institutional-capacity-comply-enhanced-transparency-framework-under https://www.thegef.org/projects-operations/projects/10039	https://www.thegef.org/projects-operations/projects/10953

Table 48: Continue

	Title of Programme			
	01 Third National Communication	02 First Biennial Update Report	**03** Strengthening Lao PDR's institutional capacity to comply with the Enhanced Transparency Framework under the Paris Agreement	**04.** Preparation of the First Biennial Transparency Report (BTR1)
Programme description	Enhance capacity of the Lao PDR and facilitate the preparation of climate change progress of the Lao PDR and communicate, through the UNFCCC, to other parties under the Convention. The project will also enhance the national capacity to integrate the climate change issues into national sustainable development process. It will	To prepare the First Biennial Update Report of Lao PDR	Strengthening Lao PDR's institutional capacity to comply with the Enhanced Transparency Framework under the Paris Agreement	support Lao PDR to prepare and submit its First Biennial Transparency Report (BTR) that complies with the United Nations Framework

	also assist the country to participate and take full advantage of international mechanism that may emerge in the future. The project will also contribute to the global effort to get better understanding of the sources and sinks of greenhouse gases, potential impacts of climate change, and effective response measures to achieve the ultimate objective of the UNFCCC.			Convention on Climate Change (UNFCCC) and Paris Agreement reporting requirements while responding to national development
Chanel	**Multilateral**	Multilateral	Multilateral	Multilateral
Time frame	2016-2023	2017-2020	2019-2023	2023-2024
Recipient Entity	MONRE	MONRE	MONRE	MONRE
Implementing Entity	DCC	DCC	DCC	DCC
Amount received (USD)	540,000	363,000	1,360,000	532,000
Financial Instruments	Grant	Grant	Grant	Grant
Status	**Received**	**Received**	**Received**	**Received**
Type of Support	Cross-cutting	Cross-cutting	Cross-cutting	Cross-cutting
Sector	Other (Natural resource management and environment)	Other (Natural resource management and environment)	Other (Natural resource management and environment)	Other (Natural resource management and environment)
Contribution to Technology Development and Transfer Objective (1 for yes, 0 for No)	**0**	**0**	**0**	**0**
Contribution to Capacity building Objective (1 for yes, 0 for No)	**1**	**1**	**1**	**1**
Status of Activity	Completed	Completed	Completed	**On going**
Use, impacts and result	To prepare the First Biennial Update Report of Lao PDR	To prepare the First Biennial Update Report of Lao PDR	Strengthen Lao PDR's national capacity to track progress against actions identified in its NDC for domestic and international reporting requirements under the Enhanced Transparency Framework of the Paris Agreement	strengthen institutional capacities to develop the First Biennial Transparency Report fulfilling the requirements provided in decision 18/CMA.1

Table 48: Continue

	Title of Programme			
	05: Third National Communication	**06**: First Biennial Update Report	**07:** Strengthening Lao PDR's institutional capacity to comply with the Enhanced Transparency Framework under the Paris Agreement	**08:** Preparation of the First Biennial Transparency Report (BTR1)
Programme description	Enhance capacity of the Lao PDR and facilitate the preparation of climate change progress of the Lao PDR and communicate, through the UNFCCC, to other parties under the Convention. The project will also enhance the national capacity to integrate the climate change issues into national sustainable development process. It will also assist the country to participate and take full advantage of international mechanism that may emerge in the future. The project will also contribute to the global effort to get better understanding of the sources and sinks of greenhouse gases, potential impacts of climate change, and effective response measures to achieve the ultimate objective of the UNFCCC.	To prepare the First Biennial Update Report of Lao PDR under the UNFCCC	The CBIT Project aims to establish a national transparency system for domestic and international reporting in compliance with the requirement of the Enhanced Transparency Framework through two main components.	To support Lao PDR to prepare and submit its First Biennial Transparency Report (BTR) that complies with the United Nations Framework Convention on Climate Change (UNFCCC) and Paris Agreement reporting requirements while responding to national development goals
Time frame	2016-2023	2017-2020	2019-2023	2023-2024
Recipient Entity	MONRE	MONRE	MONRE	MONRE
Implementing Entity	DCC	DCC	DCC	DCC
Type of Support	Cross-cutting	Cross-cutting	Cross-cutting	Cross-cutting
Sector	Other (Natural resource management and environment)	Other (Natural resource management and environment)	Other (Natural resource management and environment)	
State of Activity	**Completed**	Completed	Completed	Ongoing
Use, Impact, and Estimated Results		To prepare the First Biennial Update Report of Lao PDR under the UNFCCC	Strengthen Lao PDR's national capacity to track progress against actions identified in its NDC for domestic and international reporting requirements under the Enhanced Transparency	To strengthen institutional capacities to develop the First Biennial Transparency Report fulfilling the requirements provided in decision 18/CMA.1

