Global Green Growth Institute

Green Growth Potential Assessment

Lao PDR Country Report

November 2017

Global Green Growth Institute
Jeongdong Building 19F
21-15 Jeongdong-gil
Jung-gu, Seoul 04518
Republic of Korea

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List of Abbreviations

ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
EFA	Education for All
EIA	environmental impact assessment
EU	European Union
FAO	Food and Agriculture Organization (United Nations)
FDI	foreign direct investment
GDP	gross domestic product
GGGI	Global Green Growth Institute
GGPA	Green Growth Potential Assessment
GHG	greenhouse gas
GMS	Greater Mekong Subregion
GoL	Government of the Lao People's Democratic Republic
GW	gigawatt
GWh	gigawatt hour
IPCC	Intergovernmental Panel on Climate Change
IPP	independent power producer
IWRM	integrated water resources management
kt	kiloton
ktoe	kiloton of oil equivalent
kWh	kilowatt hour
Lao PDR	Lao People's Democratic Republic
LDC	least developed country
LMIC	lower middle-income country
LUCF	land-use change and forestry
MAF	Ministry of Agriculture and Forestry
MEM	Ministry of Energy and Mines
MES	markets for ecosystem services
MoES	Ministry of Education and Sports
MoF	Ministry of Finance
MoH	Ministry of Health
MoICT	Ministry of Information, Culture and Tourism
MoLSW	Ministry of Labor and Social Welfare
MoNRE	Ministry of Natural Resources and Environment
MPI	Ministry of Planning and Investment
MW	megawatt
NGO	non-governmental organization
NIER	National Institute for Economic Research
NSEDP	National Socio-Economic Development Plan
OECD	Organisation for Economic Co-operation and Development
PES	payments for ecosystem services
PESCO	provincial electricity supply company
PPP	purchasing power parity
REDD	reducing emissions from deforestation and forest degradation
SEA	strategic environmental assessment
SEZ	special economic zone
SIA	social impact assessment

TWh	terawatt hour
UDAA	urban development administration authority
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Cultural and Scientific Organization
USD	United States Dollar

Foreword

The Lao People's Democratic Republic (Lao PDR) is one of the world's fastest growing economies and is close to achieving its goal of graduating from least developed country (LDC) status. To ensure the country's smooth transition post-LDC, the Government of the Lao PDR (GoL) is committed to fostering the county's sustainable development that incorporates environmental protection and social inclusion, as outlined in the Vision 2030 and Socio-Economic Development Strategy 2025. To achieve these new goals, the GoL is in the process of developing a national green growth strategy to stimulate economic growth in a more efficient and equitable way, and ensure that no one will be left behind.

The national green growth strategy will serve as a guide for optimizing the use of the country's natural and human resources to sustainably develop the economy, and ensuring that the benefits are distributed equitably to all citizens. The strategy will also serve as a significant tool for climate change adaptation and mitigation to meet the targets set in the Lao PDR Nationally Determined Contribution to the United Nations Framework Convention on Climate Change and the Sustainable Development Goals.

To support the implementation of the national green growth strategy, it will be integrated into the 8th National Socio-Economic Development Plan (NSEDP), as well as future NSEDPs. The strategy will direct the efficient and effective design and implementation of public investment programs that aim to achieve the targets of the NSEDPs.

This technical report on the Lao PDR Green Growth Potential Assessment (GGPA), conducted by the Global Green Growth Institute (GGGI), is a valuable contribution to the process of formulating the national green growth strategy and a key reference on green growth in the Lao PDR. Based on the assessment, the report highlights six areas for green growth interventions: (1) agriculture and fisheries; (2) forestry and land use; (3) tourism; (4) urban development and transport; (5) energy and mines; and (6) education. The report provides recommendations within each sector for contributing to the Lao PDR's path toward sustainable development, such as protecting natural assets, improving soil health, accessing appropriate technologies and building adaptive capacity to the adverse impacts of climate change.

On behalf of the GoL, I would like to extend my sincere gratitude and thanks to GGGI in conducting the GGPA and providing this significant contribution to the team formulating the national green growth strategy. With the inputs from the GGPA, which was developed in a rigorous and participatory manner, I am convinced that the national green growth strategy will be both comprehensive and relevant. I hope that GGGI will continue to stand beside and support the GoL, not only in the process of drafting the national green growth strategy, but also in its implementation, to ensure a sustainable, equitable and prosperous future for the country and its people.

Bouasone Bouphavanh
President, National Institute of Economic Research
Chair, Steering Committee of National Green Growth Strategy
Government of Lao PDR

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Many national experts participated in a number of workshops that were held to gather input for this report, resulting in valuable new insights, feedback and data. The work could not have been achieved without the input provided by many government bodies, academia, private sector and civil society representatives during the validation workshop held on 8 December 2016, in Vientiane. In alphabetical order, workshop participants included representatives from the Department of Disaster Management and Climate Change (Ministry of Natural Resources and Environment), the Department of Energy Business (Ministry of Energy and Mines), the Departments of Forestry and Forest Resource Management (Ministry of Agriculture and Forestry), the Department of Housing and Urban Planning (Ministry of Public Works and Transportation), the Department of International Cooperation (Ministry of Planning and Investment), the Department of Investment Promotion (Ministry of Planning and Investment), the Department of Meteorology and Hydrology (Ministry of Natural Resources and Environment), the Department of Mines (Ministry of Energy and Mines), the Department of Pollution Control (Ministry of Natural Resources and Environment), the Department of Planning (Ministry of Planning and Investment), the Department of Planning and Cooperation (Ministry of Public Works and Transportation), the Department of Planning and Investment (Ministry of Science and Technology), the Department of Small and Medium Enterprise Promotion (Ministry of Industry and Commerce), the Department of Transport (Ministry of Public Works and Transportation), the Department of Water Resources (Ministry of Natural Resources and Environment), the Faculties of Agriculture, Economics and Business Administration, Environmental Science, Law and Political Science, and the Faculty of Social Science (National University of Laos), the Institute of Renewable Energy Promotion Structure (Ministry of Energy and Mines), the Lao Front for National Construction, the Lao Youth Union, the Ministry of Agriculture and Forestry, the Ministry of Energy and Mines, the Ministry of Finance, the Ministry of Labor and Social Welfare, the Ministry of Industry and Commerce, the Ministry of Natural Resources and Environment, the Ministry of Planning and Investment, the Ministry of Public Works and Transportation, the National Agriculture and Forestry Research Institute, the National Assembly, the National Institute for Economic Research, the Prime Minister's Office, and the Vientiane Cabinet.

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Executive Summary

The Lao People's Democratic Republic (Lao PDR) is in a period of dynamic change and rapid economic growth. Much of the progress can be attributed to increased foreign direct investment, and the transformation of the Lao PDR into a regional provider of natural resources, such as electricity (hydropower), minerals, timber and cash crops. However, economic growth has not been accompanied by effective regulations to manage growth and ensure distributional equity. As a result, the current growth path is introducing social and environmental challenges that are hindering the achievement of sustainable development objectives. While substantial advances toward graduating from a least developed country status have been attained, the Lao PDR has been less successful in translating economic growth into poverty reduction and job creation, when compared with peer countries in the Greater Mekong Subregion. Furthermore, rapid urbanization has introduced an additional layer of policy and planning complexity, leading to increased pollution and poor urban planning.

The Lao PDR 8th National Socio-Economic Development Plan (NSEDP) 2016-2020 prioritizes green growth and sustainable development. The plan includes initiatives to finance natural resource management, improve the equitable distribution of the benefits of economic growth and promote environmental protection. However, the goals and interventions laid out in the 8th NSEDP need to be adjusted and refined in terms of their effectiveness in achieving green growth goals for the Lao PDR. For that purpose, a national green growth strategy is currently being drafted by the National Institute for Economic Research in close collaboration with the Department of Planning of the Ministry of Planning and Investment to ensure the strategy's integration into the 8th NSEDP. The strategy is being drafted with financial support and technical assistance from the World Bank and the Global Green Growth Institute (GGGI).

GGGI conducted a Green Growth Potential Assessment (GGPA) during 2016-2017 to assist the Government of the Lao PDR (GoL) in formulating its national green growth strategy and support the national administration in policy design and implementation. The GGPA is a diagnostic tool that allows a comprehensive examination of the Lao PDR's performance in key green growth areas. The GGPA identifies appropriate green growth interventions based on a systematic understanding of the country's key development challenges. It consists of a combination of data analysis and stakeholder consultation in order to identify and prioritize a country's opportunities for green growth.

In the GGPA of the Lao PDR, a comprehensive and robust data analysis was undertaken to systematically assess the country's performance in the economic, environmental and social dimensions of green growth. As part of the analysis, the Lao PDR was compared to peer countries across a selected range of key indicators. In addition, inputs were gathered from a broad range of stakeholders through an interactive Delphi-based workshop to identify priority areas that offer the highest potential for green growth interventions. This was followed by interviews with local technical experts to inform the analysis and identify relevant recommendations. The rationale behind this inclusive process is to build the country's green growth agenda by giving the government and other stakeholders the leading role in the process, as opposed to externally-imposed solutions.

This report presents the process and findings of the GGPA of the Lao PDR. It synthesizes the findings of the initial data analysis and the outcomes of the stakeholder consultation, including green growth priorities and potential entry points identified by the Lao PDR ministries, as well as a series of

recommended interventions that contributes to sectoral green growth targets and is aligned with the 8th NSEDP.

The report identifies the following six sectors as entry points for green growth interventions: (1) agriculture and fisheries; (2) forestry and land use; (3) tourism; (4) urban development and transport; (5) energy and mines; and (6) education.

Within these sectors the following five green growth priorities have been identified: (1) depletion of natural resources; (2) technological readiness; (3) adaptive capacity to the adverse impacts of climate change; (4) soil health; and (5) agricultural productivity.

The recommendations for each sector are based on: (1) the goals set out in the 8th NSEDP; (2) the initiatives set out for the three outcomes highlighted in the 8th NSEDP; and (3) the initiatives suggested during consultation with technical experts.

These recommendations aim to support policymakers in developing the national green growth strategy. They are also meant to help GGGI identify a list of suitable initiatives for the organization's future work in the Lao PDR. GGGI aims to support the GoL in translating the findings and recommendations from this report into concrete policies and bankable projects.

In summary, the GGPA process has identified the following recommendations to promote green growth in the Lao PDR (organized by sector):

1. Agriculture and Fisheries

The report suggests developing projects that promote community participation in climate-smart agriculture and forestry. Key elements include, actively promoting and investing in agricultural modernization through planned and targeted irrigation, introducing modern seed/fertilizer technologies, and providing training in ecologically-based, climate-adapted farming approaches. In this context, the GoL is advised to reconsider investments to expand large-scale irrigation. Instead, it is suggested that the GoL increases public expenditures on targeted small-scale irrigation, as well as agricultural research and extension services. In addition, it is recommended that the GoL invests in developing and training agencies in integrated spatial land-use planning to: (1) map areas at potential risk from disasters; (2) support decision-making (e.g., on concessions); (3) address issues related to land-use and crop diversification; and (4) strengthen land tenure rights.

Further recommendations are related to improving extension services. This includes providing farmers with marketing services, such as market information, packaging and certifications. It also involves teaching farmers and district extension staff about the safe use of agrochemicals. Beyond being a threat to the environment, exposure to agrochemicals is a serious public health issue in the Lao PDR.

2. Forestry and Land Use

The report recommends a comprehensive review of forest concessions and related regulatory instruments, and the compilation of a concession inventory. The review should address inconsistencies observed between provincial interpretation, implementation and enforcement. It should also clarify the roles and responsibilities across ministries. In this context, the introduction of tools for spatial analysis can support decision-making and planning for the sustainable use of natural resources. Such tools have the potential to improve the capacity of the GoL to effectively review, monitor and enforce concession compliance, as well as conduct environmental impact assessments and social impact assessments. It would also facilitate coordination across sectors. In addition, the increase of resource rents and royalties is suggested. Royalty contributions should be extended so that developers have to pay for access to the

entirety of affected natural resources (and subsequent diminishment of those resources). All these initiatives are in line with recommendations given for the agriculture, as well as the energy and mines sectors.

Other proposed initiatives involve: (1) exploring potential payments for ecosystem services and markets for ecosystem services; (2) encouraging community forest restoration; and (3) establishing supply chain mechanisms that document compliance with regulatory requirements, including reporting requirements on processors and exporters of timber products.

3. Tourism

The report identifies eco-tourism, adventure-related and cultural tourism as opportunities to attract increasing numbers of high-spending tourists. To realize the existing potential, it is suggested to strengthen business associations with experienced high-end tourist operators from other Southeast Asian countries. These collaborations should be set up in a way that ensures management by the Lao PDR nationals, conserves tourist attractions and minimizes tourist revenue leakage. In this context, the establishment of tourism management programs to develop sustainable tourist sites is recommended. For this to be successful, capacity building for tour operators and local authorities is crucial to ensure that tour operations do not cause ecological damage or impinge on cultural traditions. In addition, vocational training as well as a university degree in nature-based, cultural and sustainable tourism will help to develop a skilled labor force and foster the professional management of tourism operations.

In line with the recommendations made for land use, tourism-related resource rents and royalties should be increased to better reflect the value of the affected natural resources and their environmental costs.

4. Urban Development and Transport

The report recommends establishing a shared planning vision and objectives for the Lao PDR urban centers, and aligning urban planning with a green growth model. In this context, enhancing mobility and access to transport, while moving toward lower carbon transport options are important. Non-motorized transport (i.e., bicycles and foot traffic) represents an important dimension among green mobility options and should be encouraged. For that purpose, it is recommended that the GoL investigates opportunities to improve facilities for cyclists and pedestrians for better and safer mobility. Another recommendation is the development of an integrated public transport system for Vientiane, and subsequently for other cities. The assessment of options for introducing electric vehicles, including electric buses, motorcycles and *tuk-tuks*,[1] is also suggested.

Beyond transport, waste management and wastewater treatment are serious challenges in urban centers. Therefore, it is recommended that the GoL increases service provision and collection rates, as well as divert waste from landfills by increasing recycling. In addition, increasing the number of decentralized wastewater treatment systems to enhance sanitation and public health is proposed. In this context, it is suggested that the GoL supports public-private partnerships to develop sustainable business models.

As in other sectors, the development and use of analytical tools that facilitate spatial planning can play a useful role for urban development.

[1] *Tuk-tuk* is a three-wheeled motorized vehicle used as a taxi.

5. Energy and Mines

The report suggests the promotion of off-grid renewable energy for rural electrification. Off-grid renewable sources avoid costly grid extensions, as well as the major investments required for centralized electricity generation. Off-grid solutions such as micro-hydro and solar installations have the additional benefits of minimizing electricity losses associated with long distance transmission, avoiding resettlement conflicts, as well as reducing fish losses and related protein deficiencies associated with large-scale hydropower.

The report also recommends that the GoL seeks technical and financial assistance to standardize the protocols and implementation checks used in concession negotiations and agreements. Among others, such an initiative should aim to establish a comprehensive and accessible concession inventory, as well as coordinate concession agreements and their enforcement between district, provincial and central authorities.

Further recommendations for the energy and mines sector include: (1) assessing the costs and benefits of measures to enhance energy efficiency; (2) using spatial planning tools to support the sustainable use of natural resources; and (3) expanding mining companies' payment of resource-related rents and royalties.

6. Education

The report recommends that educational institutions and the business sector partner with each other to develop interdisciplinary curricula and degrees in sustainable development, nature-based tourism and natural resource management. Furthermore, subjects concerned with various aspects of climate change should be integrated into primary, secondary and university education. Public-private partnerships should also be established to promote vocational training programs to increase the number of skilled labor needed for higher-value processing. This would help to improve the match between labor skills and business demands, improve household incomes, and increase economic output and tax revenues.

Additionally, the GoL is encouraged to train more women as teachers, entrepreneurs and university lecturers to correct current gender imbalances. Finally, initiatives that promote scientific research and the application of research results to raise the quality of education should be supported.

1. Introduction

The Lao People's Democratic Republic (Lao PDR) is in a period of dynamic change. Robust economic growth has been averaging 8% since 2006, and in 2015 the Lao PDR was one of the fastest growing economies in the Southeast Asia and Pacific region with 7% gross domestic product (GDP) growth. Much of the progress can be attributed to increased foreign direct investment (FDI), and the transformation of the Lao PDR into a regional provider of natural resources, such as energy (hydropower), minerals, timber and cash crops (Smajgl, A. et al. 2015).

However, economic growth has not been accompanied by effective regulations to manage growth and ensure distributional equity. As a result, the current growth path is introducing social and environmental challenges that are hindering the achievement of sustainable development objectives. The few regulations in place are often inconsistently implemented and enforced. This makes meeting the long-term objectives of sustainable development challenging. While substantial advances toward graduating from a least developed country (LDC) status have been attained, the Lao PDR has been less successful in translating economic growth into poverty reduction and job creation, when compared with peer countries in the Greater Mekong Subregion (GMS) (World Bank 2017b). Furthermore, rapid urbanization has introduced an additional layer of policy and planning complexity, leading to increased pollution and poor urban planning.

The Lao PDR 8th National Socio-Economic Development Plan (NSEDP) 2016-2020 prioritizes green growth and sustainable development. The plan includes initiatives to establish mechanisms to finance sustainable natural resource management, improve the equitable distribution of the benefits of economic growth and promote environmental protection. To achieve these initiatives the 8th NSEDP describes development strategies for the period 2016-2020 and acts as the basis for all green growth initiatives.

A national green growth strategy is currently being drafted by the National Institute for Economic Research (NIER) in close collaboration with the Department of Planning of the Ministry of Planning and Investment (MPI) to ensure the strategy's integration into the 8th NSEDP. The strategy is being drafted with financial support and technical assistance from the World Bank and the Global Green Growth Institute (GGGI). The Government of the Lao PDR (GoL) is looking to GGGI for its unique technical expertise and experience to assist with articulating the foundation principles of the national green growth strategy.

Conducting a Green Growth Potential Assessment (GGPA) is an essential part of this process. The GGPA is a diagnostic tool that allows a comprehensive examination of the Lao PDR's performance in key green growth areas. It consists of a combination of data analysis and stakeholder consultation in order to identify and prioritize a country's opportunities for green growth. The GGPA and the development of integrated sector strategies are designed to ensure government ownership, tractable progress of the 8th NSEDP and alignment of relevant institutions with green growth principles.

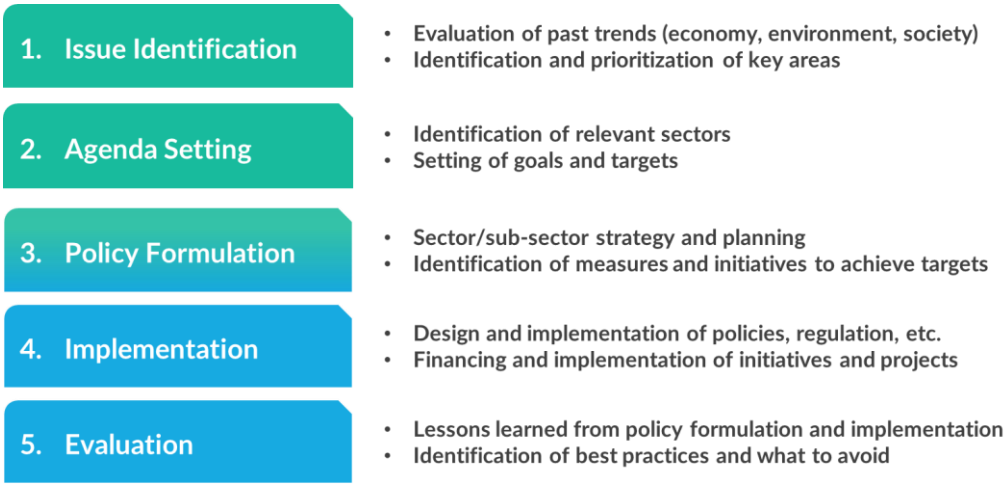
The GGPA process identifies appropriate green growth interventions based on a systematic understanding of the country's key development challenges. This process involves a comprehensive and robust data analysis by using a set of 33 indicators that covers a balanced combination of economic, environmental and social dimensions of green growth.

In addition, an essential part of the GGPA process is to gather input from a broad range of stakeholders through an interactive Delphi-based workshop to identify priority areas that offer the highest potential

for green growth interventions.[2] This is followed by interviews with local technical experts to inform the analysis and identify relevant recommendations. The rationale behind this inclusive process is to build the country's green growth agenda by giving the government and other stakeholders the leading role in the process, as opposed to externally-imposed solutions. In the Lao PDR, these efforts were led by the MPI and NIER, while working closely with GGGI and other partners.

The GGPA represents the first two steps of a five-stage process to assist the GoL in formulating its national green growth strategy and support the national administration in policy design and implementation. These five steps are shown in Figure 1. The GGPA informs the first two steps of this process (i.e., issue identification and agenda setting). It can also provide some input into the third step (i.e., policy formulation).

Figure 1 GGGI Assistance to the Government of the Lao PDR



Source: GGGI

The primary objectives of the GGPA of the Lao PDR were to:

- Identify a set of green growth priorities shared across the Lao PDR ministries;
- Identify the primary sectors associated with the management of these green growth priorities;
- Identify green growth initiatives to assist the Lao PDR improve the performance in the selected priority areas and sectors; and
- Provide an evidence-based contribution to the formulation and effective implementation of green growth policy and institutional arrangements in the Lao PDR.

The combination of a diagnostic tool and participatory stakeholder consultation addresses several critical challenges facing developing countries implementing green growth principles and practices, namely:

- Difficulties in making practical comparisons of non-commensurate indicators;
- Diversity of competing claims and interests of stakeholders impeding consensus building;
- Political preference and lack of transparency in decision-making processes;
- Insufficient scientific evidence; and
- Conflicts and alignment with existing policies.

[2] The Delphi technique is "a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem." It relies on individual opinions and evaluations, based on the idea that discovering solutions "can benefit from subjective judgements on a collective basis" (Linstone and Turoff 2002).

This report presents the process and findings of the GGPA of the Lao PDR. It synthesizes the findings of the initial data analysis, the outcome of the stakeholder consultation, including green growth priorities and potential entry points identified by the Lao PDR ministries, as well as a series of recommended interventions that contributes to sectoral green growth targets and is aligned with the 8th NSEDP. Based on the results of this assessment, GGGI aims to support the GoL in translating its findings and recommendations into concrete policies and bankable projects.

Chapter 2 describes the general methodology of the GGPA process and elaborates on how the GGPA was applied in the Lao PDR, describing each step of the assessment.

Chapter 3 presents the findings from the GGPA workshop held on 8 December 2016. Firstly, subchapter 3.1 highlights the results of the data analysis conducted prior to the workshop, providing details of the green growth indicators that showed a low performance for the Lao PDR in comparison to lower middle-income countries (LMICs) and the Lao PDR's neighboring states — Cambodia, Thailand and Vietnam. Secondly, subchapter 3.2 describes the workshop process and presents the results of the stakeholder consultation and consensus building process. It presents the identified priority areas for green growth, as well as the sectors most relevant to these priority areas and most likely to improve performance.

Chapter 4 details the process and the outcomes of interviews conducted with technical experts. Technical experts familiar with green growth and sustainable development in the Lao PDR were invited to share their experience and opinions about the underlying causes for low performance in areas relevant to green growth, as well as potential initiatives, instruments and policies to improve performance.

Chapter 5 lists the objectives and indicators described in the 8th NSEDP for the Lao PDR, and synthesizes initiatives and projects detailed in the 8th NSEDP that are relevant to green growth.

Chapter 6 discusses in detail the priority sectors identified for green growth interventions, including proposed projects and recommendations on the implementation of these projects. Each subchapter looks at an individual sector. It describes the relevance of the sector within the context of the Lao PDR, highlights existing issues within the sector, identifies related programs and projects described in the 8th NSEDP, and provides an overview of the analysis and interventions proposed by technical experts. Finally, each subchapter presents a series of recommendations and projects that corresponds to both the 8th NSEDP and technical experts' suggestions, and is guided by the results of the GGPA workshop.

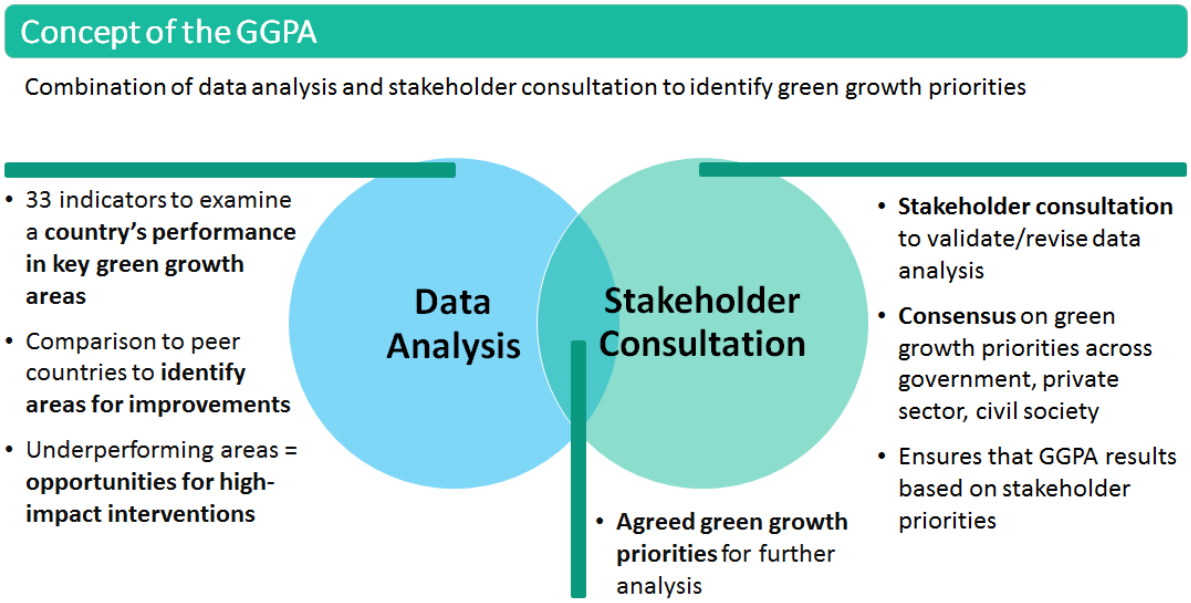
A synthesis of the GGPA's aims and results, as well as how these results will be used going forward is described in Chapter 7. The chapter highlights initiatives involving multiple sectors, as well as interventions that are both listed in the 8th NSEDP and suggested by technical experts.

A description of the GGPA indicators, the GGPA workshop report, interview details and the interview questionnaire can be found in the Appendix.

2. GGPA Methodology

The GGPA is a diagnostic tool that consists of a combination of data analysis and stakeholder consultation in order to identify and prioritize a country's opportunities for green growth (see Figure 2). The GGPA process involves three phases: (1) preliminary assessment based on data analysis; (2) validation of the preliminary assessment and consultation with stakeholders; and (3) sector analysis and the development of recommendations (see Figure 3). This design aims to ensure that the assessment process is systematic, objective and participatory.

Figure 2 Conceptual Schematic of the GGPA



Source: GGGI

Phase 1: Preliminary Assessment

First, based on 33 comparative indicators covering the economic, environmental and social dimensions of green growth, areas of underperformance were identified. These areas were considered as opportunities for high-impact green growth interventions at modest costs. To identify areas of underperformance, the score for the Lao PDR in each of the indicators was compared with selected peer countries and the average for LMICs, as per the World Bank classification.

Phase 2: Validation and Consultation

An interactive, Delphi-based workshop was held in Vientiane on 8 December 2016 to validate the findings of the preliminary assessment, select priority green growth areas, and identify the relevant sectors related to each of the areas.

At the workshop, results from the preliminary assessment were presented to a broad range of stakeholders, and their inputs were elicited with the intention to build consensus on the priority green growth areas and the associated sectors to manage the interventions in each area. The workshop also served to gather additional data and information missing from the preliminary assessment.

The systematic and participatory Delphi technique was complemented by an electronic voting system throughout the workshop, which allowed the participants to voice their opinions anonymously. Workshop participants selected priority green growth areas (based on the green growth indicators) for the Lao PDR, and identified the relevant sectors related to each priority area. The sequence of surveys and discussions proved successful in facilitating participant consensus on the priority areas and sectors across the different government ministries and departments.

A final list of the relevant priority areas and sectors was defined after the workshop by combining the result of the Delphi surveys with the inputs from individual discussion groups, as well as the findings from the preliminary assessment. Details of the GGPA workshop can be found in Appendix 8.4.

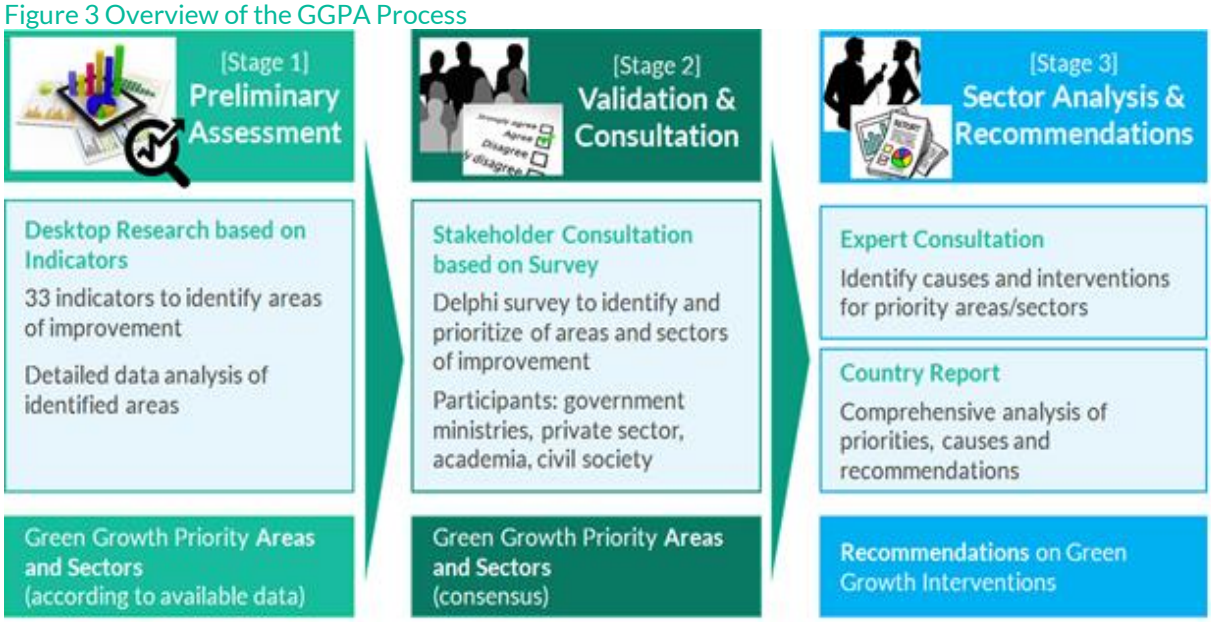
Phase 3: Sector Analysis and Recommendations

Based on the priority green growth areas and associated sectors identified in Phase 2, a qualitative analysis was conducted to assess factors constraining performance in the priority areas. The linkages between priority areas and sectors were analyzed, and existing gaps in the Lao PDR policy framework and the governance structure were examined. This process helped to identify potential interventions that are aligned with existing policy targets and can address the current shortcomings in the priority areas.

A crucial input to this analysis was a series of interviews with technical experts in the Lao PDR. The interviews served to identify existing green growth impediments at the sectoral level and develop recommendations including sectoral strategies, potential interventions, as well as pilot projects, to improve performance within the priority areas.

Finally, a set of recommendations based on inputs from technical experts from the Lao PDR and GGGI was compiled. These recommendations address the agreed priority areas and sectors identified in Phase 2 and are aligned with the goals set out in the 8th NSEDP.

Figure 3 Overview of the GGPA Process



Source: GGGI

Box 1 Vocabulary of the GGPA

The GGPA provides a method to identify priorities for green growth interventions. Throughout the assessment, a number of terms are used, as follows:

- **Indicators** – Thirty-three indicators have been selected by GGGI for comparing a country's performance to selected peers on a range of green growth aspects. These indicators, covering the economic, environmental and social dimensions of green growth, are derived from global data sources.

- **Areas** – Each indicator represents a topic relevant to green growth that includes more than the corresponding data point captured by an individual GGPA indicator. In the consultation workshop, votes for a specific indicator are interpreted as recognition that the related area is of high concern in a country. For example, votes for the indicator on electricity losses are assumed to translate to a concern about the reliability of the energy system as a barrier to development and well-being.

- **Sectors** – In the second half of the consultation workshop, participants were asked to identify sectors of the economy that are most relevant for addressing the highest-ranked areas.[3] Fourteen sectors represent the domestic economy within a country and help to target expert interviews in the subsequent stage of the GGPA process. Many areas are affected by more than one sector. Identifying the sectors most connected to priority areas can guide the development of green growth policies and projects, and encourage investments in green growth.

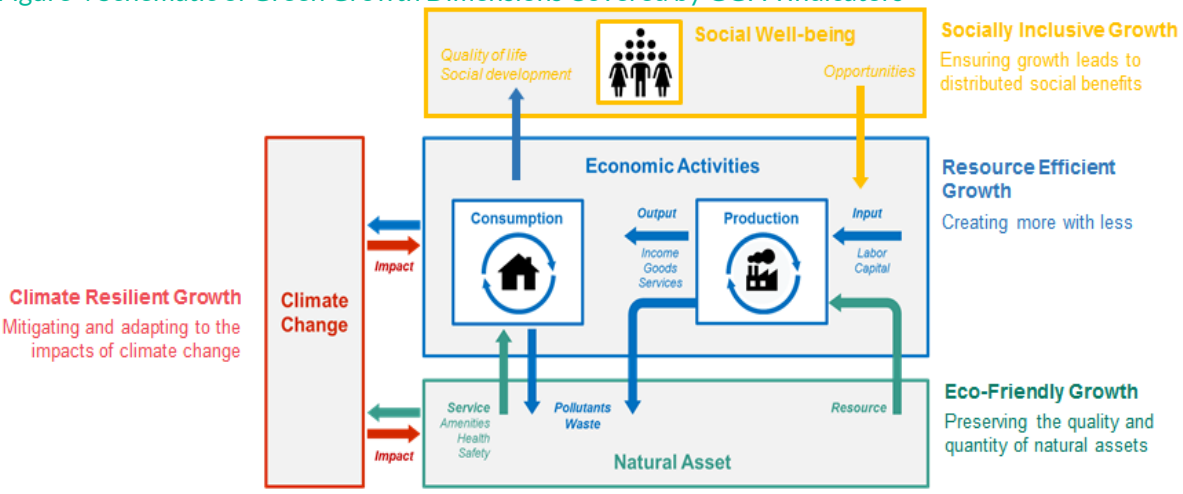
[3] The GGPA adopts the Organisation for Economic Co-operation and Development (OECD) definition of the term "sector" to denote thematic areas that may have several ministries and/or entities involved with policy implementation.

3. Identifying Green Growth Priorities

3.1 Evaluation and Comparison of Green Growth Indicators

This subchapter shares the results of a comparative analysis of the Lao PDR's green growth performance with the selected peer countries — Cambodia, Thailand and Vietnam — and with the average for LMICs. The analysis compares 33 indicators across four green growth dimensions:[4] (1) resource efficient growth; (2) eco-friendly growth; (3) climate resilient growth; and (4) socially inclusive growth (see Figure 4). The descriptions, metrics and data sources for the 33 indicators can be found in Appendix 8.1.

Figure 4 Schematic of Green Growth Dimensions Covered by GGPA Indicators



Source: GGGI

The discussion focuses on the indicators that the Lao PDR is underperforming in when compared with the selected peer countries and the average for LMICs, as those indicators represent the areas with the highest potential for green growth interventions. The results of the comparative analysis of indicators for the resource efficient, eco-friendly and climate resilient growth dimensions are summarized as radar charts in Figure 6, 10 and 14, respectively.

The indicators related to socially inclusive growth were not considered separately when identifying priority areas for green growth. Instead, the GGPA considered socially inclusive growth as a cross-cutting dimension that is relevant to all aspects of green growth (see Box 3).

[4] The four green growth dimensions are based on the Green Growth Knowledge Platform's definition of green growth that includes: (1) resource efficiency; (2) eco-friendliness; (3) climate resilience; (4) economic growth and innovation; and (5) social inclusion.

Box 2 Defining Green Growth

GGGI defines green growth as a development approach that seeks to deliver economic growth that is both environmentally sustainable and socially inclusive. Through the green growth model, countries seek opportunities for economic growth that are low carbon and climate resilient, prevent or remediate pollution, and maintain healthy and productive ecosystems, as well as create green jobs, reduce poverty and enhance social inclusion.

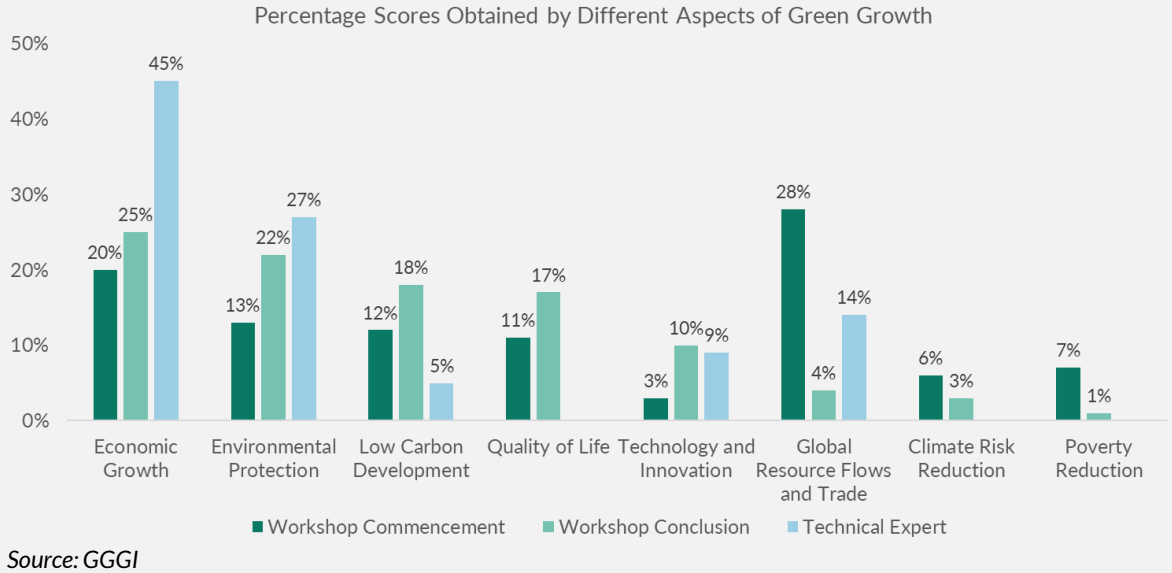
Several definitions and concepts of green growth exist from development entities, such as OECD, United Nations Environment Programme and the World Bank. Common to all of these definitions is the recognition of the three pillars of green growth: (1) economic growth; (2) environmental sustainability; and (3) social inclusion. GGGI's definition recognizes the importance of all three pillars without emphasizing one over the other.

In order to measure green growth, the Green Growth Knowledge Platform (2016) proposed to look at indicators reflecting the following five dimensions: (1) natural assets (eco-friendliness); (2) resource efficiency; (3) (climate) risk and resilience; (4) economic growth and innovation; and (5) social inclusion. The GGPA is largely following this approach in its selected indicators. To the extent possible, indicators reflecting the dimension of economic growth and innovation have been included in other dimensions due to the limited availability of relevant data.

As part of the GGPA consultation workshop, participants were invited at the commencement and the conclusion of the workshop to select up to three concepts that best describe their understanding of green growth. The following question was asked: "Which of the following concepts best represent your understanding of green growth? Using your selection devices, please choose up to 3 answers." Technical experts were asked the same question in the interviews. The results are illustrated in Figure 5. Two key points emerge from the analysis:

- The majority of technical experts and workshop participants (at workshop conclusion) selected economic growth and environmental protection as reflecting their understanding of green growth. This result is in line with the definition of green growth that GGGI proposes.
- Poverty reduction was not considered a priority concept of green growth by participants or experts, despite this being a central objective of the 8th NSEDP and its central role in GGGI's definition of green growth.

Figure 5 Perceptions of Green Growth



Source: GGGI

The 33 indicators used in the GGPA were standardized as percentile scores (between -50% and 100%), based on a two-point transformation of data collected for more than 200 countries and territories.[5] Using a common scale allows comparison of a country's performance across distinct indicators (e.g., water productivity vs. water quality). To aid visualization and interpretation of the comparative analyses, standardized indicators were graphically illustrated as radar charts where:

- A score of 100% (good) indicates the country's performance is within the global top 10 percentile;
- A score of 50% (average) indicates the country's performance is on par with the global average; and
- A score of 0% or lower (poor) indicates that the country's performance is within the global bottom 10 percentile.

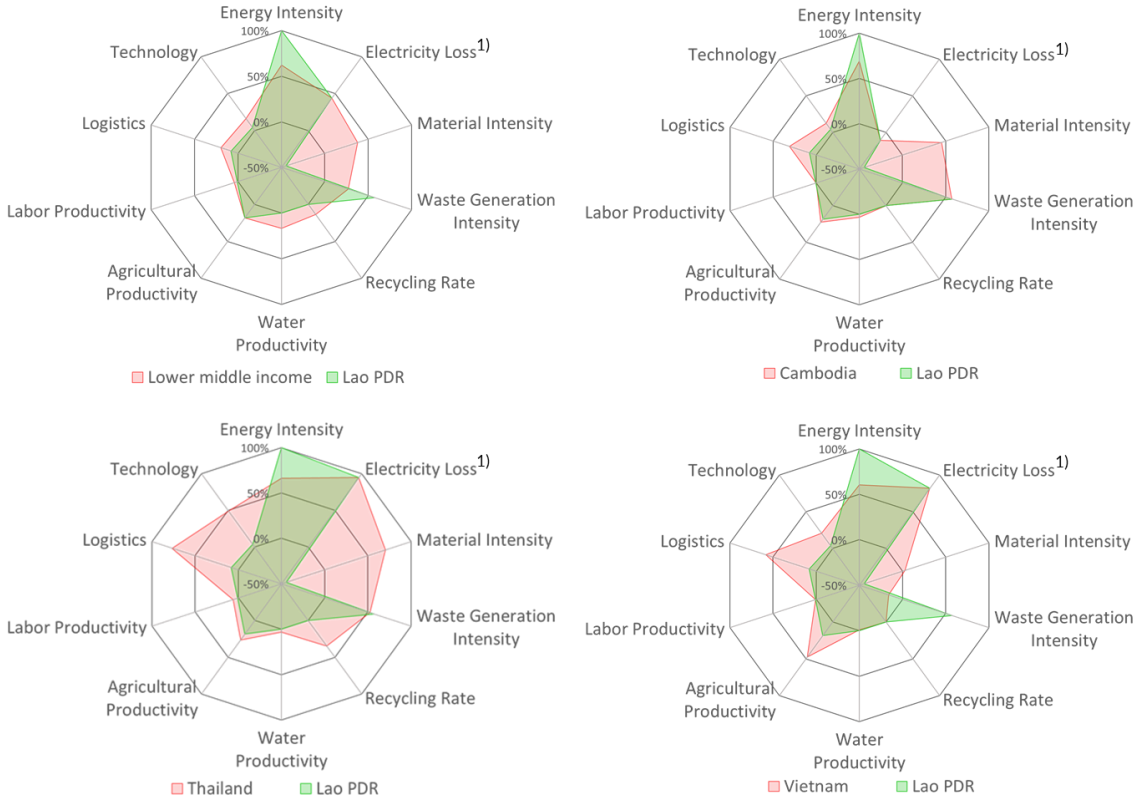
3.1.1 Comparative Analysis of Resource Efficient Growth

The comparative analysis of indicators related to resource efficient growth shows that the Lao PDR is consistently underperforming in material intensity, technological readiness and logistics. These three indicators are discussed in more detail below.