			Framework of the Paris Agreement	
Additional Information			https://www.cbitplatform.org/projects/strengthening-lao-pdrs-institutional-capacity-comply-enhanced-transparency-framework-under https://www.thegef.org/projects-operations/projects/10039	https://www.thegef.org/projects-operations/projects/10953

5.5. Assessment of the participation of women in climate implementation and monitoring

Lao PDR has 7,012,995 people, mostly young (the median age of its population is 24.4 years). Around 65% of Lao people live in rural areas, and 70% of the total population works in the agricultural sector, contributing to 17.7% of the GDP. Almost 70% of the population are women, and they play an essential role in the agricultural sector. Lao farmers live dependent upon the exploitation of natural resources and gain major nutrition from forest, non-timber forest, and water resources, so they are simply vulnerable to climate change[174]

Apart from providing information on financial support, technology development and transfer, and capacity-building support, BTR1 Chapter IV will include an assessment of various existing policies and strategies relating to gender and climate change. The purpose of this assessment is to 1) determine the extent to which laws, policies, and strategies consider gender equality and women's empowerment and contribute to strengthening women's resilience to climate change and disaster risk; 2) to understand how the unique social and economic roles played by women is crucial to the effective implementation of sectoral and national projects and programs to adapt and to mitigate climate change in Lao PDR. The result of an assessment of various existing policies and strategies relating to gender and climate change is presented in the table below.

Table 49: Summary of Gender Equality and Women's Empowerment Reference

Laws/ policies/ strategies	Summary of gender equality and women's empowerment references
NSCC	It includes "Development of programs, projects and detail plans, including financial mechanism and plan, for implementation. Development of programs and projects shall consider consistency and impacts to socio-economy and environment, gender equality and vulnerable groups". Priority Programs and Projects to the year 2030 includes: - Assessment of risk and impacts from climate change and natural disaster to vulnerable groups, especially women, children, disables, ethnics, elders and other groups (2021-2024). - Development, implementation, monitoring and reporting of climate change adaptation plans of vulnerable communities,

[174] GoL , 2010: Lao PDR National Strategy on Climate Change

	especially women, children, disables, ethnics, elders and other groups (2021-2030).
NDC	It does not include references to the principles of gender equality nor women's empowerment in climate change. It includes only "Implementation plans on gender roles related to the climate change and health" in the Annex 2 on Adaptation Health Adaptation Strategy (Component 2: Organizational and Staff Capacities Strengthening with target of 100 people/ year had attended the workshop (50% of women) and Component 8: Climate Informed Health Programs with target of 20 sensitive communities informed on water, sanitation, hygiene, dengue control, nutrition, women health, reproductive and children health)
Decree on Climate Change (2019)	It does not include references to the principles of gender equality nor women's empowerment in climate change.
Environmental Protection Law (2012)	It does not include references to the principles of gender equality nor women's empowerment in climate change.