On the other indicators, both the LMIC average and Thailand have a higher score than the Lao PDR in recycling rates for solid waste and labor productivity. However, while water productivity shows similar results for the Lao PDR and the three selected peer countries, it is lower than the LMIC average. Agricultural productivity of the Lao PDR is comparable to the LMIC average, as well as to Cambodia and Thailand, but considerably lower than Vietnam (see Figure 6 and Table 1).

[5] The GGPA follows the World Bank country classification as given in https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups.

Figure 6 Radar Charts for Resource Efficient Growth



Source: GGGI

[1]Note: Data on electricity losses is not available for the Lao PDR.

Table 1 Summary of Country Comparisons for Resource Efficient Growth

	Indicators	LMIC	Cambodia	Vietnam	Thailand
Resource Efficient Growth	Material Intensity	X	X	X	X
	Recycling Solid Waste	X			X
	Water Productivity	X			
	Agricultural Productivity			X	
	Labor Productivity	X			X
	Logistics Performance	X	X	X	X
	Technological Readiness	X	X	X	X

Source: GGGI

Notes: X = Indicators for which the Lao PDR receives a score lower than the respective peer country.
Gray highlight = Indicators for which the Lao PDR shows consistent underperformance across all peer countries and LMICs.

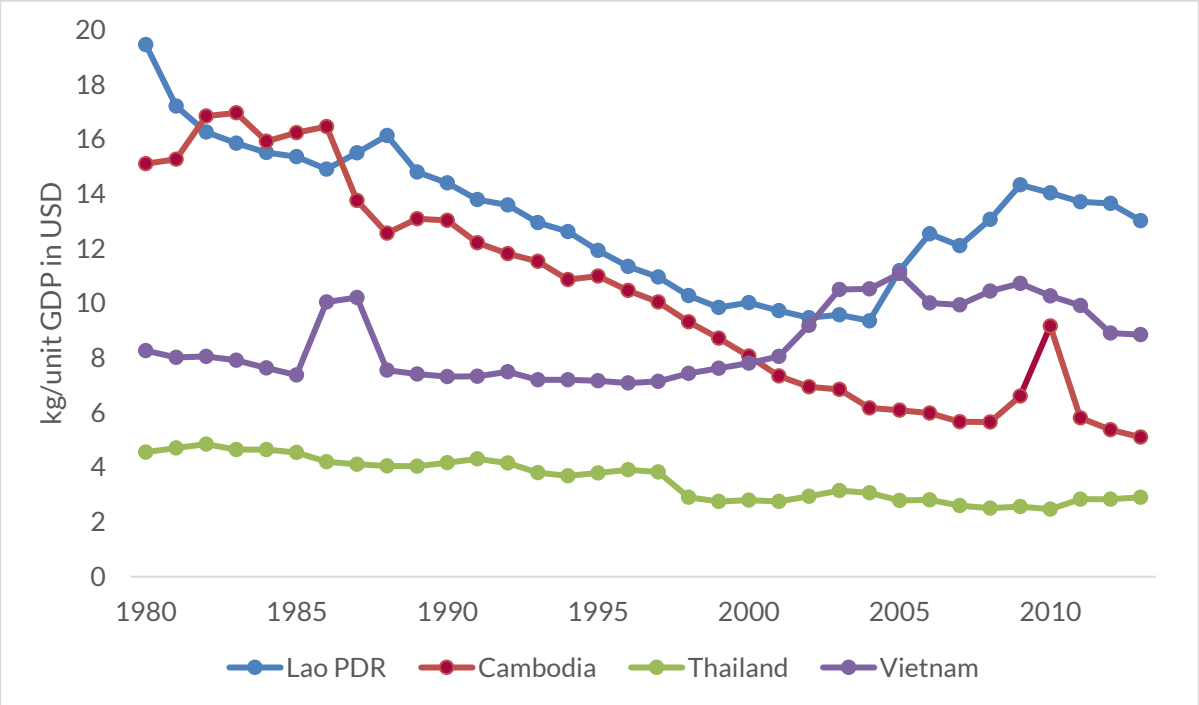
Material Intensity

The quantity of material used to produce goods and services. It is the ratio between GDP and the total amount of domestic materials (construction/industrial minerals, metal, ores, fossil fuels and biomass) extracted.

Material intensity has generally declined from 1980 to 2012 in Cambodia and Thailand. In Vietnam, it increased from 2002 to 2008, but has since declined. However, in the Lao PDR, although material intensity declined from 1980 to 2004, it has since increased substantially relative to peer countries (see Figure 7). The substantial increase since 2004 corresponds with the increase in estimates of the rate of

natural resource depletion (see Figure 11), suggesting that the low performance is correlated primarily with accelerated extraction of forest resources and minerals, inefficient production processes, and lack of skilled labor and advanced technologies.

Figure 7 Material Intensity in the Lao PDR and Peer Countries



Source: The Online Portal for Material Flow Data, http://www.materialflows.net

Insights from technical experts (see Chapter 4) suggest that the structure of resource concession agreements in the Lao PDR may be an influential factor explaining the low scores for material intensity and natural resource depletion. Material intensity measures across two dimensions: material flows and GDP.

Firstly, the main contribution to GDP from concession agreements is limited to royalty payments, with limited GDP contributions from exploration, construction and operational expenditures. For example, the GDP contributions (and subsequent income and employment multipliers) from a sample of the Lao PDR mining concessions are approximately 5% of total expenditures (MPI 2016). This compares to 95% of total expenditures being spent with local companies and entities for Australian and Canadian mining operations. For a given amount of resources extracted, the relative contribution to GDP is approximately 19 times greater than an equivalent amount in the Lao PDR.

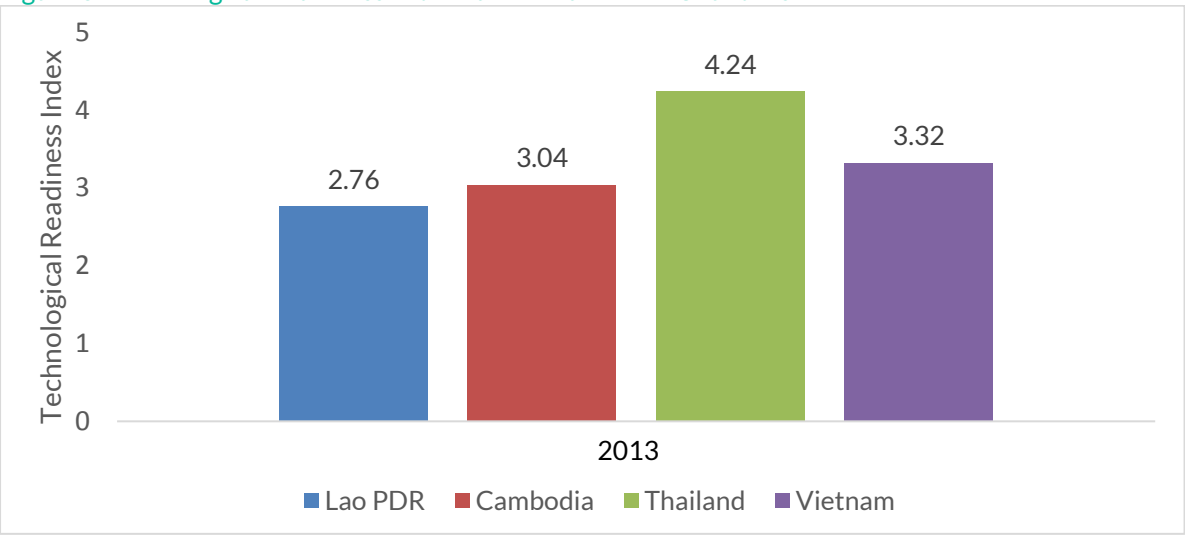
Secondly, royalty payments or resource rents are generally limited to a specific resource, despite substantial deterioration or reductions in interdependent resources as a result of concession operations. The losses associated with external resources (e.g., forest or aquatic ecosystems) are not specified as management obligations in the concession agreement.

Technological Readiness

The agility with which an economy adopts existing technologies to enhance the productivity of its industries. The measure includes absorption of technologies by firms, FDI and technology transfer, internet users, subscriptions to fixed broadband internet, internet bandwidth, mobile broadband subscriptions, mobile phone subscriptions and fixed telephone lines.

The Lao PDR has the lowest score for technological readiness (2.76) compared to peer countries (see Figure 8). The main reasons for a low performance in technological readiness are low information technology literacy, a shortage of skilled information technology professionals, and a general lack of awareness of information and communication technologies within the government and among the Lao PDR population (UNDP 2002).

Figure 8 Technological Readiness in the Lao PDR and Peer Countries



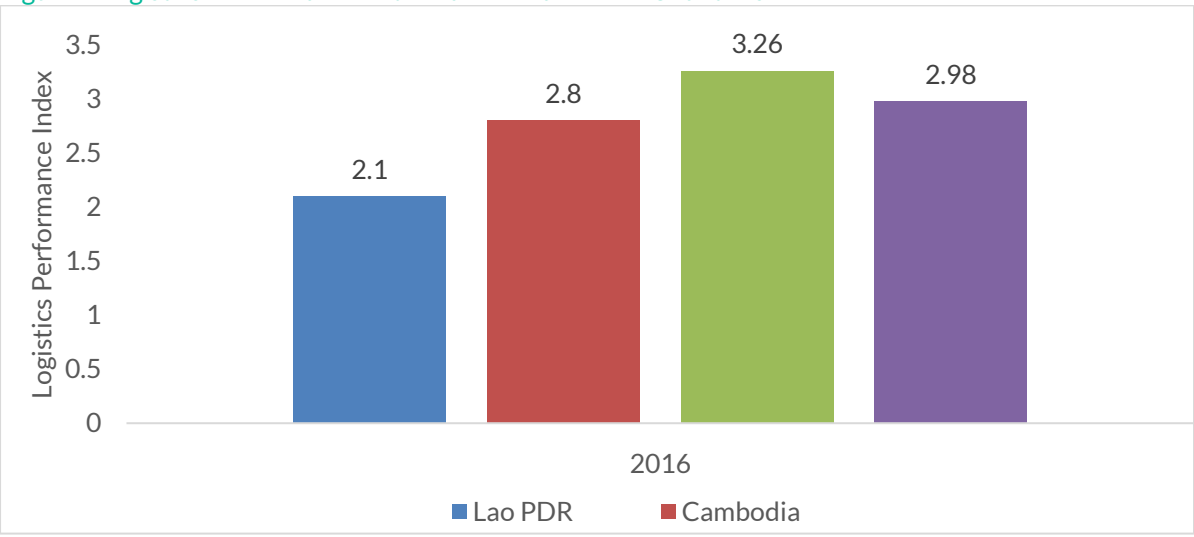
Source: World Economic Forum 2015

Logistics Performance Index

Measures efficiency in customs procedures, quality transport infrastructure, ease of shipments, quality of logistics services, ability to locate and track shipments, and the frequency with which shipments reach their destination on time.

The Lao PDR has the lowest score for logistics performance (2.1) compared to peer countries (see Figure 9). The main reason for the low performance is the weak transportation industry that is hampering the efficiency of logistics services (Phandanouvong 2016).

Figure 9 Logistics Performance in the Lao PDR and Peer Countries



Source: World Bank 2017a

3.1.2 Comparative Analysis of Eco-Friendly Growth

The comparative analysis of indicators representing the eco-friendly dimension of growth suggests that the Lao PDR is consistently underperforming on the rate of natural resource depletion and soil health. These two indicators are discussed in more detail below. In contrast, the Lao PDR is performing comparatively well in the areas of forest cover change, water stress and water quality (see Figure 10 and Table 2).

Figure 10 Radar Charts for Eco-Friendly Growth

Source: GGGI

[1]Note: Coastal shelf fishing pressure is not relevant in case of the Lao PDR.

Table 2 Summary of Country Comparisons for Eco-Friendly Growth

	Indicators	LMIC	Cambodia	Vietnam	Thailand
Eco-Friendly Growth	Natural Resource Depletion	X	X	X	X
	Soil Health	X	X	X	X

Source: GGGI

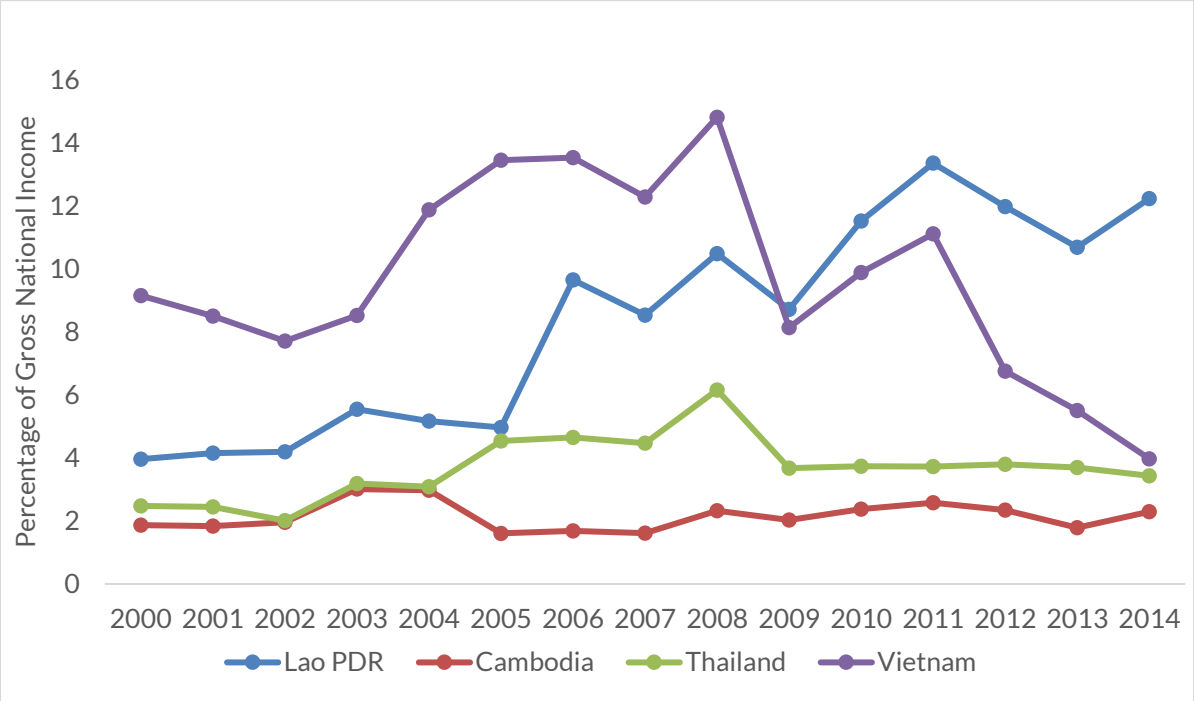
Notes: X = Indicators for which the Lao PDR receives a score lower than the respective peer country.
Gray highlight = Indicators for which the Lao PDR shows consistent underperformance across all peer countries and LMICs.

Natural Resource Depletion

Measures the aggregate of forest, mineral and fossil fuel depletion as a percentage of gross national income. Net forest depletion is resource rents times the excess of round wood harvest over natural growth. Fossil fuel depletion is the ratio of the value of the stock of fossil fuel resources to the remaining reserve lifetime (capped at 25 years). It covers coal, crude oil and natural gas. Mineral depletion is the ratio of the value of the stock of mineral resources to the remaining reserve lifetime (capped at 25 years). It covers tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite and phosphate.

The rate of natural resource depletion has remained relatively stable from 2000 to 2014 in Thailand and Vietnam. It increased from 2002 to 2008 in Cambodia, but has since declined (see Figure 11). On the other hand, the rate of natural resource depletion has increased in the Lao PDR from 2000 to 2014, with substantial increase in depletion rates observed from 2005 to 2014, relative to peer countries. The substantial increase since 2005 coincides with the increase in estimates for material intensity (see Figure 7). This is confirmed by the insights from technical experts regarding the relation between resource flows and national accounts associated with the low performance of material intensity.

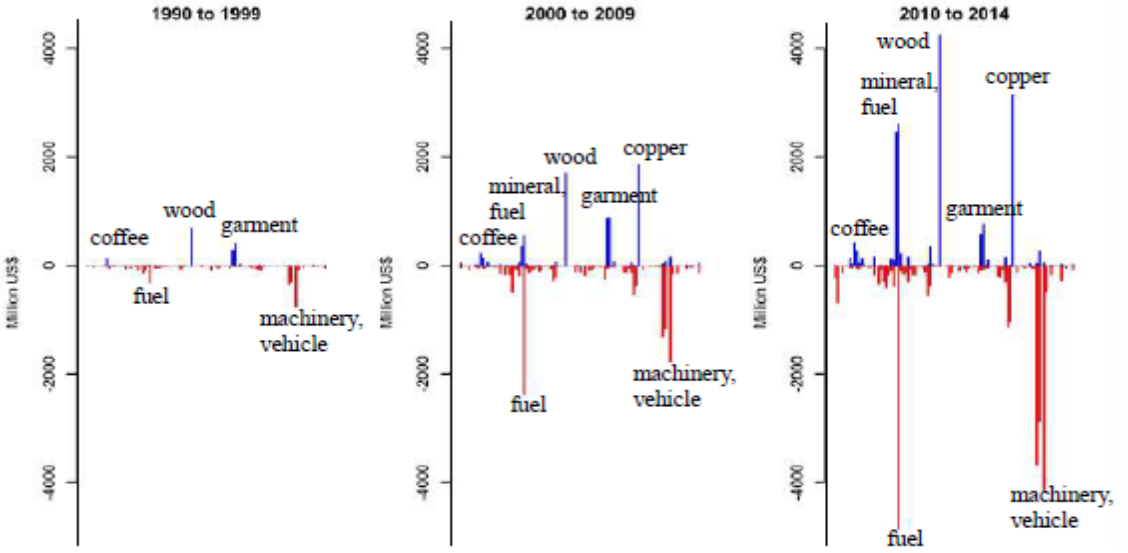
Figure 11 Natural Resource Depletion in the Lao PDR and Peer Countries



Source: World Bank 2017a

Generally, the reasons stated for the low performance in material intensity also apply to natural resource depletion. Figure 12 shows the increase in wood, mineral and copper extraction and export in the Lao PDR for the period 2000-2009, and their escalating exports for the period 2010-2014. Technical experts suggested that the current suite of environmental impact assessments (EIAs), social impact assessments (SIAs) and strategic environmental assessments (SEAs) in the country does not meet international standards, and these partial and inaccurate pre-operation assessments have resulted in the overexploitation of natural resources. Limited audits of practitioners and agency implementation have meant that the EIAs, SIAs and SEAs conducted in the Lao PDR are characterized by low compliance and enforcement levels. Technical experts also pointed out the importance of cumulative impact assessments of inter-connected projects, but their conceptual framework is poorly understood in the Lao PDR and such assessments have not been conducted, contributing to the observed increase in natural resource depletion.

Figure 12 Lao PDR Imports and Exports, 1999-2014



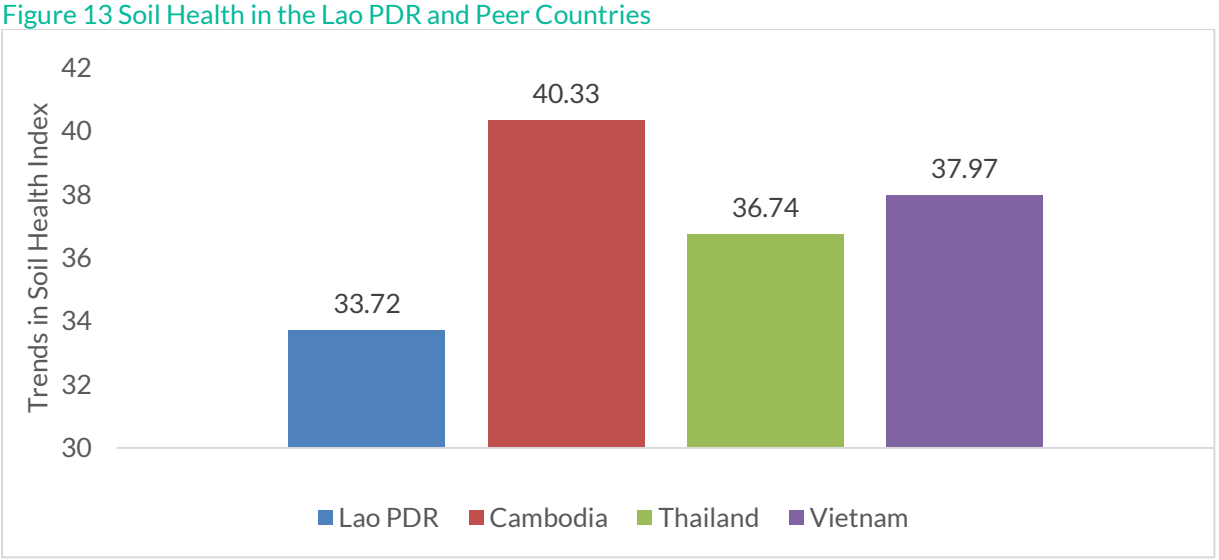
Source: Nishimura et al. 2016, 53; compiled by the authors from COMETRADE
Notes: Blue = Exports, Red = Imports.

Trends in Soil Health Index

Measures the physical part related to loss of soil mass and structure, and the long-term chemical well-being of the soil in terms of nutrients and absence of toxicities built up.

The value of the 2011 Trends in Soil Health Index is substantially lower for the Lao PDR compared to peer countries, suggesting substantial application of agrochemicals and loss of soil nutrients (see Figure 13). The widespread misuse of agrochemicals is one potential reason for soil deterioration and the low performance observed in the Lao PDR. The GoL has introduced strengthened regulations to restrict the illegal import and use of banned agrochemicals (e.g., paraquat), particularly at large-scale banana and rubber concessions. Educational programs to raise the awareness of farmer and laborer on the safe application of hazardous chemicals are complementary initiatives. The strengthened agrochemical regulations have been triggered by an escalation in the number of reported deaths, hospitalizations and contaminated water supplies. The misuse of agrochemicals is currently considered the third most serious public health risk in the Lao PDR, behind vector-borne diseases and child malnutrition (Ministry of Health personal communication, April 2017).

Figure 13 Soil Health in the Lao PDR and Peer Countries



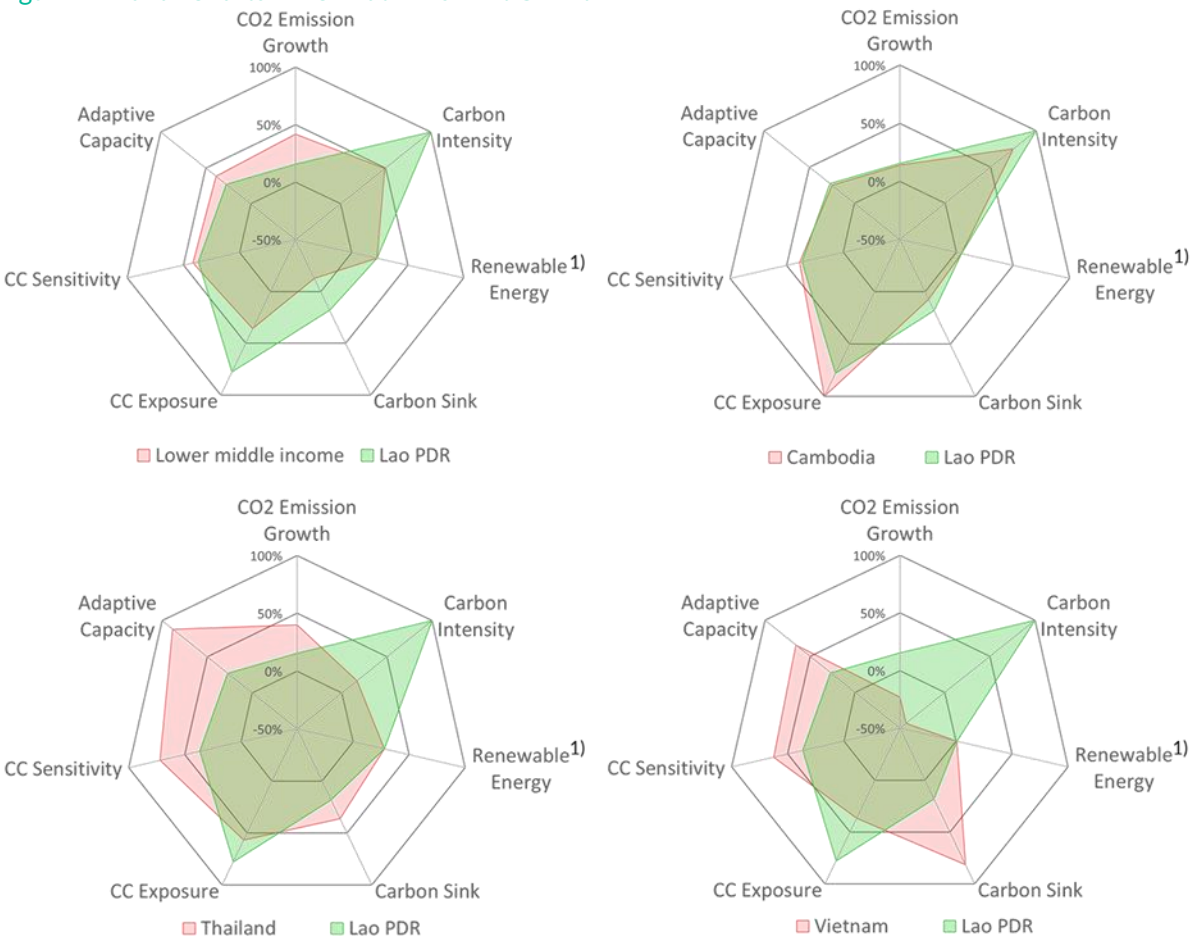
Source: Nachtergaele et al. 2010

3.1.3 Comparative Analysis of Climate Resilient Growth

The comparative analysis of indicators related to climate resilient growth shows that the Lao PDR is characterized by a rapid increase in carbon dioxide (CO_2) emissions compared to LMICs and Thailand, with only Vietnam witnessing higher growth among the peer countries. For the purpose of this report, CO_2 emissions are measured as the annual growth rate in national emissions of CO_2 over the latest five years for which data is available.

While the Lao PDR shows similar levels of sensitivity to climate change and adaptive capacity when compared with the average for LMICs, both these areas are a concern when they are compared with Thailand and Vietnam. Furthermore, carbon sink scores for the Lao PDR are higher relative to the LMIC average, similar to Cambodia and Thailand, and significantly lower compared to Vietnam (see Figure 14 and Table 3).

Figure 14 Radar Charts for Climate Resilient Growth



Source: GGGI

[1]Note: Comparative data on renewable energy is not available for the Lao PDR.

Table 3 Summary of Country Comparisons for Climate Resilient Growth

	Indicators	LMIC	Cambodia	Vietnam	Thailand
Climate Resilient Growth	CO_2 Emissions Growth	X			X
	Sensitivity to Climate Change			X	X
	Adaptive Capacity			X	X
	Carbon Sink			X	

Source: GGGI

Note: X = Indicators for which the Lao PDR receives a score lower than the respective peer country.

Sensitivity to Climate Change

The degree to which a society and its supporting sectors are affected by climate-related perturbations. The factors increasing sensitivity include the degree of dependency on sectors that are climate sensitive and the proportion of population sensitive to climate hazard due to factors such as topography and demography. Note that a lower score indicates that a country is less sensitive to climate change.

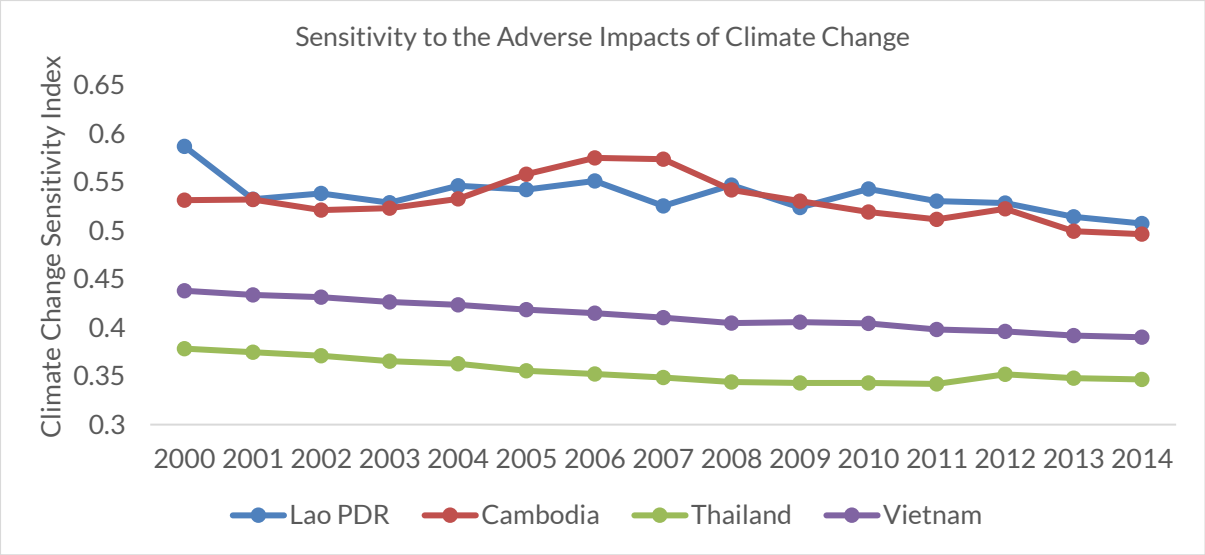
For the purpose of the GGPA, the indicators for climate resilient growth represent a disaggregation of vulnerability to the impacts of climate change (Smajgl et al. 2016). Firstly, a country's vulnerability is determined by its exposure to various climate-related changes, such as changes in weather patterns and the occurrences of extreme climate events. Assessing exposure requires an examination of climate forecasts, biophysical dynamics, and social and economic projections. Secondly, a country's vulnerability is determined by its sensitivity to climate change, that is, the extent to which the economy relies on sectors where output depends on the climate. The agriculture sector, for example, is highly sensitive to climate change.

Exposure and sensitivity are generally expressed as a series of consequences relevant to affected communities, such as crop productivity, poverty levels, flood and drought risks, enforced migration, and forest conditions. Thirdly, adaptive capacity reflects the ability of a country or system to manage or reduce the impacts of climate change, despite its level of exposure and sensitivity. Adaptive capacity can be measured at multiple levels, at individual, household, community or watershed level.

Vulnerability is assessed as the combination and dynamic interaction of exposure, sensitivity and adaptive capacity. Higher exposure and sensitivity raise a country's overall vulnerability to climate change, while higher adaptive capacity reduces overall vulnerability. The Lao PDR is characterized by high sensitivity and low adaptive capacity, which implies a high vulnerability to the impacts of climate change.

The 2000-2014 time-series trajectory of climate change sensitivity indicates that the Lao PDR and the three selected peer countries have all become less sensitive over time. However, the Lao PDR and Cambodia remain considerably more sensitive to climate change than Thailand and Vietnam (see Figure 15).

Figure 15 Climate Change Sensitivity in the Lao PDR and Peer Countries, 2000-2014



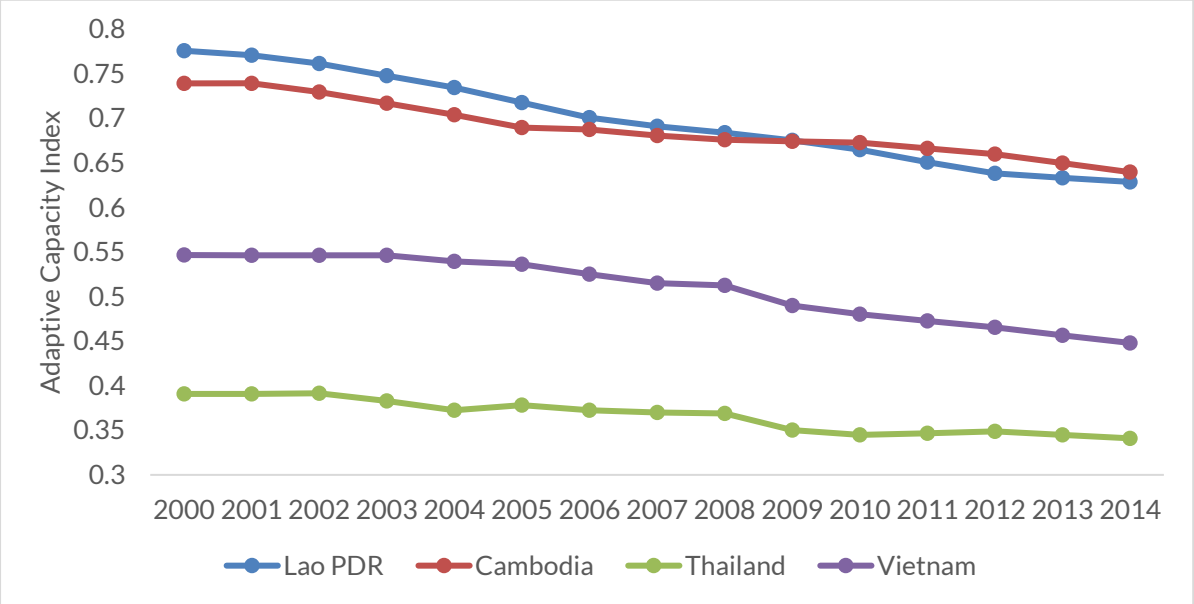
Source: University of Notre Dame 2017

Adaptive Capacity

Measures the availability of social resources for sector-specific adaptation. In some cases, these capacities reflect sustainable adaptation solutions. In other cases, they reflect capacities to put newer, more sustainable adaptations into place.

The 2000-2014 time-series trajectory of adaptive capacity to the adverse impacts of climate change indicates similar rates of improvement for the Lao PDR and the three selected peer countries (see Figure 16). Note that a lower score indicates higher levels of adaptive capacity. Cambodia and the Lao PDR have similar adaptive capacities, but both have considerably lower capacities compared to Thailand and Vietnam.

Figure 16 Adaptive Capacity to Climate Change in the Lao PDR and Peer Countries, 2000-2014



Source: University of Notre Dame 2017

The Lao PDR is particularly vulnerable to the adverse impacts of climate change due to its high dependence on climate-sensitive natural resources (e.g., water and agricultural produce) and its low adaptive capacity. Natural hazards such as droughts, floods and storms increasingly affect the Lao PDR. Often, these hazards trigger secondary hazards such as fires, landslides, infestations and outbreaks of diseases (PreventionWeb 2014).

3.1.4 Summary of the Data Analysis Results

The results from country comparisons of the selected indicators representing resource efficient, eco-friendly and climate resilient growth dimensions are summarized in Table 4. An "X" represents those indicators for which the Lao PDR receives a score lower than the respective peer country. Indicators for which the Lao PDR shows consistent underperformance across all peer countries and LMICs are highlighted in gray.

Table 4 Summary of Country Comparisons for GGPA Indicators

	Indicators	LMIC	Cambodia	Vietnam	Thailand
Resource Efficient Growth	Material Intensity	X	X	X	X
	Recycling Solid Waste	X			X
	Water Productivity	X			
	Agricultural Productivity			X	
	Labor Productivity	X			X
	Logistics Performance	X	X	X	X
	Technological Readiness	X	X	X	X
Eco-Friendly Growth	Natural Resource Depletion	X	X	X	X
	Soil Health	X	X	X	X
Climate Resilient Growth	CO_2 Emissions Growth	X			X
	Sensitivity to Climate Change			X	X
	Adaptive Capacity			X	X
	Carbon Sink			X	

Source: GGGI

Notes: X = Indicators for which the Lao PDR receives a score lower than the respective peer country.
Gray highlight = Indicators for which the Lao PDR shows consistent underperformance across all peer countries and LMICs.

Box 3 Socially Inclusive Growth

Besides resource efficient, eco-friendly and climate resilient growth, the analytic framework of the GGPA incorporates a fourth dimension, i.e., socially inclusive growth. This dimension of growth is especially important in the context of the Lao PDR. As described in Chapter 5, the Lao PDR development policy is geared toward reducing poverty, as well as increasing human well-being and social equality.

Figure 17 illustrates that the Lao PDR has scores similar to the LMIC average, except in the area of education in which the Lao PDR has performed better. The education indicator measures primary school enrollment rates (but not drop-out rates).

On poverty levels, the Lao PDR shows consistently lower scores compared to peer countries. However, while being on par with Thailand and Vietnam regarding reducing income inequality, the Lao PDR receives lower indicator scores for addressing hunger and malnutrition, and promoting health and well-being. For a definition of the indicators and sources, please refer to Appendix 8.1.

Figure 17 Radar Charts for Socially Inclusive Growth

Source: GGGI

[1]Note: Comparative data on gender inequality is not available for the Lao PDR.

The indicators related to socially inclusive growth were not considered separately when identifying priority areas for green growth. Instead, the GGPA considers socially inclusive growth as a cross-cutting dimension that is relevant to all aspects of green growth. Based on this rationale, recommendations for all sector interventions take social inclusion into account.

3.2 Results of the Stakeholder Consultation

An essential part of the GGPA process is to gather input from a broad range of stakeholders through an interactive Delphi-based workshop. As part of this workshop, three survey rounds and five parallel group discussions were conducted. The objective was to validate the findings of the preliminary assessment, select priority areas, and identify the relevant sectors related to each of the priority areas. After each survey round, the results were discussed among participants, with the discussion results serving as a starting point for the following survey round. This process was aided by the use of electronic voting devices allowing each participant to voice his/her opinion anonymously.

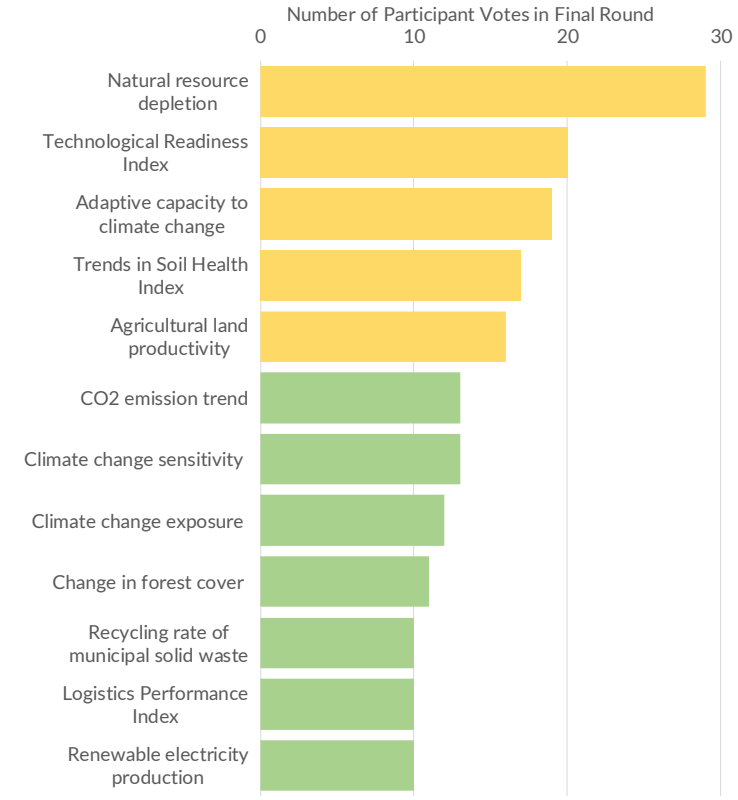
The sequence of surveys and discussions proved successful in facilitating participant consensus on the priority areas and sectors across the different government ministries and departments. A final list of the relevant areas and sectors was defined after the workshop by combining the result of the Delphi surveys, inputs from the discussion groups and findings from the preliminary assessment.

This subchapter provides an overview and an analysis of the results of the stakeholder consultation workshop held in Vientiane on 8 December 2016. The workshop brought together about 60 participants from different ministries and departments, as well as representatives from academia, the private sector and civil society. For more details concerning the workshop, please refer to Appendix 8.4.

3.2.1 Participant Prioritization of Green Growth Areas

The results of the preliminary assessment were presented to participants in the form of radar charts, summarized country results and time-series analyses of key underperforming indicators. To ensure that the Delphi survey results were measuring the opinions and perspectives of participants, and not differences in the understanding of the metrics, detailed explanations of the 24 indicators and the standardization process were provided.[6] Furthermore, it was explained that the preliminary assessment identified those areas as underperforming where the corresponding indicators show the scores of the Lao PDR being substantially below those of peer countries.

Figure 18 Voting Scores for Green Growth Areas



Source: GGGI

[6] Results for indicators covering socially inclusive growth were not part of the prioritization process as they are regarded as cross-cutting and relevant to all aspects of green growth. See Box 3 Socially Inclusive Growth.

Participants were invited to vote for up to five indicators they believed represent areas most important for green growth in the Lao PDR. Two rounds of voting to identify these priority areas were conducted. The voting scores after the second round are listed in Figure 18.

The top five priority areas after the second voting round were (from highest voting score to lowest):

1. Natural Resource Depletion;
2. Technological Readiness;
3. Adaptive Capacity to Climate Change;
4. Soil Health; and
5. Agricultural Land Productivity.

3.2.2 Identification of Sector-Area Pairs

Workshop participants were invited to match the identified priority areas (represented by the indicators) to the sectors most relevant to each priority area and most likely to manage and implement changes.

Firstly, participants were assigned into breakout groups comprised of multiple agency representatives. The groups were instructed to select three priority areas and assign three sectors related to each of the priority areas.

Secondly, participants were asked to vote in the plenary. For that purpose, participants were asked to choose up to three sectors relevant to the top five priority areas identified in the prior voting rounds. One round of voting was conducted using the electronic voting devices to select from 14 sectors,[7] followed by a plenary discussion to revise and amend the original selection as required. The sectors with the highest voting scores and the respective priority areas are presented in

[7] For the purposes of this GGPA, the term "sector" is utilized as defined by the OECD to denote thematic areas that may have several ministries and/or entities involved with policy implementation. The 14 sectors from which participants were asked to choose were: (1) Agriculture and Fisheries; (2) Industry; (3) Commerce; (4) Energy and Mines; (5) Transportation; (6) Water and Sanitation; (7) Waste Management and Disposal; (8) Forestry and Land Use; (9) Urban Development; (10) Housing and Buildings; (11) Education; (12) Health Services; (13) Public Administration; and (14) Household Consumption.

Table 5. In summary, the six sectors with the highest voting scores to manage the five priority areas are: (1) agriculture and fisheries; (2) industry; (3) forestry and land use; (4) education; (5) energy and mines; and (6) urban development.

Table 5 Summary of Priority Areas and Related Sectors

Priority Area / Priority Sector	Natural Resource Depletion	Technological Readiness	Adaptive Capacity to Climate Change	Soil Health	Agricultural Productivity
Agriculture and Fisheries	X	X	X	X	X
Forestry and Land Use	X		X	X	X
Industry	X	X			
Education	X	X	X	X	X
Energy and Mines	X	X			
Urban Development (including Transport)	X	X	X		

Source: GGGI

The agriculture and fisheries sector and the education sector were considered relevant to all five of the identified priority areas. Participants believed that these sectors play a role in managing and implementing changes in all the priority areas. The forestry and land use sector was regarded as relevant to all the priority areas, except technological readiness, while the energy and mines sector, which was included post workshop following consultation with MPI delegates, was deemed relevant to the areas of natural resource depletion and technological readiness.

Like the energy and mines sector, the industry sector was also considered relevant to natural resource depletion and technological readiness. The Lao PDR industry sector is comprised of construction, manufacturing, energy and water, and mining (Bank of the Lao PDR 2015). In the post-workshop consultation with the Lao PDR agencies and technical experts, however, tourism was identified as an important sector that should be treated independently rather than as a sub-sector of industry. Since significant parts of the Lao PDR industry sector were captured in other selected sectors, such as the manufacturing of agricultural products, and energy and mines, the decision was made to replace the industry sector with the tourism sector.