The goal of the Fourth Year National Plan of Action on Gender Equality (2021-2025) includes goals and targets to promote equality, improve women's resilience to disasters, and increase the participation of women in climate change and disaster risk reduction. Goal 4 of this Action Plan includes providing enhanced living conditions for women and girls to escape poverty and live safely through economic empowerment, increase access to quality education, healthcare, and social welfare services, access to justice, prevent and eliminate violence against women and girls, reduce risks from natural disasters and climate change. Reducing climate change and disaster risks for women, men, and children is set out in output 2 of this Action Plan, covering targets and indicators on the rate of women engaging in formulation and implementation of national policies and action plans on climate change, disaster responses, and disaster reduction accounts for 30 % of all participants.

From the above summary table, the laws and policies on climate change in the Lao PDR do not include mandates or mechanisms for special measures to achieve substantive gender equality and women's empowerment, even the NSCC prioritizing programs and projects for assessing risk and impacts from climate change and natural disaster to vulnerable groups including women.

Lao PDR has a national framework on gender equality to promote the participation of women in climate change and disaster risk reduction, as well as the membership of the Lao Women Union in the Technical Working Group on Climate Change, which is a foundation and a positive step toward encouraging an integration of gender and women's empowerment in the climate change institutional framework. Gender mainstreaming is needed in all laws and policies relevant to climate change to improve gender equality and women's empowerment effectively.

5.6. Gaps and barriers in tracking and reporting the support needed and received

There is neither a centralized nor ready system for tracking and reporting the support needed, including how the support will contribute to NDC and the Paris Agreement's long-term goals. The financial support needed by Lao PDR under Article 9 of the Paris Agreement is described in (Table 44): Information on financial support needed under Article 9 of the Paris Agreement is extracted from the NSCC 2023 and the 2020 NDC.

1. Former MPI and DCC have been upgrading the ODAMIS to include the record of climate change support received as required in Decision 18/CMA.1; however, the information recorded in this system cannot be transferred to the Common Tabular Format (CTF) for preparing BTR as required in Decision -/CMA.3 Guidance operationalizing the modalities,

procedures, and guidelines for the enhanced transparency framework referred to in Article 13 of the Paris Agreement;

2. Former MPI is the focal point for tracking climate change-related support with the support of former MONRE. However, this process is in its very early stages, and further development is needed, including identifying and defining the roles, responsibilities, mandates, and channels for information sharing to allow MAE to use the recorded information in ODAMIS;
3. There is a lack of continuity in data entry due to the fact that most line ministries and organizations do not appoint permanent staff to ODAMIS. Some assigned staff do not have sufficient English language skills to read through the project document and record the correct climate change information in the system

Chapter VI: A Self-Assessment and Stocktaking

6.1. Core challenges and barriers faced during the BTR1 preparation in Lao PDR

National inventory report (NIR)

1. Lack of country-specific activity data to meet the IPCC guidelines requirement, resulting in many reporting requirements not being fulfilled and specific emissions not being estimated. In addition, Due to the lack of activity data from local sources, data available from international sources/websites have been used to calculate emissions. However, the majority of data are not segregated based on IPCC guidelines. Thus, the calculation was based on a single set of data representative of those categories. Another challenge includes the uncertainty of data available from different sources and the lack of time series data. Thus, data assumptions need to be made in order to calculate emissions;