Participants selected the urban development sector as relevant to managing natural resource depletion, technological readiness and adaptive capacity to climate change. Given the high voting scores, as well as the relevance of the transport sector to urban development, it was decided that transportation would be included in the analysis of this sector.

A key finding from the GGPA workshop was the need for coordination and cooperation between sectors, and the integration of decisions and policies to implement and achieve green growth targets and objectives.

Cooperation refers to the willingness and capacity of agencies to engage in cross-sectoral deliberations and share information and data. Coordination refers to agencies agreeing to and complying with common policy guidelines, co-developing analytical tools and decision platforms, and implementing policies at agreed schedules and sequences. Integration refers to co-designing and implementing policies that address sectoral interactions and interdependencies. For example, integration can refer to the design of decision-making tools such as integrated spatial planning described in the 8th NSEDP. Integration also

includes the joint and synchronized evaluation of biophysical, social and economic variables and outcomes.

The results presented in

Table 5 indicate that individual priority areas are likely to be relevant to and managed by multiple sectors. The workshop outcomes also suggest that individual sectors will most likely be relevant to and mange changes across multiple priority areas (see Smajgl and Ward 2013 for examples of cross-sectoral analysis in the Lao PDR).

The integration of policies across agencies and sectors is an administrative and policy objective prescribed by the National Assembly of the Lao PDR. However, there is currently a lack of capacity to coordinate decisions across sectors concerned with natural resource management, agricultural productivity, adaptive capacity, land-use change and technological readiness. An acute knowledge gap remains in the Lao PDR when designing and implementing cross-sectoral development investments and initiatives. Generally, policy formulation remains geared toward single-sector objectives and decisions.

Similarly, assessments of development interventions that consider trade-offs between different priority areas remain underdeveloped in the Lao PDR. Limited cross-sectoral collaboration and failure to account for the interdependencies of priority areas lead to:

- Lack of debate and missed opportunities to design coordinated and integrated policies and investment decisions capable of promoting green growth strategies that balance resource use with gender-specific livelihood outcomes and sustained ecosystem functionality; and
- Possible unforeseen negative and unintended economic and ecological consequences, as well as distributional disparities affecting the poorest and most vulnerable.

However, GGPA participants' increased awareness of the need to coordinate green growth decisions across sectors represents substantial progress in achieving policy integration targets.

4. Interviews with Technical Experts

Obtaining the knowledge and perspectives of interested and affected stakeholders is central to the participatory GGPA process. It is particularly important for undertaking the sector analysis and developing recommendations that will inform the design, methods and plans for the green growth agenda in the Lao PDR. For this purpose, semi-structured interviews were conducted to gather inputs and insights from technical experts and policy influencers.

Interviews and consultations were conducted in February 2017 with technical staff from the Lao PDR ministries responsible for the six identified sectors, representatives from the private sector, and research institutes with a substantial presence in the Lao PDR. The objectives of these interviews were to identify sectoral strategies, potential interventions and pilot projects to improve the performance of the priority areas identified for the Lao PDR in the consultation workshop (see Chapter 3.2).

Interviewees were asked to select the sector-area pairs that corresponded with their expertise and knowledge, and provide their opinions about the causes of low performance in the relevant priority areas, as well as propose potential policy initiatives, applicable financial and economic instruments, and pilot projects to improve performance. Participants were also invited to suggest initiatives to improve cross-sectoral integration and coordination, and identify sectors that should be coordinating decision-making.

The technical experts invited to participate in the interviews were selected in consultation with the MPI, comprising staff members of:

- Ministry of Agriculture and Forestry (MAF);
- Ministry of Education and Sport (MoES);
- Ministry of Energy and Mines (MEM);
- Ministry of Finance (MoF);
- Ministry of Information, Culture and Tourism (MoICT);
- Ministry of Labor and Social Welfare (MoLSW);
- Ministry of Natural Resources and Environment (MoNRE);
- Ministry of Planning and Investment (MPI);
- Ministry of Public Works and Transportation (Urban Planning);
- Ministry of Science and Technology;
- National Agricultural and Forestry Research Institute;
- National University of Laos;
- Asian Development Bank (ADB);
- CGIAR Research Program on Water, Land and Ecosystems;
- International Water Management Institute; and
- United Nations Development Programme (UNDP).

A total of 27 agency staff participated in the interviews. The questionnaire and introductory letter can be found in Appendix 8.6. Twenty-one of the respondents were government officials while the remaining six were staff of the National University of Laos, international research consultants or non-governmental organization (NGO) staff. Approximately half of the respondents were familiar with the GGGI and the general concepts of green growth.

The technical experts selected 15 of the possible 21 sector-area pairs as their areas of expertise. The two sector-area pairs selected by the majority of experts were: (1) agriculture and fisheries with natural resource depletion; and (2) energy and mines with natural resource depletion. Technical experts were invited to propose linkages that promote coordination and cooperation between the green growth sectors (see Table 6 and
Table 21 in Appendix 8.2).

Table 6 Sector-Area Pairs Covered by Technical Experts

Sector	Area	Coverage by Technical Experts	Interlinkages with Other Sectors
Agriculture and Fisheries	Natural Resource Depletion	7	• Forestry and Land Use • Industry / Tourism • Urban Development
	Adaptive Capacity to Climate Change	2	
	Soil Health	2	
	Agricultural Productivity	2	
Forestry and Land Use	Natural Resource Depletion	3	• Agriculture and Fisheries • Urban Development • Energy and Mines
	Adaptive Capacity to Climate Change	2	
Industry / Tourism	Natural Resource Depletion	1	• Agriculture and Fisheries
	Technological Readiness	1	
Education	Natural Resource Depletion	2	• All Sectors
	Technological Readiness	2	
	Adaptive Capacity to Climate Change	1	
Energy and Mines	Natural Resource Depletion	7	• All Sectors
	Technological Readiness	2	
Urban Development and Transport	Natural Resource Depletion	1	• Industry • Education • Forestry and Land Use
	Technological Readiness	1	

Source: GGGI

The technical experts also provided valuable insights to guide GGGI engagement strategies when invited to comment on green growth in general, as follows:

- The national green growth strategy and interventions should build on actions set out in the 8th NSEDP;
- All policy initiatives require *ex ante* research to evaluate effectiveness;
- Green growth objectives and principles need to be clearly stated, and where relevant, differentiated from those articulated for sustainable development and the Sustainable Development Goals;
- The arrangements and collaborative efforts between different development partners working in the Lao PDR need to be clarified to enhance synergies; and
- Gender and distributional equality should be highlighted as green growth principles.

4.1 Cross-Sectoral Barriers to Green Growth

After selecting the sector-area pairs that matched their areas of expertise, technical experts were invited to suggest possible causes or factors for the low performance of the priority green growth areas, based on their experience and expertise. Several causal relationships were expressed by technical experts that were common across all sector-area pairs, including: (1) lack of implementation and enforcement; (2)

uncertain funding; (3) lack of decision-making tools for integrated planning and cross-sectoral coordination; (4) lack of enforcement of regulations in managing natural resource concessions; (5) low standard of Environmental Impact Assessments (EIA), Social Impact Assessments (SIA) and Strategic Environmental Assessments (SEA); and (6) lack of green growth education and training options. The extensive set of causal relationships for each sector-area pair identified by technical experts can be found in Table 22 in Appendix 8.2.

4.1.1 Lack of Implementation and Enforcement

The technical experts expressed that existing policies have not been consistently implemented and enforced. Despite improved central policies and robust policy frameworks, inconsistent interpretation, implementation, enforcement and monitoring by provincial and districts authorities was cited as a common cause of low performance across sectors. Poor implementation and enforcement has meant informal and partial evaluations of policy performance.

The technical experts also indicated that the Lao PDR policy cycle has typically included neither rigorous *ex ante* assessment nor *ex poste* monitoring and evaluation. Rather than revise current policies based on rigorous evaluation, the general approach has been to jettison existing policies, and introduce new and often untested initiatives. Additionally, poor policy performance could be traced to a general lack of willingness to enforce policy objectives and regulations. The partial implementation and limited evaluation of policies have substantially compromised sectoral coordination and integrated decision-making.

4.1.2 Uncertain Funding

The technical experts identified uncertain funding and resourcing that compromises effective long-term strategic project planning as a common cause of low performance. There has been a substantial deficit of financial and economic instruments, such as bonds and full-cost accounting, to guarantee sufficient compensation for natural resource losses caused through the operations of concession agreements and development activities. Decisions concerned with competing use of natural resources have primarily been based on financial and political influence rather than rigorous analysis, debate and balanced decision-making. Agencies have consistently been faced with limited financial and personnel resources, restricting efforts to assess sector management and evaluate policies. This lack of evaluation has meant that potential opportunities for policy improvement have not been identified. Finally, allocation and transparency regarding the dispersion of FDI revenues have remained poorly managed and monitored.

4.1.3 Lack of Decision-Making Tools for Integrated Planning and Cross-Sectoral Coordination

The technical experts cited limited access to spatial planning tools, a lack of decision coordination and poor data sharing as common causes of low sectoral performance. Constrained access to spatial planning tools (capable of integrating changes in social, environmental and economic domains) has hindered coherent and coordinated planning by ministries. FDIs have been approved without balanced planning and assessments of how they affect water quality, social inclusiveness, gender balance and ecological processes.

The need for tools and technical capacity for data collection, data analysis and spatial planning was a recurring recommendation expressed by experts (see Chapter 6). The lack of planning and technical capacity (coupled with limited external assistance) has resulted in limited greenhouse gas (GHG) monitoring and an absence of reliable GHG inventories in the Lao PDR. Moreover, the lack of systematic planning tools has contributed to a poorly coordinated land management and urban planning system in

an era of rapid urban development. Currently, the Lao PDR cities and metropolitan areas are without a unified urban planning vision.

A key finding from the consultation workshop was the need for coordination and cooperation between sectors, and the integration of decision support and analysis to implement and achieve green growth targets and objectives. This finding is consistent with a policy objective prescribed by the National Assembly of the Lao PDR. However, technical experts noted that there has been a lack of capacity to coordinate decisions across those sectors concerned with natural resource depletion (and subsequent management), agricultural productivity, adaptive capacity, land-use change and technological readiness. Generally, policy formulation has been geared toward single-sector objectives and decisions. A common suggestion from the experts was to analyze the performance of previous and existing "coordinating committees", their successes and failures, and whether funding and resources were adequate and secure to complete the coordination process. The experts suggested the analysis would help to motivate sustained coordination, and develop a future green growth vision, as well as shared priorities and objectives across ministries and sectors.

The lack of effective sector coordination and partnering has hampered the development of interdisciplinary degrees and curricula such as sustainable development, natural resource management, nature-based tourism and climate change. Consequently, the limited higher education training and technology to implement regulations has compromised mining and forestry site restoration and post-concession operations. The lack of access to and promotion of lifelong and ongoing education has also contributed to the capacity gap.

4.1.4 Lack of Enforcement of Regulations in Managing Natural Resource Concessions

The Lao PDR prioritizes economic growth and poverty alleviation through “sustainable development of the nation’s rich natural capital and land”, and particularly through encouraging private investment and granting concessions of state land to investors (Heinimann et al. 2014). The national strategy to convert land and resources into financial capital has introduced hydropower, forestry, mining and agri-business land concessions to large areas of rural Lao PDR. This represents an unprecedented transfer of land access from small-scale farmers to foreign investors (Heinimann et al. 2014).

Concessions and leases are legal mechanisms for granting land in the Lao PDR for a limited amount of time and a specified activity. Both are subject to distinct legal definitions. Leases are granted for state and private developed land, and tend to be smaller in area and contract length. Concessions apply to state land only and are granted for natural resource development projects. Concessions tend to be larger in size and impact compared to leases, and are subject to concession charges and resource use-related royalties (DECIDE 2013).

Schönweger et al. (2012) estimated that 1.1 million ha of land (or 5% of land cover) have been granted to primarily foreign entities since 2000. Wellmann (2012), however, suggested a concession area of 5.5 million ha or 21% of total land cover. The divergence in estimates indicates difficulties in accurately gauging the extent of land concessions in the Lao PDR (Hirsch and Scurrah 2015). The MPI is responsible for a concession inventory, although at the time of writing the inventory remains incomplete.

The 1.1 million ha land concession estimate represents an area greater than that devoted to rice production. Schönweger et al. (2012) contended that the majority of concessions have been formerly used for small and diversified agriculture, critical for rural livelihoods, in contrast to unused or unoccupied land as has been commonly cited. The authors argued that the limited diversity of concession-based production points to high levels of dependency on international markets and subsequent price volatility. Aspirations of equitable economic development (including both benefits and costs) through concessions

have been superseded by foreign investment demands. At the same time, concession agreements have not been subject to systematic and standardized processes or effective enforcement. These findings are consistent with Hirsch and Scurrah (2015).

As a corrective measure, the GoL has issued a moratorium on new concessions and is reviewing and revoking existing concessions that have not implemented or adhered to concession agreements[8] (Wells Dang et al. 2016). The Lao PDR National Assembly has also emphasized the need for increased monitoring and evaluation of land concessions (Wells Dang et al. 2016).

Concessions have been granted to forestry, hydropower, agricultural and industrial concessionaires and are therefore relevant to many of the priority green growth sectors identified in this report. The technical experts pointed out that concession negotiations, agreements and implementation checks have not been subject to systematic and standardized processes and protocols, constraining rigorous evaluation of concession management and performance. Firstly, the current 30-year and 50-year concession periods and tax holidays of up to 10-15 years have led to substantial natural resource depletion and poor concession performance. The national economic benefits of concession operations have been severely negated through speculation and market transfer of concession agreements without any investments or commencement of operations. Secondly, district and provincial level concession approvals have often diverged from policy prescriptions and requirements. For example, by law, hydropower projects less than 15 MW are to be approved at the provincial level, but in practice, 60 MW projects have been provincially approved as 4 x 15 MW.

4.1.5 Low Standard of Environmental Impact Assessment (EIA), Social Impact Assessment (SIA) and Strategic Environmental Assessment (SEA)

According to the technical experts, the current suite of implemented EIAs, SIAs and SEAs does not meet international standards. Limited audits of practitioners and agency implementation have meant that EIAs, SIAs and SEAs conducted in the Lao PDR are characterized by low compliance and enforcement levels. Further, the lack of a register of approved practitioners and irregular audits have compromised the validity and efficacy of EIAs, SIAs and SEAs.

The technical experts also pointed out the importance of cumulative impact assessments of inter-connected projects. However, the concept is poorly understood in the Lao PDR and such assessments have not been conducted, contributing to the depletion of natural resource and reduction of agricultural productivity.

4.1.6 Lack of Green Growth Education and Training Options

The technical experts considered the lack of access to quality education as a primary factor affecting low green growth performance across all sector-area pairs. Restricted funding was cited as the main reason for poor overall performance of the Lao PDR educational system. The technical experts also noted that funding has been biased toward urban centers, leading to inconsistent quality of education between rural and urban regions. Vocational education has been constrained by low funding levels and minimal contributions by private companies operating in the Lao PDR. The lack of financial and personnel resources has meant that capacity in the education sector has not kept pace with rapid developments and

[8] MoNRE, 2013, Ministerial Instruction on the Process of Initial Environmental Examination of the Investment Projects and Activities; and Prime Ministerial Decree, 2011, Decree on the Implementation of the Investment Promotion Law No. 119/PM.

a changing economy, resulting in poor business skills that constrain local entrepreneurs and local business and enterprise ownership.

4.2 Suggested Policies to Foster Green Growth

The technical experts were invited to suggest policies and initiatives related to their selected sectors, to improve performance in the green growth priority areas. They generally agreed that coordination among different ministries, the use of standardized assessments, and rigorous evaluation of past initiatives are essential to improving performance and implementation.

There was consensus among the technical experts that the recently adopted Prime Ministerial decrees and statutory legislation have improved the prospects for achieving the Lao PDR green growth and sustainable development objectives reflected in the 8th NSEDP. Furthermore, the majority of the experts mentioned that effective policies at provincial and district levels are in place across all sectors. However, they highlighted that implementation has been inconsistent. Common reasons cited for ineffective policy implementation were lack of human capacity and capability, lack of willingness to enforce policies, and limited coordination between ministries and administrative levels.

According to the technical experts, policy implementation could improve substantially by clearly defining the roles and responsibilities of the involved authorities, using standardized assessments and evaluation tools, and learning and adapting from lessons of effective and ineffective policy implementation. Policy design should rely on rigorous *ex ante* research rather than trial and error. An environmental compliance database would support successful policy implementation through increased transparency of ongoing projects.

Policy regulations that formally require a consistent and systematic process for concession approval, including the accounting of local investment and expenditure during the construction phases, and not just a fiscal reliance on royalties, were cited as important initiatives. The comprehensive list of policy-related suggestions can be found in Table 23 in Appendix 8.2.

4.3 Suggested Financial and Economic Initiatives

Suggested initiatives include the introduction of payments for ecosystem services (PES), an environmental tax, as well as a fuel tax, which are consistent with those articulated in the 8th NSEDP. In addition, technical experts noted that financial instruments and initiatives should consider trade-offs between interdependent sectors, as well as their impact on social inclusion. Again, the introduction of complementary regulatory and financial incentives is closely in line with the 8th NSEDP, and also GGGI's strategies for the Lao PDR.

Due to the relative scarcity of resources and funding, technical experts proposed that relevant ministries coordinating efforts to design cross-sectoral instruments should conduct a more thorough analysis than the assessments currently undertaken in the Lao PDR. The analysis should attempt to balance trade-offs and account for externalities associated with the planned financial and economic instruments and initiatives.

A concern mentioned by technical experts was the introduction of economic and financial initiatives that would be geared narrowly toward development and growth, at the expense of equitable distribution and negative cultural and social impacts. The principles of guaranteeing distributional equity and procedural fairness, referred to in the Lao PDR as social inclusion, are central to the 8th NSEDP and the Lao PDR Constitution. Therefore, corrective policies or additional economic instruments should be designed in a

way to avoid distributional inequity and meet the social inclusion objectives set out in the 8th NSEDP. A list of financial and economic instruments and initiatives suggested by technical experts can be found in Table 25 in Appendix 8.2.

4.4 Suggested Project Initiatives

The technical experts recommended general project initiatives to address data deficiencies, and the lack of analytical tools and capacity, as well as improve the effectiveness of policy implementation. They, however, did not suggest readily implementable infrastructure projects, and did not go into specific project parameters such as actions, locations, timings, outputs and responsibilities.

The technical experts' main proposals included the following:

- The need for community participation – Active community participation was considered a central requirement across all sectors for successful project design, implementation and monitoring.

- Sector coordination and cooperation – The strengthening of planning and administrative capacity to give Lao PDR agencies the autonomy to design and source the funding for their own projects was suggested.

- A common approach for data collection and analysis across ministries – Consistent data collection across sectors, standardized use, data sharing and commonly-deployed modeling were considered the basis for successful project design. Additionally, spatially-referenced tools to support decision-making and capable of integrating social, economic and biophysical outcomes were seen to be pivotal for green growth planning.

- The development of methodologies to systematically evaluate the biophysical, social and economic impacts of large-scale infrastructure projects – The development of processes and methodologies to assess large-scale infrastructure projects (hydropower, road and railway), and the conduct of comprehensive social and economic analyses and evaluations on income effects, livelihood, distribution of poverty and gender effects, were recommended for all sectors.

The extensive set of initiatives suggested by technical experts for each sector-area pair can be found in Table 24 in Appendix 8.2.

5. Green Growth Objectives of the 8th National Socio-Economic Development Plan

5.1 8th NSEDP 2016-2020

The authorities in the Lao PDR have been focusing on modernizing and industrializing the economy since adopting the New Economic Mechanism in 1986. The Lao PDR has had six Five-Year Plans, the latest being the 8th NSEDP that describes development strategies for the period from 2016 to 2020, and is the basis for all green growth initiatives. The 8th NSEDP explicitly sets the target for the Lao PDR to graduate from LDC status by 2020. This is to be achieved in part by strengthening the country's productive base and diversifying the economy through industrialization and modernization. The key areas or sectors identified for this goal are electricity generation, agro-processing, tourism, mining and construction. To achieve social and economic development, industrialization and modernization goals, the 8th NSEDP identified three outcomes (see Table 26 in Appendix 8.3):

- **Outcome 1** – Sustained inclusive economic growth with, the Economic Vulnerability Index[9] reduced to levels required for LDC graduation, and consolidated financial, legal and human resources to support growth.
- **Outcome 2** – Human resources are developed and the capacities of the public and private sectors are upgraded; poverty in all ethnic groups is reduced; all ethnic groups and both genders have access to quality education and health services; the unique culture of the Lao PDR is protected and consolidated; and political stability, social peace and order, justice and transparency are maintained.
- **Outcome 3** – Natural resources and the environment are effectively protected and utilized according to green growth and sustainable principles; and there is readiness to cope with natural disasters, the effects of climate change and reconstruction following natural disasters.

The corresponding outputs for each NSEDP outcome are given in Table 26 in Appendix 8.3. The 8th NSEDP does not state how it defines green growth but describes 15 green growth indicators (see Table 7). Nine of the 15 green growth indicators listed in the 8th NSEDP are associated with Outcome 3, which prioritizes green growth and sustainable development, coupled with initiatives to establish mechanisms to finance sustainable natural resource management, distributional equity and environmental protection.

The World Bank (2016) summarizes Outcome 3 initiatives as two pillars central to achieving green growth objectives and progress. Pillar One emphasizes, "planning and monitoring for clean, efficient and resilient growth," and Pillar Two emphasizes, "protecting and ensuring the sustainable use of the water and forest resources capital, and improving environmental quality especially through pollutant control."

[9] The Economic Vulnerability Index includes the following criteria: (1) population size; (2) remoteness; (3) merchandise export concentration; (4) share of agriculture and forestry in GDP; (5) instability of exports of goods and services; (6) share of population that have been victims of natural disasters; and (7) instability of agricultural production.

The national green growth strategy for the Lao PDR is currently being drafted by the National Green Growth Committee, MPI and NIER, with financial support and technical assistance from the World Bank and GGGI, respectively. This strategy will contribute to achieving all three outcomes of the 8th NSEDP.

Aligned with the efforts of the National Green Growth Committee and MPI, a series of 2017 Prime Ministerial and Ministerial decrees has addressed the two green growth pillars of Outcome 3 through the intention to:

- Introduce an environmental tax to increase the annual budgets of priority green growth sectors and increase the financial resources for a proposed Environmental Protection Fund;
- Ensure strategic environmental assessments address environmental, social and economic considerations;
- Increase compliance of concession holders and developers;
- Invest in public infrastructure that addresses climate risks;
- Improve allocation and security of water and land rights;
- Ensure the interests of forest-dependent communities are addressed in forest plans;
- Ensure the tourism sector plays an important role in the conservation of high-value biodiversity zones;
- Minimize the harm to human health through the safe application of agrochemicals; and
- Reduce air and water pollution emissions from areas of concentrated industries and risks.

The 8th NSEDP details the outputs, outcomes, indicators, targets, policies and institutional arrangements to achieve the economic, environmental and social objectives set by the GoL for 2020. A set of sector-specific pilot projects and initiatives envisioned to support the transition to a more sustainable growth model is described in Subchapter 5.2.

Table 7 Green Growth Indicators Listed in the 8th NSEDP

Lao PDR Green Growth Indicator	Theme/Group	Performance Indicator (Linked to LDC Graduation Criteria)	Baseline Data	Baseline Year	Baseline Data Source	Target
Outcome 1, Output 1 – Sustained and inclusive economic growth						
Green Growth Indicator #1	Diversification away from resource sector	Percentage of GDP attributable to natural resources	N/A	N/A	N/A	N/A
Outcome 1, Output 3 – Integrated development planning and budgeting						
Green Growth Indicator #2	Quality of investment	Percentage of investment projects deemed to require EIA/IEE/ESIA/SIA by MoNRE/DESIA that have been evaluated against social and environmental criteria: • Public infrastructure investment projects • Concessions • Special Economic Zone (SEZ) projects	N/A	N/A	N/A	N/A
Outcome 1, Output 5 – Improved public/private labor force capacity						
Green Growth Indicator #3	Labor productivity, especially in agriculture and tourism	Labor productivity (GDP/per person employed): • Non-resource sectors • Resource sectors	N/A	N/A	N/A	N/A
Green Growth Indicator #4	Professional certification for labor market	Graduates with degrees or professional certification in any of the following subjects: agro-processing, tourism, construction/engineering, vehicle mechanics, business administration and management	Total: 694	2015	MoLSW	12,500.0
Outcome 2, Output 4 – Access to high quality health care and preventative medicine						
Green Growth Indicator #5	Access to safe drinking water and improved sanitation	Proportion of population using (with access to) an improved drinking water source	84	2014	7th NSEDP Review of MoH	90
Green Growth Indicator #6		Proportion of population using (with access to) an improved sanitation facility	67	2012	7th SEDP Review of MoH	75
Outcome 2, Output 6 – Protection of traditions and culture						

Green Growth Indicator #7	Cultural sites and tourism	Number of established tourist sites: • National heritage sites (cultural/historical/natural) • Nature tourism sites	15	2015	MoICT	N/A
Outcome 3, Output 1 – Environmental protection and sustainable natural resources management						
Green Growth Indicator #8	Environmental protection	Production forest area: • Certified by FSC • With FLEGT license	81.600 ha	2015	MAF	20% of 324 zones
Green Growth Indicator #9		Number of projects that completed IEE and/or EIA before MPI signs to approve project implementation	399	2015	MoNRE	N/A
Green Growth Indicator #10	Land management	Completion of land-use classification in all parts of the country: number of provinces and districts	0 province and 55 districts	2015	MoNRE	18 provinces and 93 districts
Green Growth Indicator #11	Resilience and green growth	Number of districts that have completed preliminary assessments for Green and Clean Towns (including climate-smart planning) along Road No. 13	N/A	N/A	N/A	10
Green Growth Indicator #12	Forest cover	Forest area as a percentage of total land area	42%	2010	MAF Forest survey	70%
Green Growth Indicator #13	Biodiversity	Number of known species threatened with extinction	212	2015	N/A	N/A
Outcome 3, Output 2 – Preparedness for natural disasters and risk mitigation						
Green Growth Indicator #14 and LDC graduation factor	Disaster impact	Number of deaths, missing people, injured, relocated or evacuated due to disasters per 100,000 people	10,928	2015	MoLSW Report in FY2015-2016	N/A
Outcome 3, Output 3 – Reduced instability of agricultural production						
Green Growth Indicator #15 and LDC graduation factor	Agricultural production stability	Economic Vulnerability Index component: instability of agricultural production	N/A	N/A	N/A	N/A

Source: MPI 2016; Note: N/A = not available.

5.2 Cross-Sectoral Priority Projects of the 8th NSEDP

The cross-sectoral priority projects mentioned in the 8th NSEDP to achieve the envisioned environmental, social and economic goals include the following:

- Establish instruments and mechanisms for sustainable financing and funding to manage natural resources and protect the environment. These include natural resource taxes and fines against abusers; royalties from the energy, agriculture and mining sectors; and private investment to develop rural areas, particularly in improving the quality of the environment, promoting eco- and cultural tourism, and improving rural livelihoods to ensure job security and reduce urban migration and congestion.

- Develop plans, capacity and methods to compile data on GHG emission rates, and reduce GHG emissions.

- Develop mitigation and risk reduction strategies in the areas of land use, forestry, agriculture, energy, industry, transport and waste management.

- Classify the Lao PDR organizations into various categories and set standards and conditions for each class. Organizational classes include ministries, ministry-equivalent organizations, mass organizations and technical service units.

- Improve the coordination mechanism between the provinces, districts and villages, particularly those in remote areas.

- Develop regulations and procedures on hand-over rights and responsibilities of local authorities following the "Three-Builds directive".[10]

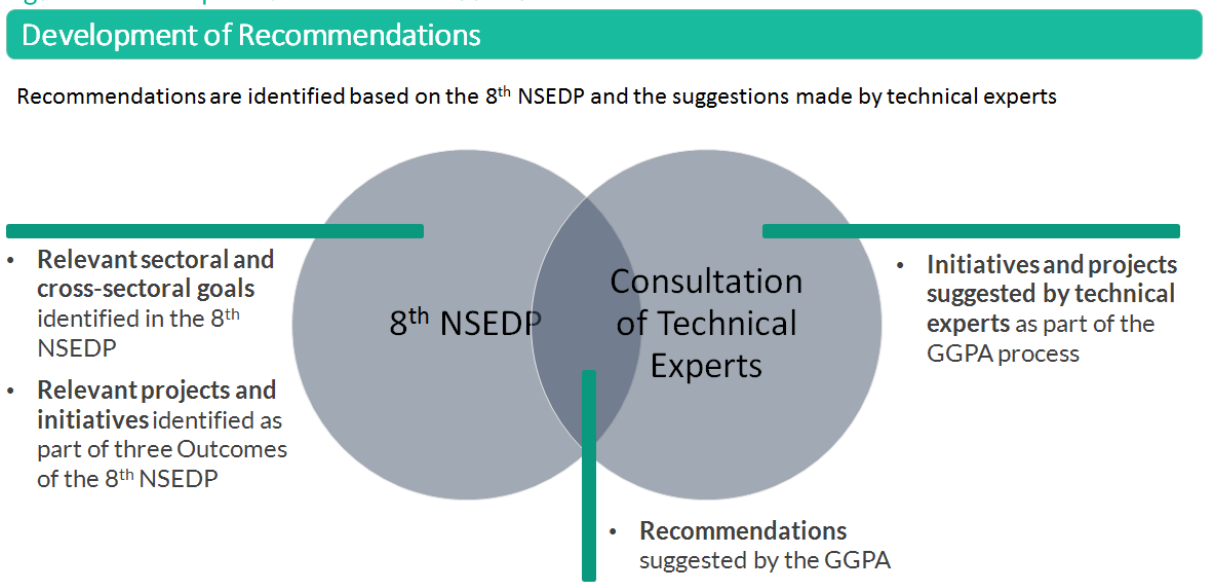
- Develop and improve the land database (records, leases, concessions and registration) in 18 provinces across the country, introduce spatial assessment and planning tools, and consolidate revenues from land ownership and use.

[10] The Three-Builds directive includes: (1) building provinces to become strategic units; (2) building districts to become comprehensively strengthened units; and (3) building villages to become development units (MPI 2016).

6. Green Growth Priority Sectors in the Lao PDR

This chapter discusses the green growth priority sectors identified during the stakeholder consultation. Each subchapter focuses on a sector, looking at the relevance of the sector for the Lao PDR, and making a number of recommendations in line with the priority areas identified for each sector during the stakeholder consultation. The recommendations for each sector are based on: (1) the goals set out in the 8th NSEDP; (2) the initiatives identified to accomplish the three NSEDP outcomes; and (3) the initiatives suggested during the consultation with technical experts (see Figure 19). These recommendations aim to support policymakers in developing the national green growth strategy, and assist GGGI in identifying a list of suitable initiatives for the organization's future work in the Lao PDR.

Figure 19 Development of Recommendations



Source: GGGI

6.1 Agriculture and Fisheries

6.1.1 Relevance of Agriculture and Fisheries in the Lao PDR

In 2015, more than 60% of the total Lao PDR population lived in rural areas and relied mainly on harvesting cash crops and animal products (World Bank 2017a). The main crops grown are cassava, sweet potato, taro, soybeans, sugarcane, cotton, coffee, tea, tobacco and rubber (FAO 2017). Generally, agricultural productivity and agricultural labor skill levels are low compared to the Lao PDR's peer countries — Cambodia, Thailand and Vietnam.

The farming system can be divided into two main categories — lowland rain-fed and irrigated system of the Mekong flood plains and its tributaries, and the upland swidden agriculture system. According to the Mekong River Commission (2017), there are currently 3,162 irrigation projects in the Lao PDR, covering more than 260,000 ha in the wet season and 170,000 ha in the dry season. The 8th NSEDP, however,

reports that the current area of irrigation is about 315,000 ha, and is expected to expand to about 476,000 ha by 2020. The discrepancies in the total area of irrigation estimated by the Mekong River Commission and the NSEDP typify data deficits in the Lao PDR.

Despite declining contribution to GDP, the agriculture sector continues to play a major role in the Lao PDR economy. Between 2006 and 2010, the agriculture sector together with forestry contributed to 4% of the country's economic growth (MoNRE 2015). In 2000, agriculture accounted for nearly half of national GDP. By 2015 it had declined to about one quarter (see Figure 20), but still employed more than 70% of the workforce in the Lao PDR. Importantly, the equivalent GDP value of subsistence production is generally not estimated in the national production GDP accounts. Estimates from the Nam Ngum and Nam Xong River Basins suggest that the monetized value of subsistence production is at least as great as marketed agricultural production (Ward et al. 2016).

In recent years, agriculture has become more commercialized, and the value of agricultural exports has grown as more farmers invest in cash crop plantations. Between 2000 and 2014, the area of agricultural land increased from 1,806,000 ha to 2,369,000 ha, or approximately 30% (World Bank 2017a). The amount of foreign investment in commercial plantations such as cassava, maize, jatropha and rubber has also increased.

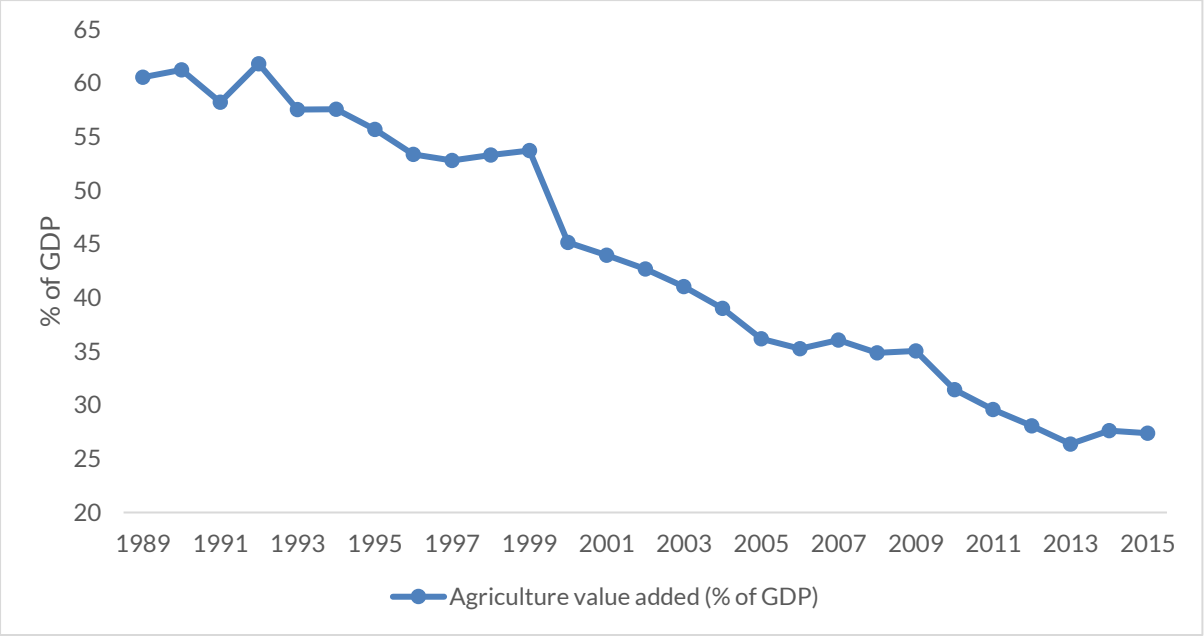
Agricultural investments cover more than 330,000 ha, the second largest class of land concessions in the Lao PDR. Eighty-five percent of the concessions have been granted to foreign entities, predominately from China (50%), India, Republic of Korea, Thailand and Vietnam (Wellmann, 2012). Wellmann (2012) contended that concession-based commercial-contract farming contributes to deforestation, and the transition to commercial agriculture, land consolidation and monoculture can escalate the conflict between conservation and land utilization. The increasing area of land concessions can potentially raise tensions between the Lao PDR farmers, and undermine the future availability and access to arable land.

Small-scale farms are a characteristic of agriculture in the Lao PDR and they are often reliant on subsistence production. Access to high-quality arable land is likely to become an increasingly important national concern, considering that 80% of the Lao PDR's terrain is mountainous. Moreover, FDI in agri-business is increasing and 18.5% of the population is facing food insecurity (measured using the 2014-2016 FAO Undernourishment Index), which could further deteriorate due to climate shocks such as severe floods and droughts (FAO 2017).

Public health, ecological degradation and economic externalities affecting non-agricultural sectors (e.g., manufacturing, land availability or tourism projects) are potential trade-offs of a more commercialized agriculture sector. The high usage of agrochemicals (fertilizer, pesticides and herbicides) is viewed as the third most important public health issue in the Lao PDR (Ministry of Health personal communication, April 2017). The ecological consequences and increased economic vulnerability of monoculture plantations and steep slope cultivation are likely to have negative effects on already stressed soil health and water quality.

To address the above issues, the GoL is promoting a balanced approach between commercial agriculture and the protection of ecosystems through agroforestry, community-based resource management and organic agriculture (MPI 2016).

Figure 20 Value of Agricultural Production, 1989-2015



Source: World Bank 2017a

6.1.2 8th NSEDP Initiatives for Agriculture and Fisheries

The 8th NSEDP lists a series of pilot initiatives and projects to explore ways to achieve the specified agriculture and fisheries objectives (see Table 8). It focuses on projects that promote community participation in agriculture and forestry. Initiatives related to data collection and research that inform and guide communities in climate-smart agriculture are also prioritized. Examples include the mapping of disaster risks and research on crops that are resilient to climate change. Other initiatives include planning the effective allocation of agricultural production areas by classifying and identifying land-use areas. Projects that promote the safe management of toxic agrochemicals and hazardous waste are also given emphasis.

Table 8 Initiatives for Agriculture and Fisheries Listed in the 8th NSEDP

Agriculture and Fisheries	
Outcome 1, Output 1 – Sustained and inclusive economic growth	• Continue allocating land for agriculture and production to secure food and commercial production with a focus on organic, chemical-free production, agricultural modernization and intensification. • Diversify and increase in-country processing of agricultural products for local consumption and export. Involve small and medium-sized enterprises to increase processing capacity at the household level, and include handicraft production. • Promote agricultural processing cooperatives coupled with training in marketing expertise. • By 2020, reduce agricultural dependency and re-structure the economic sectors such that agriculture and forestry contribute to 19% of the total GDP. • Adopt an inclusive approach to support small-holder farmers (the majority of Lao PDR farmers) to diversify and improve production within integrated farming systems. • Expand irrigated water supply from the 315,374 ha currently covered to 476,012 ha by 2020, and upgrade existing infrastructure.

	• Produce sweet corn of approximately 228,000 tons, potatoes and starch roots of about 304,000 tons, fruit trees yielding 800,000 tons and vegetables of 1.5 million tons. • Increase livestock by 6% per year, and fishery and aquatic animal breeding by 8-10% per year. • Target agricultural production according to local potential and geographical characteristics. The Boloven plain is suitable for growing coffee, vegetables, fruit trees, flowers and cold weather crops; the Nakai plain is suitable for fishery and fishing; and the Xiengkhouang plain is suitable for growing cold weather crops, vegetables, fruits and livestock feed.
Outcome 1, Output 3 – Integrated development planning and budgeting	• Support small and medium-sized enterprises' access to the financial system (including bank credits and stock markets) to allow them to invest in agricultural production.
Outcome 2, Output 2: Food security ensured and malnutrition reduced	• Plan effective allocation of agricultural production areas by classifying and identifying land-use areas, such as areas for rice farming, cash crops plantation, large animal husbandry, poultry and aquatic animals, and target areas for tree plantation for supplying the domestic and export markets. • Expand modern and highly effective agricultural production, and apply advanced science and technology into primary production.
Outcome 3, Output 1: Environmental protection and sustainable natural resources management	• Manage water resources based on integrated water resources management (IWRM) principles in 10 priority river basins (Nam Ou, Nam Nguem, Sebangfai, Se Bang Hieng, Nam Ngiep, Nam Theun-Nam Kading, Sedon, Nam Sam, Nam Ma and Sekong). • Develop national parks to demonstrate IWRM in Nam Por, Vangvieng district, Vientiane province, as a venue for education, training, study tours and knowledge exchange. • Formulate and implement the Wetlands Management Plan to strictly and effectively adopt the Ramsar Convention on Wetlands. • Improve and identify 200 water-quality monitoring points and define levels of risk based on water quality in two basins (case studies).

6.1.3 Initiatives Proposed by Technical Experts for Agriculture and Fisheries

According to technical experts, the challenges that are inhibiting progress toward more sustainable and productive agriculture include the unsafe use of agrochemicals, national GDP accounting of the agriculture sector, and poor integration into the regional market.

The farmers' poor knowledge of safe agrochemical use, coupled with illegal imports of banned chemicals and incorrect labeling, are degrading soil and water quality in the Lao PDR. Besides, the interdependency between improved productivity, reduced ecosystem services and nutritional well-being is not well understood across ministries.

National GDP accounting does not currently account for the monetized value of subsistence farming, which is estimated to be equivalent to marketed production. The reported GDP contribution of agriculture (27% in the 8th NSEDP) substantially underestimates total agricultural productivity as it does not include subsistence production (Ward et al. 2016). Government actions to increase agricultural productivity based on erroneous data can lead to granting of additional concessions, land consolidation, unplanned agricultural expansion, and the degradation of natural resources and forest areas.

Poor regional market integration and value chain expansion, combined with limited export promotion of agricultural products and limited access to relevant technologies, are contributing to low agricultural productivity. For example, there has been a lack of effective marketing and processing of organic products and specialized rice varieties, where the Lao PDR could have a competitive advantage. Two technical experts mentioned that only 10% of value-added agricultural processing is taking place in the Lao PDR, while the remainder is processed outside of the country. Agricultural production in the Lao PDR is generally geared to self-sufficiency and not to external demands.

Based on these key challenges, technical experts proposed a suite of projects that is consistent with the 8th NSEDP priorities, including the modernization of agricultural production, increase in local processing of agricultural production and improvement of export marketing. Common across all sectors was the suggestion to carry out projects that develop and train agencies in integrated spatial land-use planning tools (not just land-use mapping), which would enable agencies to monitor the spatial and temporal distribution of poverty levels, and the effectiveness of poverty alleviation efforts.

Specific projects proposed by technical experts include: (1) trialing value-added processing in the agriculture and forestry sector; (2) promoting transparent local processing ownership; (3) correcting the deficit of skilled labor; and (4) developing small-scale hydropower projects in remote rural areas to reduce losses in native capture fisheries associated with large-scale hydropower projects.

Consistent with the 8th NSEDP, technical experts proposed trialing regulatory mechanisms for managing toxic chemicals and hazardous waste and wastewater treatment systems in cities and provincial municipalities. Related to this, the training of farmers and district extension staff in the safe use of agrochemicals was suggested.

The technical experts also considered the development of financial instruments, PES and REDD++,[11] and the provision of incentives to promote projects with multiple benefits, such as projects that improve water quality and river flows to sustain aquatic and riparian ecologies, as well as food security. A complementary initiative that will support these projects is a scheme to encourage communities' willingness to conserve natural assets.

A comparison of the initiatives listed in the 8th NSEDP and suggested by technical experts is provided in Table 32 in Appendix 8.7.

6.1.4 Recommendations

Based on the initiatives suggested by technical experts during the interviews and the projects detailed in the 8th NSEDP, the following recommendations for the agriculture and fisheries sector have been developed as part of the GGPA process:

1. Develop projects that promote community participation in climate-smart agriculture and forestry, and are guided by data analysis and research. To support this set of projects, actively promote and invest in agricultural modernization through targeted small-scale irrigation and the introduction of

[11] REDD (reducing emissions from deforestation and forest degradation) is a framework through which developing countries are rewarded financially for any emissions reductions achieved associated with a decrease in the conversion of forests to alternate land uses. REDD+ includes conservation, sustainable forest management and enhancement of forest carbon stocks, and REDD++ adds an element that would help prevent the conversion of low-carbon but high biodiversity forests for agricultural or other uses.

modern seed/fertilizer technologies. At the same time, offer training in ecologically-based, climate-adapted farming approaches, and increase public expenditures in agricultural research and extension services. Undertake research to understand the capacity, as well as the prevailing cultural and behavioral impediments, to adapt to changed livelihood conditions and activities.