2. Due to the limited historical data on Greenhouse gas emissions, Laos reports its annual time series from 2020 until 2022 instead of 1990 until 2022, as detailed in paragraph 57 of Decision 18/CMA.1. Laos also applies the flexibility provisions of paragraph 48 of Decision 18/CMA.1 Report only four gases (CO2, CH4, N2O, and HFC) out of 7 gases (CO2, CH4, N2O, HFCs, PFCs, SF6 and NF3). PFCs, SF6, and NF3 gases were not included in previous inventory reports or in NDC 2.0 due to the lack of activity data and their relatively low emission levels compared to other reported gases. NDC 2.0 does not include activities under Article 6, as its primary goal is to contribute to overall emission reductions and achieve net-zero emissions by 2050. Another flexibility applied is Uncertainty assessment, as detailed in paragraph 29 of Decision 18/CMA.1, where the report presents a qualitative discussion of uncertainty for key categories where quantitative input data are unavailable. Lastly, due to the delay in implementing the BTR project and the lack of resources and internal experts, Lao was unable to submit its national inventory report by 2024 but has scheduled it for 2025. As a result, the flexibility is outlined in paragraph 58 of Decision 18/CMA.1 (Time series) was also applied, where the latest reporting year is three years, rather than two years, before the national inventory report submission. Hence, for the future BTR, there should be an improvement in applying complete requirements based on the best capacity and resources given;
3. Since there is limited country-specific activity data, data collection can be done on the Tier 1 level only for all emission sources, including those considered to be key categories. Also, all the emission factors used are the default values provided by the IPCC guideline;

4. There is a lack of proper, clear, and efficient data collection/providing mechanisms among concerned stakeholders, as there is a loop that needs improvement to make it clear and consistent and ensure effective and sustainable quality data collection/providing in the future.

In addition, there is still lacks a systematic data record/collection that meets the IPCC software requirement;

5. The data transfer system between groups working on preparing reports is not smooth, resulting in a lack of deep knowledge and context on how to navigate the report preparation journey, considering there is no current local reporting handbook;
6. There is no manual or documentation of the GHG inventory preparation done previously; as a result, navigating and preparing for the data collection is quite a challenge and time consuming;
7. There was no permanent core contact person in place in the respective sectors for the BTR report during the data collection process, which resulted in the delay in collecting/providing the data;
8. Some sectors in charge could not provide data despite several request letters sent with proper data collection questionaries per their advice. Also, a few organizations declined to meet with the data collection team;
9. Inadequate human resources and capacities of relevant agencies, especially staff, including knowledge and skill to develop or handle data gaps, use of tools, estimation of GHGs in different sectors, key categories uncertainty analysis, reporting, and QA/QC.

Information necessary to track progress made in implementing and achieving nationally determined contributions

NDC still lacks clear indicators for tracking each target. In addition, the information contributed to the project, with or without conditions, is not fully complete. To ensure effective NDC tracking in the future, the MAE and respective relevant sectors need to discuss and determine the clear indicators in National Determination Communication (NDC) for each target while improving the data collection mechanism and analysis further.

Information related to climate change impacts and adaptation

1. Lack of data, information, and development. Those include long-term historical, time series, and updated (i) meteorological and hydrological data, including water flow and other data for more appropriate national climate scenarios and downscaling; (ii) climate hazards; (iii) a standard or consistent socioeconomic and environmental data for hazard exposure, sensitivity, and adaptive capacity analysis; and (iv) adaptation technologies and practices;
2. Lack of a database system for archiving, analyzing, and providing more accurate and timely data. Lao PDR needs as a foundation for impact analysis;
3. Lack of comprehensive, in-depth, and continual studies and monitoring of climate change, hazards, and sectoral impacts. The hazard profile was developed in 2010 but has not been updated. There are some climate change assessments but a lack of downscaling and consolidation or harmonization.
4. Lack of comprehensive strategies and plans on adaptation, including timely and updated adaptation technology action plans for relevant sectors, NAPA, and sectoral, region or local, city, and community adaptation plans, including hazard mapping. In addition, it lacks resource mobilization for the implementation and MRV of adaptation;

5. High adaptation cost and limited access to technologies and information;
6. Shortage of financial and human resources, and organizational and staff capacity and awareness on resources mobilization, implementation, and MRV of adaptation;
7. Other issues include overlapping or unclear responsibilities, ineffective coordination among stakeholders, and a lack of a centralized, harmonized, or integrated planning and implementation system.