2. Reconsider investments to expand large-scale irrigation, which often privileges the land holding elite and disadvantages the most vulnerable and poor (see for example, Kandulu and Connor 2017; Smajgl and Ward 2013). Irrigation infrastructure should not be limited to large dams. Instead, it is recommended to rely on a combination of targeted small, medium and large irrigation projects that address multiple aspects of green growth, and align with biophysical, ecological and economic needs.

3. Invest in projects to develop and train agencies in integrated spatial land-use planning tools. Spatial planning can be used to improve green growth performance in several areas, as follows:

    - Map areas at potential risk from disasters, including floods, droughts, landslides, and disease outbreaks in plant and animal populations.
    - Address land-use suitability to assist the Lao PDR rice farmers in diversifying into high-value rice and crop production, such as specialty coffee and organic products.
    - Undertake spatial land-use mapping to provide secure title deeds to farmers, and improve farmers' access to financial services (including savings, credit and insurance), which is likely to contribute to higher farm incomes and income stability.
    - Carry out assessments and analyses to minimize social and economic losses associated with poorly planned or ad hoc decisions. For example, assess large agricultural concessions to ensure they create skilled employment, allow technology transfer to small farm enterprises, and discourage farmers from migrating to non-farm jobs, which can add to urban congestion and poverty.

4. Improve agricultural extension services, particularly in the following ways:

    - Provide farmers with business and marketing services such as market information, product packaging and certifications. A clear delineation of extension roles and agency responsibility will avoid costly duplication of such services.
    - Since the exposure to agrochemicals is currently the third most important public health issue in the Lao PDR (Ministry of Health personal communication, April 2017), pilot a scheme, potentially using smartphone technologies, to teach farmers and district extension staff about the safe use of agrochemicals.

5. In line with the recommendations for the energy sector, develop pilot small-scale hydropower and other renewable energy projects to reduce losses in capture fisheries associated with large-scale hydropower development. Fish catch is a critical protein source that can reduce the incidence of malnutrition — one of the main obstacles to the Lao PDR's graduation from LDC status.

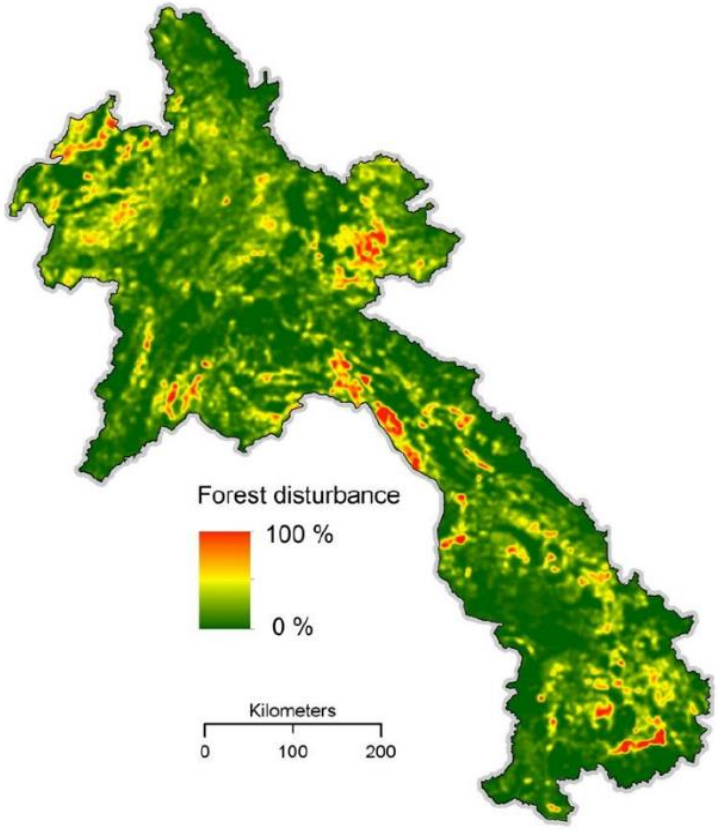
6.2 Forestry and Land Use

6.2.1 Relevance of Forestry and Land Use in the Lao PDR

Although the Lao PDR has one of the largest forest covers in Southeast Asia, considerable deforestation and forest degradation has occurred during the past two decades. The total tree cover declined by 80,000-170,000 ha per year between 2006 and 2012 (Saunders 2015). Figure 21 shows forest loss between 2001 and 2014. The direct drivers of deforestation and forest degradation are mining, hydropower and infrastructure developments, agricultural and urban expansions, forestry plantations, shifting cultivation, natural and human-induced fires, and illegal logging for commercial and household use (see Table 9). There are challenges to estimate the extent of illegal logging, but Hodgdon (2008) estimated that 600,000m^3 of timber was illegally extracted annually (as at 2008), compared to the official quota of 150,000-200,000m^3 set by the MAF (MAF 2005).

Deforestation and forest degradation, as well as concessional land allocation processes, can have significant negative impacts on the Lao PDR population as it is estimated that 80% rely on forest and non-timber forest products for their livelihoods (Stephenson 2014). A striking example of the high rate of forest degradation can be seen in the relatively small wood processing sector of the Lao PDR that has reported shortages of high-quality raw materials.

Figure 21 Forest Loss, 2001-2014



Source: Thomas 2015

Table 9 Contribution of Direct Drivers to Deforestation and Forest Degradation

Sources	Impact	Projected Annual Forest Loss Rate	Remarks
Wood Extraction	Forest Degradation	Estimated between 0.97 million m^3 and 1.57 million m^3 per year during the period from 2002 until 2009	Includes commercial logging, illegal logging and household consumption. The combined total represents the primary driver of deforestation and forest degradation. Control of wood extraction is a high priority for the GoL.
Agricultural Expansion	Deforestation	Commercial – 34,200 ha/year; Small-holder – 14,700 ha/year	Since 2007 the GoL has placed successive moratoriums on new concessions.
Industrial Tree Plantation	Deforestation	6,000 ha/year	The GoL is prioritizing tree plantations. However, deforestation occurs when plantations replace natural forest.

Pioneering Shifting Cultivation	Deforestation and Forest Degradation	57,300 ha/year degraded	The GoL continues to make efforts to control shifting cultivation. Such areas typically regenerate over approximately 40 years.
Hydropower	Deforestation	13,100 ha/year	The rate is likely to increase as many more new hydropower projects are built.
Mining	Deforestation	5,100 ha/year to 14,100 ha/year	Only for certain types of mining (such as large-scale bauxite strip mining) do individual projects cause extensive deforestation. However, the cumulative effects of numerous smaller local artisanal mines are probably a more substantial driver of deforestation at present.
Infrastructure	Deforestation	1,000 ha/year to 2,000 ha/year	Direct impact is relatively small. However, indirect impact especially due to increased accessibility (road construction) is much higher.
Urban Expansion	Deforestation	Not significant except in Vientiane Prefecture where annual loss rates average 1.5%	Could result in overall positive change due to associated rural de-population placing less pressure on forests.
Fire	Forest Degradation	MODIS satellite has detected more than 10,000+ fires in a one-week reporting period	Satellite imagery shows that during dry seasons the frequency of forest fires is very high in the Lao PDR. However, burnt areas typically regenerate very quickly.

Source: Thomas 2015

The Lao PDR Department of Forestry defines forest as an area of more than 0.5 ha with more than 20% tree canopy cover. Based on this definition, the forest cover in the Lao PDR decreased from 17 million ha (representing 72% of total land area) in 1960 to 9.9 million ha (42% of total land area) in 2010 (MPI 2016). According to the MAF, however, the forest cover of the Lao PDR was 47% of total land area in 2015. Contradicting data in national and international reports can also be found and figures should be treated with caution. For example, the United Nations Food and Agriculture Organization (FAO), which defines forest as land spanning more than 0.5 ha with trees higher than 5m and a canopy cover of more than 10%, indicated that the forest cover in the Lao PDR was 15.8 million ha (67% of total land area) in 2010. Regardless of these differences in definition, it is clear that the forest cover in the Lao PDR has decreased considerably in the recent past.

In response, the GoL has categorized the country's forests into 24 protection forest areas, 51 production forest areas and 57 conservation forest areas, each with corresponding levels of protection and use. According to the 2007 Forestry Law, the three forest categories are defined as follows (GoL 2007):

- Conservation Forests – Forests classified for the purposes of conserving nature, preserving plant and animal species, ecosystems and other valuable sites of natural, historical, cultural, touristic, environmental, educational and scientific significance.
- Protection Forests – Forests classified for the function of protecting water resources, river banks, road sides, strategic areas for natural defense and the environment; protecting soil quality and preventing soil erosion; and protecting against the impact of natural disasters.

- Production Forests – Natural forests and planted forests classified for use and production of wood and forest products to satisfy the requirements of national socio-economic development and people's livelihoods.

The latest GHG emissions inventory in the Lao PDR's Second National Communication to the United Nations Framework Convention on Climate Change identified land-use change and forestry (LUCF) as both the key sources and key sinks of CO_2 emissions in the country. LUCF[12] accounted for 42,800kt CO_2e emissions and stored about 2,100kt CO_2e per year, and is therefore a vital sector for climate change mitigation (MoNRE 2013). In 2005, MAF launched the "Forestry Strategy 2020" with the target to increase the national forest cover to 70% by 2020 (based on the Department of Forestry's definition of "forest"). By achieving this goal, the forestry sector would be able to sequester about 60,000-69,000kt CO_2e (GoL 2015). To increase forest cover and meet the stated forest cover target of 70%, the GoL plans to reduce the export of primary wood products and raw logs, and promote the production of industrial tree crops (e.g., teak, rubber and jatropha).

The Lao PDR is currently in the process of negotiating a legally binding trade agreement with the European Union — the FLEGT Voluntary Partnership Agreement. If ratified, the agreement will ensure that only verifiable legal timber and other timber products are traded between the Lao PDR and the European Union.[13]

6.2.2 8th NSEDP Initiatives for Forestry and Land Use

The 8th NSEDP refers to the development of a plan for sustainable use of natural resources that addresses their interdependent impacts on land, forests, minerals and water as an initiative to achieve the specified forestry and land use objectives. Other key projects listed include: (1) the completion of the land survey; (2) the allocation and identification of national forest areas and classification according to standard forest types; and (3) the strengthening of assessments on environmental and social impacts of natural resource exploitation. See Table 10 for the full list of initiatives for forestry and land use mentioned in the 8th NSEDP.

Table 10 Initiatives for Forestry and Land Use Listed in the 8th NSEDP

Forestry and Land Use	
Outcome 1, Output 1 – Sustained and inclusive economic growth	• Continue to focus on sustainable recovery, management, protection of forests and forest resources. • Manage and use production forests and community forests effectively. • Continue surveys and allocate at least 600,000 ha to forestry. • Certify 30% of total production forest area and restore 500,000 ha of production forests. • Promote cultivation of 500,000 ha of traditional plants and industrial crops. • Develop forest allocation and management plans at village level in 1,500 villages. • Reduce GHG emissions from deforestation and forest degradation (REDD+) by preparing for carbon credit trading in 2020.

[12] The Intergovernmental Panel on Climate Change (IPCC) Guidelines refer to Land-Use Change and Forestry (LUCF), but Land Use, Land-Use Change and Forestry (LULUCF) has become the usual term in negotiations under the United Nations Framework Convention on Climate Change, and was adopted as the title for IPCC's 2000 Special Report on the subject (IPCC 2003). The terminology in this paragraph is chosen to reflect the language used by the MoNRE in its Second National Communication on Climate Change of Lao PDR (MoNRE 2013).

[13] EU FLEGT Facility, Laos, http://www.euflegt.efi.int/laos.

	• Develop the Forest and Forest Resources Development Fund.
Outcome 3, Output 1 - Environmental protection and sustainable natural resources management	• Strive to complete the National Master Plan on Land Use and the comprehensive land allocation in 18 provinces, 92 districts and 3,455 villages across the country. • Issue 400,000 land titles in the rural and urban areas during the next five years. • Conduct a survey on land titles and digitize the data for at least 500,000 land titles. • Complete land mapping to assess land prices in 100 districts nationwide. • Modernize and digitize the land management system to collect the full set of data (land certificate, land lease and concession, land registration and estimated land value) to ensure that people have legal rights to use land, resolve land disputes and increase revenues from land. • Develop forest management, protection and restoration plans for seven protected areas (Nam Ha, Laving-Lavern, Nam Att-Phou Leuy, Nakai-Nam Theun, Hin Nam No, Dong Am Pam and Dong Hua Sao). • Complete reforestation to achieve forest cover of over 70% of the total country area, by restoring natural forests with 1.5 million hand-planted trees on 35,000 ha of protected and conservation forests. • Complete the Lao PDR biodiversity list and the national list of rare species in the national protected and conservation areas. • Complete the pilot on establishment of two model national natural parks (Nam Att-Phou Leuy and Nakai-Nam Theun), and propose to the United Nations Educational, Scientific and Cultural Organization (UNESCO) that it includes Hin Nam No as one of the World Natural Heritage sites. • Reduce illegal trade of wood products and wildlife trafficking by 5%.

6.2.3 Initiatives Proposed by Technical Experts for Forestry and Land Use

Many of the initiatives proposed by technical experts are in line with those listed in the 8th NSEDP. The technical experts emphasized developing cross-sectoral and integrated spatial tools to support decision-making. Such tools can help to plan for the most suitable and sustainable use of natural resources, and should be trialed in at least one province and district. Integrated planning brings coordination and cooperation to statement and praxis through co-designing and implementing policies that address sectoral interactions and interdependencies. Such integrated tools also allow for the joint and synchronized evaluation of biophysical, social and economic variables and outcomes.

The efficient and coordinated management and use of resources including land, forests, minerals and water is considered a central focus of the 8th NSEDP and among technical experts. The experts highlighted several benefits of integrated spatial planning. Firstly, they suggested utilizing the planning tools to improve the capacity of relevant ministries (i.e., MoNRE and MAF) to effectively review, monitor and enforce concession compliance, as well as carry out EIAs and SIAs. Secondly, experts believed that systematic and widespread use of such planning tools will catalyze increased cross-sectoral coordination and help define agency responsibilities. Finally, experts suggested that properly designed tools for spatial planning can strengthen land tenure rights. In their opinion, the tools should be used to support the assignment of secure and equitable land and resource tenure rights to local communities, individuals and collectives. This should also include the right to exclude unlawful access and appropriation.

Specific projects proposed by experts include: (1) trialing value-added processing in the wood sector; (2) promoting transparent local processing ownership; (3) correcting the deficit of skilled labor; and (4) addressing the limited border control of unprocessed timber production.

In addition, technical experts suggested aligning green growth projects with the ADB Forestry in the GMS Corridor Program, prioritizing community engagement in forest restoration to promote stewardship and custodianship principles. Sectoral data sharing initiatives were seen as important to satisfy World Bank green growth funding requirements. Aligning sectoral initiatives with the 8th NSEDP was also viewed as a prerequisite for project success.

A comparison of the initiatives listed in the 8th NSEDP and suggested by technical experts is provided in Table 32 in Appendix 8.7.

6.2.4 Recommendations

Based on the projects suggested by technical experts during the interviews and the projects detailed in the 8th NSEDP, the following recommendations for forestry and land use have been developed:

1. Consistent with the other sectors, conduct a comprehensive review of land-forest concessions and regulatory instruments, and compile a concession inventory. The review should address or remove inconsistencies observed between provincial interpretation, implementation and enforcement, and clarify the roles and responsibilities across ministries. The technical experts emphasized the Lao PDR's need for assistance to develop enforceable guidelines to clarify the responsibilities of forestry and plantation concession holders in: (1) protecting environmental and social values; (2) avoiding or minimizing negative impacts; and (3) ensuring extensive community consultation. These guidelines should specify support mechanisms that allow for effective enforcement, including the suspension or termination of concessions that consistently fail to meet audits and regulatory requirements or deliver environmental and social benefits. Any new regulation should ensure that communities affected by a specific project have access to independent arbitration.

2. Develop and train the Lao PDR agency staff in tools for spatial analysis to support decision-making and manage the sustainable use of natural resources, with the aim to improve the capacity of relevant ministries to effectively review, monitor and enforce concession compliance, as well as carry out EIAs and SIAs, among others.

3. Explore potential PES and markets for ecosystem services (MES). PES generally represent government or philanthropic subsidy programs with ongoing maintenance and transaction costs. MES rely on independent market transactions between buyers and suppliers, but generally require more stringent tenure rights and contracting conditions. Both options warrant further exploration as viable financial mechanisms to balance the imperatives of conservation and utilization.

4. Encourage private-public partnerships in the development of training programs to ensure that the Lao PDR skilled labor force could contribute to high-value wood processing. This might also include overseas deployments.

5. Encourage community forest restoration. Recognizing customary ownership structures, community forest restoration promotes awareness of the importance of functioning forest ecosystems to livelihoods. Thereby, it fosters the adoption of sustainable forestry. Village-Based Forest Associations that are consistent with ADB projects would be effective partners in this initiative.

6. Establish supply chain mechanisms that document compliance with regulatory requirements, including reporting requirements on processors and exporters of timber products. The technical experts suggested the documentation of timber supply and processing chains as a first step in reducing illegal logging and exports.

7. In line with recommendations for other sectors, increase resource rents and royalties. Developers do not currently pay for access to the entirety of affected natural resources (and subsequent diminishment of those resources) as part of concession revenues. Currently, developers pay 5-6% royalty but only for a single resource — water. The technical experts suggested retaining the current royalty contribution, and in addition, introduce non-market valuations and full-cost accounting in order for concessions to reflect the value of the entirety of affected resources.[14]

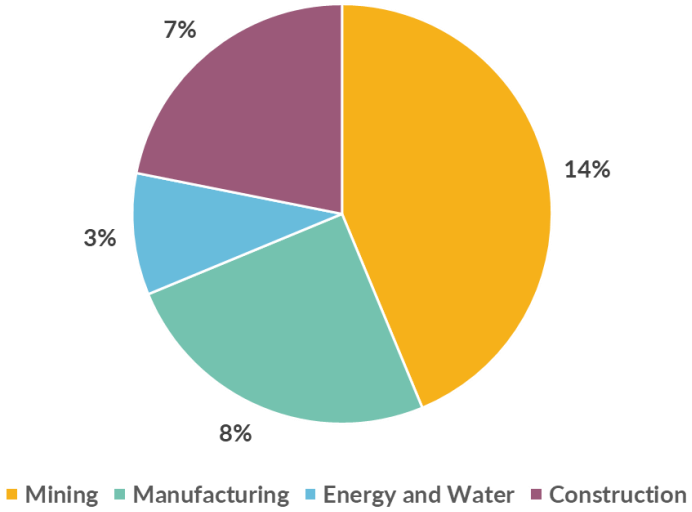
[14] A ready reckoner for non-market valuation is available at http://mekongarcc.net/ESV_tool/ESV.html.

6.3 Tourism

6.3.1 Relevance of Tourism in the Lao PDR

The industry sector in the Lao PDR is comprised of construction, manufacturing, energy and water, and mining. The industry sector contributed 35%, 33%, 32% and 31% of GDP in 2012, 2013, 2014 (Figure 22) and 2015, respectively. The declining contribution to GDP is attributed to declining global commodity prices and the cessation of some mining projects (ADB 2015; Nishimura et al. 2016).

Figure 22 Share of Industry Sub-Sectors, 2014



Source: Bank of the Lao PDR 2015

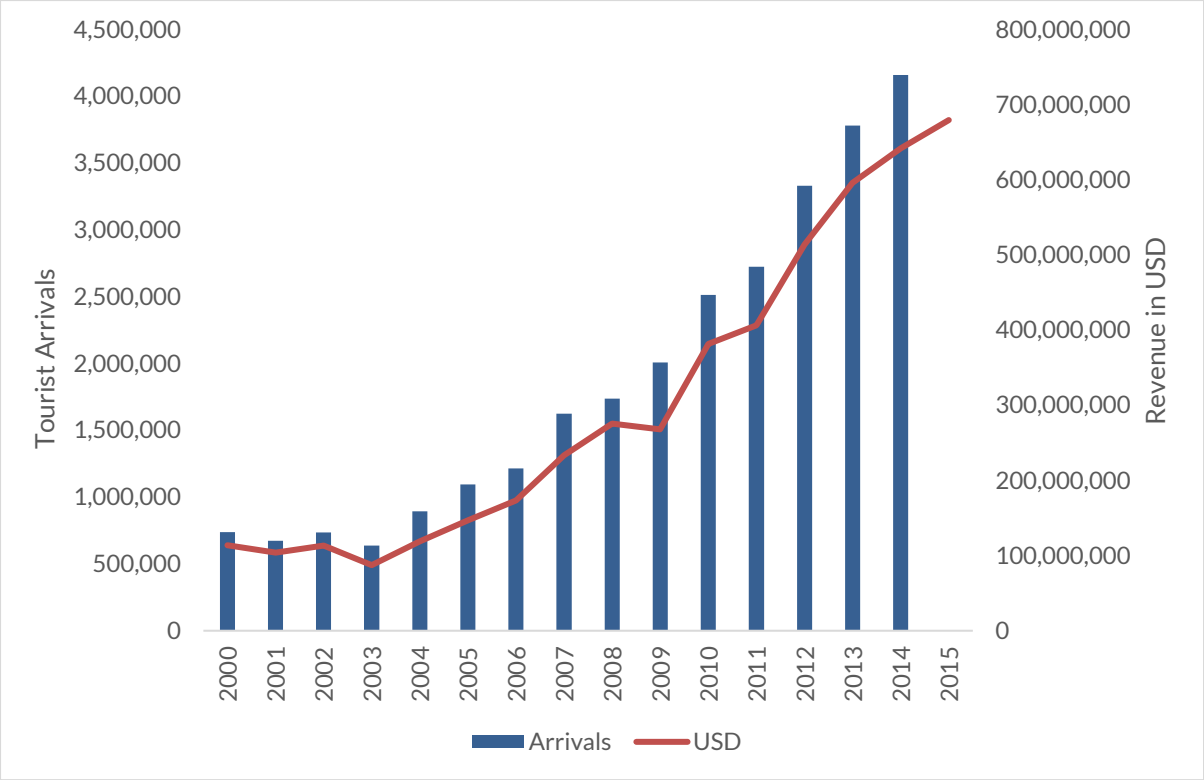
The Lao PDR is in the process of accelerating its structural transformation given the aspiration to graduate smoothly out of LDC status and integrate with the more prosperous Mekong countries (MPI and UNDP 2017). In response, the 8th NSEDP has emphasized industrialization and modernization of manufacturing and services.