Information on financial, technology development and transfer and capacity-building support needed and received

1. The challenge faced by relevant sectors in supporting and providing data related to climate change activities, including limited knowledge and understanding of climate change work and unclear the activities implemented under its climate change; Understanding of filling out the information collection form, how to use the form, and the required information. In addition, there is a lack of firm data/information collection/providing a mechanism;
2. Neither centralized nor ready system for tracking and reporting the support needed, including supporting NDC and the Paris Agreement's long-term goals;
3. There is a lack of continuity in data entry because most line ministries and organizations do not appoint permanent staff to ODAMIS. Some assigned staff do not have sufficient English language skills to read through the project document and record the correct climate change information in the system.

6.2. Recommendation and action needed for the future BRT

National inventory report (NIR)

1. Strengthen institutional capacity, and improve knowledge and skills of MAE and relevant organizations to conduct research and development of the country specific emissions factors and activity data or statistics, especially those are relevant to key sources of emissions, database and information sharing system or mechanism;
2. Training on the use of IPCC and others' tools and guidelines for GHG inventories from the national to facility level, including review and reporting to the concerned stakeholders;
3. Develop a manual or documentation of the GHG inventory preparation to be used as a handbook/ guideline for the GHG inventory preparation.

Information necessary to track progress made in implementing and achieving nationally determined contributions

To ensure effective NDC tracking in the future, the MAE and respective relevant sectors need to discuss and determine the clear indicators in National Determination Communication (NDC) for each target while improving the data collection mechanism and analysis further.

Information related to climate change impacts and adaptation

1. Strengthen institutional capacity and improve knowledge and skills of MAE and relevant organizations to conduct research and development of (1) the country climate data, including temperatures, rainfalls, extreme events, and hazards and vulnerability as well as exposure, sensitivity and adaptive capacity of the country, regions, sectors and specific targets; (2) technologies for assessments of climate change, hazards, vulnerability, early warning, and adaptation;

2. Training on the use of IPCC, UNEP, UNDP, and others' tools and framework for Vulnerability and Adaptation, cost-effective adaptation planning and implementation, and reporting;
3. Strengthen institutional capacity and improve the knowledge and skills of MAE and relevant organizations to conduct research and transfer mitigation technologies, such as renewable and alternative energy efficiency, low carbon, carbon capture and storage (CCS), and ecosystem-based technologies and practices;

Information on financial, technology development and transfer and capacity-building support needed and received

1. Develop a centralized system for tracking and reporting the support needed, including how the support will contribute to NDC and the long-term goals of the Paris Agreement;
2. Continue upgrading the ODAMIS to be ready to support the information for preparation of the next BTR. This needs to include the formalization of legislation for identifying and defining the roles, responsibilities, mandates, and channels for information sharing to allow MAE to use the recorded information in ODAMIS;
3. Once the ODAMIS is upgraded, there is a need to conduct training programs and ad-hoc consultations on ODAMIS operation in order to facilitate other line ministries, organizations, development partners, particularly project staff who have access to the project document and know well about the project activities.

CHAPTER VII: Conclusion and Recommendations

7.1 Conclusion

The Lao People's Democratic Republic (Lao PDR) has prepared its First Biennial Transparency Report (BTR1) in line with Decision 18/CMA.1 (Modalities, Procedures, and Guidelines – MPGs), particularly Paragraphs 3 and 4. The estimation methods are based on the 2006 IPCC Guidelines. The greenhouse gas (GHG) inventory results indicate that Lao PDR remains a net carbon sink, with total removals from the LULUCF sector amounting to -60,297.51 $GgCO_2e$, offsetting total emissions (excluding LULUCF) of 38,844.04 $GgCO_2e$, resulting in a net sink of 21,453.47 $GgCO_2e$.

Lao PDR has made notable progress in advancing renewable energy, promoting electric mobility, implementing REDD+ initiatives, and expanding community-based adaptation programs. These collective efforts reaffirm the country's commitment to a green growth pathway and a low-carbon, climate-resilient future.

The BTR1 ensures consistency between global climate commitments and national development priorities. This coherence enhances credibility, facilitates international support, and embeds mitigation and adaptation actions within the country's long-term policy frameworks. The Long-Term Low Emission Development Strategy (LT-LEDS) serves as the overarching vision toward net-zero emissions, while NDC 3.0 provides the medium-term implementation pathway. Similarly, the National Strategy on Climate Change to 2030 prioritizes mitigation in key sectors and highlights adaptation as a core component of development and resilience building.

Despite this progress, significant challenges remain. These include data limitations, institutional coordination gaps, insufficient financial and technical resources, and capacity constraints at both national and subnational levels. Overcoming these barriers will be crucial to improving

transparency, strengthening reporting systems, and ensuring effective implementation of Lao PDR's climate commitments under the Paris Agreement.

7.2 Recommendations

1) **Strengthen Institutional Arrangements and Coordination**
   - Establish and regularly convene a national MRV/ETF coordination mechanism involving key ministries and provincial authorities.
   - Clarify mandates, roles, and data-sharing responsibilities through standard operating procedures (SOPs) and inter-ministerial agreements.
   - Enhance coordination between MAE, line ministries, and development partners to ensure integrated implementation and reporting.
2) **Enhance National GHG Inventory and MRV Systems**
   - Improve data collection and management through a centralized, digitized system compatible with the Common Reporting Tables (CRTs) and Common Tabular Formats (CTFs).
   - Develop and use country-specific emission factors and activity data, particularly for key sectors.
   - Strengthen QA/QC procedures and establish a national protocol for inventory compilation, validation, and archiving.
3) **Strengthen Data and Information Systems (ODAMIS)**
   - Finalize the upgrade of ODAMIS to support real-time data sharing and ensure interoperability across ministries.
   - Formalize legislative and institutional arrangements for defining mandates and reporting channels.
   - Provide regular training and capacity-building for data providers, including provincial officials and project staff, to ensure consistent and accurate data entry.
4) **Build Capacity for ETF and NDC Implementation**
   - Conduct training programs on ETF reporting, GHG inventory management, and adaptation tracking for government officials, technical experts, and local focal points.
   - Integrate transparency-related capacity building into existing institutional frameworks and budget planning processes.
   - Strengthen partnerships with regional and international organizations to access technical support and knowledge exchange.
5) **Enhance Financial, Technology, and Capacity-Building Support**
   - Develop a national tracking framework for climate finance to monitor both domestic and international resources supporting mitigation and adaptation actions.
   - Strengthen coordination with donors to align financial and technical assistance with Lao PDR's NDC and LT-LEDS priorities.
   - Promote technology transfer and innovation, especially in renewable energy, sustainable agriculture, waste management, and climate-resilient infrastructure.
6) **Mainstream Adaptation and Gender-Responsive Approaches**
   - Integrate climate adaptation and resilience into national and subnational development plans.
   - Strengthen gender mainstreaming in climate policies and programs, ensuring women's active participation in decision-making and climate action implementation.
7) **Prepare for Future BTRs and Continuous Improvement**
   - Conduct a comprehensive stocktaking exercise to assess lessons learned from BTR1.

- Update national datasets regularly and institutionalize reporting cycles aligned with the biennial submission schedule.
- Foster collaboration with the UNFCCC, GEF, and CBIT initiatives to support continuous improvement and quality assurance of future reports.

In conclude, Lao PDR's First Biennial Transparency Report marks an important milestone in enhancing national transparency and fulfilling commitments under the Paris Agreement. Continued investment in institutional strengthening, data systems, and human capacity will enable Lao PDR to improve the robustness of its future BTRs, strengthen global credibility, and advance toward a sustainable and climate-resilient future.

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