Since significant parts of the Lao PDR industry sector are captured in other sectors considered under the GGPA, such as energy, mining and agricultural processing (i.e., manufacturing), it was decided that this chapter will be dedicated to the tourism sector.

Tourism is one of the key sectors identified by the GoL for industrialization and modernization of the country as it generates natural resource-based revenues that are non-extractive (MPI 2016). The World Travel and Tourism Council (2015) estimated that the direct, indirect and induced contribution of tourism to the 2015 GDP of the Lao PDR was 14.7%, and it supported nearly 470,000 jobs or 12.2% of total employment. The number of tourist arrivals in the Lao PDR has been increasing. From 1995 to 2003, arrivals grew at approximately 8%; and from 2004 to 2014 the rate of growth was above 18% (Nishimura et al. 2016).

The number of tourist arrivals grew nearly six-fold from 737,000 in 2000 to 4.4 million in 2015 (see Figure 23). In line with the increasing number of tourists visiting the Lao PDR, revenue increased from USD 114 million in 2000 to USD 679 million in 2015 (Bank of the Lao PDR 2015). However, short cross-border or daily trips by Thai and Vietnamese nationals accounted for 57% and 25% of tourist arrivals, respectively (MPI and UNDP 2017). The third largest group were visitors from China and Western countries (including Japan), accounting for 7% of arrivals.

Figure 23 Tourist Arrivals and Revenue from Tourism, 2000-2014

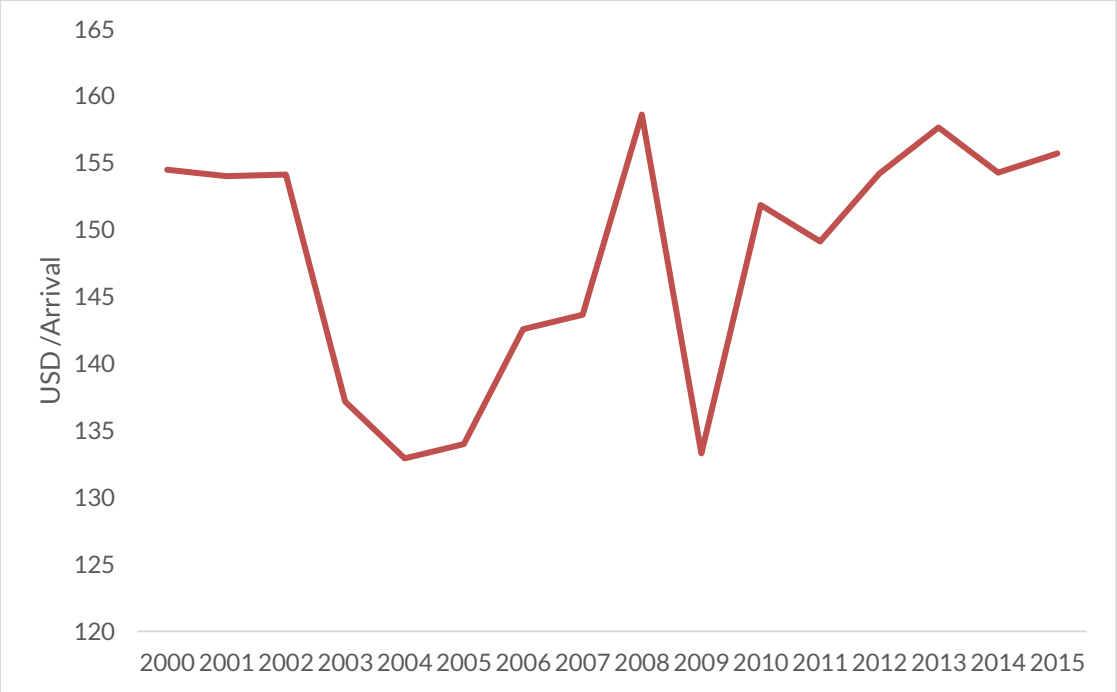


Source: Bank of the Lao PDR 2015

Short duration visits do not generate a high revenue for the tourism sector and this partially explains the low expenditure per tourist arrival in the Lao PDR. The average inflation-corrected expenditure per tourist arrival of USD 154 remained relatively static from 2000 to 2015 (Figure 24). In fact, tourist spending in the Lao PDR has been the lowest among countries of the Association of Southeast Asian Nations (ASEAN). In comparison, the per arrival expenditure in Myanmar and Cambodia was USD 383 and USD 711 in 2014, respectively (Nishimura et al. 2016). Broadening the tourism sector, in particular, attracting tourists from high-income countries and increasing the duration of the stay to increase expenditure per arrival are important aspects for raising sector revenue (MPI and UNDP 2017; MPI 2016).

The tourism sector has been relying mainly on nature tourism with 1,093 eco-tourism, 282 historical and 541 cultural tourist sites (MPI 2016). Due to its abundance of potential tourist sites of high natural, historical and cultural value, the Lao PDR attracts tourists to ethnic villages, and protected forest, rivers and caves.

Figure 24 Mean Expenditure per Tourist Arrival, 2000-2015



Source: GGGI

The Lao PDR Tourism Strategy was launched in 2005 and promotes community-based eco-tourism and environmentally-sound tourism. The aim is to empower villagers to use and access the economic potential of the tourism sector. Eco-friendly and community-based tourism can provide valuable economic, educational and environmental benefits, especially for the rural population through increased household income, new professions in the villages, as well as environmental awareness and responsibility. The Association of Tourism Agencies is collaborating with the GoL to find ways of implementing and expanding the substantial opportunities for participatory eco-tourism and community-based tourism (MoICT 2016). Manivong (2016) suggests that 50% of arrivals participate in nature-based and cultural activities, although there is a paucity of official statistics.

To promote increased revenues and arrivals in the Lao PDR, Nishimura et al. (2016) recommended: (1) promotion of "key marketing visuals" geared to the core markets of China, Thailand and Vietnam; (2) attraction of high-spending visitors from China, Japan and the Republic of Korea during the summer vacation season (July–August); (3) development of tourism that meets the needs of travelers from different countries; and (4) improvements in the quality of tourism services (e.g., sanitation). A UNDP report (MPI and UNDP 2017) highlighted the need for the GoL to manage the uneven development between provinces, high leakage of tourism spending, social and economic inequities, as well as the requirement for a skilled labor force and professional private sector management. The UNDP report also suggested that ecological degradation of poorly planned and implemented tourism developments is a negative consequence that needs to be carefully monitored and managed.

6.3.2 8th NSEDP Initiatives for Tourism

A key initiative indicated in the 8th NSEDP is a project to increase the number of villages with developed plans, sites and infrastructure to participate in cultural and natural tourism. The endeavor is intended to expand the number of established nature-based tourism sites, and as a corollary, increase the number of international tourists visiting the Lao PDR, the expenditure per visit and total tourism revenues. See Table 11 for the full list of tourism-related initiatives mentioned in the 8th NSEDP.

Table 11 Initiatives for Tourism Listed in the 8th NSEDP

Tourism	
Outcome 1, Output 1 – Sustained and inclusive economic growth	• Support the tourism sector with provision of infrastructure such as roads, electricity and water supply. • Increase the number of tourists to six million by 2020, and encourage an average stay of more than 10 days per head to generate a minimum annual revenue of USD 953 million. • Produce souvenirs for tourists (one district, one product) by 2020, develop 25 tourist sites, survey and allocate 40 tourist sites, and improve and develop 10 tourist cycle sites of quality. • Strive to design internet websites for tourism advertisements linked with ASEAN, GMS and Pacific Asia Travel Association websites, and deploy tourism representatives/liaison offices in five foreign countries that are main markets. • Organize the Third Visit Laos Year in 2018 for tourism publicity and promote domestic tourism "Lao Visit Laos". • Develop effective financial institutions. • Aim for the industry sector to contribute 32% of GDP. • Develop tourism based on the potential of natural, cultural and historic inheritances. • Ensure community participation in the building of complete service-cycle tourism, and link it to domestic and international tourist systems. • Train tour guides. • Transform tourism into a revenue-generating sector by focusing on prolonging tourists' duration of stay and increasing their spending in the Lao PDR to create employment and income for the local population.
Outcome 1, Output 3 – Integrated development planning and budgeting	• Direct domestic and foreign private sector investments at economic development sectors, such as hydropower construction projects, SEZ and unique economic zone development, processing industries, construction materials, vehicle spare parts assembly industries, tourism development and railway construction.
Outcome 1, Output 5 – Improved public/private labor force capacity	• Test and issue skill standard certificates for 10 professions in the construction sector, 7 professions in automobiles, 6 professions in information technology and 4 professions in tourism.
Outcome 1, Output 7: Regional and international cooperation and integration	• Preserve and protect the Lao PDR cultures and traditions by encouraging cultural tourism.
Outcome 2, Output 6: Protection of national traditions and cultures	• Create model cultural villages as tourist destinations. • Support the restoration, preservation and enhancement of the nation's unique historical and cultural heritage. • Increase coordination between central and provincial governments in improving the curriculum on tourism for each level of higher education, including bachelor's degree courses.

6.3.3 Initiatives Proposed by Technical Experts for Tourism

While literature on the ecological impacts of tourism in the Lao PDR is sparse, technical experts highlighted that tourism in its current form is contributing to ecological degradation. Many of the green growth initiatives proposed by technical experts for the tourism sector correspond to the 8th NSEDP.

The experts emphasized public-private partnerships in the development of the infrastructure for tourism in the National Protected Areas. Five National Protected Areas — Paksong, Na Ha, Phou Khao Kawai, Limestone Mountain and Houaphan — have been selected as focal sites for nature-based tourism development. The experts highlighted the active involvement of private enterprises in supporting the Lao PDR ministries with the development of regulations to ensure that tourism infrastructure developments and their operation, while meeting the needs of tourists, do not degrade the specific aesthetics, cultural and ecological aspects of individual sites.

The technical experts pointed to the lack of skilled labor in the tourism sector as limiting opportunities and revenues, and recommended the design and implementation of a university curriculum in nature-based, cultural and sustainable tourism to meet the skilled labor and research requirements of sustainable tourism objectives.

The experts also recommended the introduction of tourism fees such as a bed tax to contribute to training programs and infrastructure projects. Such fees could support the conservation of cultural traditions and ecological assets. Experts specifically mentioned the use of fees and taxes to support effective sanitation, as well as sewage and waste management in sites such as Vangvieng. This recommended action is consistent with the 8th NSEDP's notion of introducing environmental "user pays" taxes.

Another important recommendation by the experts was a project to assist the MoICT develop protocols to prevent the transfer of concessions without any investments or commencement of operations.

A comparison of the initiatives listed in the 8th NSEDP and suggested by technical experts is provided in Table 32 in Appendix 8.7.

6.3.4 Recommendations

Based on the projects suggested by technical experts during the interviews and projects detailed in the 8th NSEDP, the following recommendations for tourism have been developed:

1. Attract tourists beyond current target markets (i.e., Thailand and Vietnam) through strengthened business associations with experienced high-end tourist operators in other ASEAN countries. The tourism sector needs broadening in terms of attracting more tourists from high-income countries and having them spend more time in-country, in order to enhance the sector's revenue. Design these collaborations in a way that ensures management by the Lao PDR nationals, conserves the aesthetics of tourist attractions and minimizes tourist revenue leakage.

2. Set up tourism management programs to develop high-value and sustainable tourist sites. The quality of the Lao PDR tourism products does not currently correspond with consumer demands, particularly the increasing numbers of high-spending Korean and non-Asian tourists. The GoL has identified new sites and new directions for tourism, such as eco-tourism, adventure-related and cultural tourism. The mountain and sub-mountain terrain is ideally suited to these tourism opportunities.

3. Build capacity of tour operators and local authorities to ensure that tour operations do not cause ecological damage or impinge on cultural traditions (particularly cultural traditions of vulnerable ethnic minorities). In this context, the development of eco-tourism field guides is recommended.

4. Implement a vocational training program to develop a skilled labor force and foster the professional management of tourism operations, as well as a university degree in nature-based, cultural and sustainable tourism.

5. Increase tourism-related resource rents and royalties where applicable. Developers do not currently pay for access to the full suite of affected natural resources (and subsequent losses) as part of concession revenues. Therefore, it is recommended that concessions account for the full costs, reflecting the value of the entirety of affected resources.

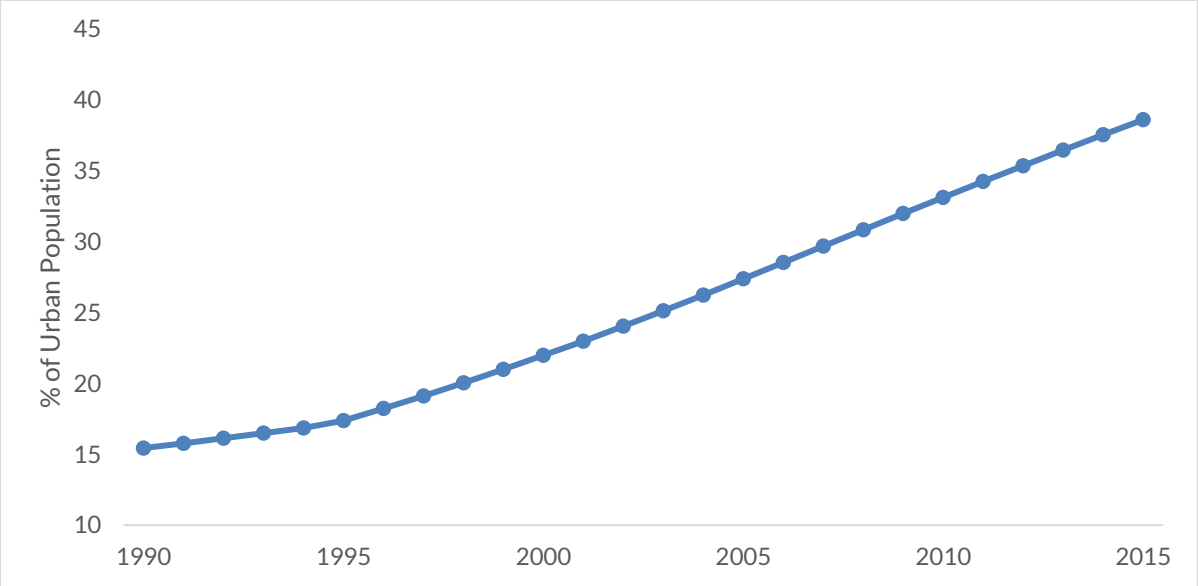
6.4 Urban Development and Transport

6.4.1 Relevance of Urban Development and Transport in the Lao PDR

In 2015, the population of the Lao PDR was 6.8 million people of which more than three-fifths lived in rural areas (World Bank 2017a). The share of the urban population grew rapidly from 15% in 1990 to nearly 39% in 2015 (see Figure 25). The urban areas have been developing faster than the rural areas, and this trend of rapid urbanization is likely to continue. The reasons for rural-to-urban migration include the areas' widening disparities in education, access to health services, quality of livelihoods and household incomes.

The urban centers in the Lao PDR are Vientiane with a population of between 783,000 and 811,000 (World Population Review 2017; Inthavongsa 2014), four secondary towns — Luang Prabang, Pakse, Savannakhet and Thakhek — each with 38,000-82,000 people, 12 provincial capitals each with 6,000-38,000 people, and 106 district towns each with 500-15,000 people (ADB 2012).

Figure 25 Urban Population, 1990-2015



Source: World Bank 2017a

The Lao PDR cities and urban centers are relatively small with low population density. Nevertheless, development issues such as inadequate waste management, traffic congestion and encroachment into wetlands (especially in Vientiane) are emerging. According to the ADB, an incomplete and poorly constructed road network, planning deficiencies, obsolete water supply pipes, flooding and clogged drains, and disposal of untreated waste constrain the productive capacity of urban areas and make them less livable and competitive than cities in neighboring countries. In addition, inadequate urban infrastructure and poor management of urban services discourage external investment to the detriment of economic development and growth in the Lao PDR (ADB 2012).

The main problems associated with urbanization in the Lao PDR include: (1) the lack of coordination among decision-makers, and unclear hierarchy and division of responsibilities; (2) insufficient assessment of environmental impacts, combined with a lack of awareness of urban and environmental issues among decision-makers; and (3) inadequate infrastructure and land-use planning. In addition, the ADB (2012) cited poor enforcement and inadequate planning tools as factors contributing to ineffective urban planning. This has resulted in inefficient land use, inadequate access to urban infrastructure and

associated services, uncoordinated growth, and negative contributions to climate change. Finally, the lack of reliable data for urban areas severely restricts any efforts toward a qualitative and quantitative assessment.

Sustainable urban planning and transport has the potential to play a major role in reducing the poverty gap and balancing economic growth in rural and urban areas (ADB 2012). The 8th NSEDP notes that poverty alleviation efforts in urban planning should not be biased toward urban centers at the exclusion of rural and remote communities. Instead, urban planning should aim to connect remote communities with central services and markets. Planned and balanced urban development is important to avert the economic decline of smaller towns and the rural agricultural hinterlands, as this will eventually have severe social and economic implications for the country. It will accentuate existing regional disparities and impede the successful implementation of equitable regional development (ADB 2012).

The ADB (2012) reported that urban development administration authorities (UDAAs) were established in Vientiane and in the four secondary towns between 1997 and 1999, and subsequently in the provincial capitals, as part of government reform for better urban management. UDAAs: (1) have a status equal to a division of provincial government; (2) are financially independent and able to generate their revenues; (3) may use this generated income for urban development and administration; and (4) are required to prepare and submit annual budget plans for approval (similar to other divisions of the province or prefecture).

The ADB (2012) noted that the institutional reform has been difficult to implement due to unrealistic assumptions regarding capacities and available resource support, inadequate planning tools and resources, poorly defined and understood roles and responsibilities, as well as poorly remunerated public service positions. The ADB report also argued that the current situation in the Lao PDR urban administration is cause for concern. Firstly, the financial and human resources of the UDAAs to maintain even existing drains and provide solid waste services need to be enhanced, while responsibilities for service delivery in urban areas need to be clarified. Secondly, as the government becomes more decentralized and participatory, a wider spectrum of society, including the private sector and communities, will need to be involved in decision-making. Municipalities, UDAAs and district government capacities to facilitate and coordinate collaboration and participation of societal stakeholders in urban planning, development and management will need to be strengthened.

Waste Management

Waste collection in the Lao PDR is limited in terms of its spatial reach — available only to those communities and businesses able to afford adequate service and where collection is profitable. It is estimated that in urban areas, approximately 40-60% of urban solid waste is collected by either public or private providers, although the informal sector plays a key yet unrecognized role (ADB 2012; Aphaylath 2015).

In Vientiane, approximately 50% of households have waste collection services, 37% in secondary towns and provincial capitals, and 30% on average in the remaining urban areas. Waste collection services in Vangvieng (91%) and Kenethao (100%) distort the figures as the percentage of households with access to waste collection is well below 30% in most secondary towns, and less than 10% in some urban centers (ADB 2012). Aphaylath (2015) reported eight private companies and one public enterprise collecting and transporting Vientiane solid waste to a 32km landfill site. The remaining uncollected waste is either dumped (i.e., by burying in pits near household, or littering along roadsides, roadside drains, streams and vacant lands) or openly burned, which causes pollution and significant health issues for residents.

In total, there are operational 57 landfill sites throughout the country. They are operated as controlled dump sites despite their labeling as sanitary landfills (ADB 2012). The sites are largely not monitored and do not meet international environmental standards, including the separation of hazardous waste (ADB 2012). The primary system is one of collect-and-dump, which results in rapidly growing open landfill sites. Such approach means lost opportunities in waste-to-resource conversion and revenue generation from waste. For example, the waste produced in Vientiane was 237 kg per capita in 2015, while it is estimated that 70% of the municipal solid waste could be recycled as it consists largely of paper, plastic, glass and metals. However, only 10% of waste is being recycled within the country or exported abroad for further processing (Aphaylath 2015). Increasing wealth and associated increase in the use of packaging and disposable goods suggest that the amount of urban waste will grow disproportionately compared to the rate of urbanization.

The ADB (2012) and Aphaylath (2015) cited the following factors that are limiting adequate waste disposal and recycling in Vientiane and elsewhere in the Lao PDR:

- Inadequate legal framework and unclear institutional responsibilities;
- A lack of incentives for businesses to recycle or separate at source, and limited cultural traditions that encourage such practices;
- Public/private enterprises are not given the proper mandate in accordance with the law, or not given sufficient budget to enable them to function in accordance with the law. New legislation is often drafted without coordinated reference to other agencies and legislations;
- A habit of illegally dumping considerable amounts of waste into the drainage channels and rivers;
- The waste collection vehicle fleet is old and subject to frequent breakdown (although modern collection vehicles have recently been donated or purchased);
- The institutional and administrative structure is not well established; and
- Public education system and participation programs are not established.

Transportation

Transportation and mobility in the Lao PDR is dominated by road transport and non-motorized transport (i.e., bicycles and foot traffic). Surface passenger transport is entirely by these two transport modes, while inland waterways account for roughly a fifth of surface freight transport (see Table 12). As with many other sectors discussed in this report, transport data for the Lao PDR is sparse.

Table 12 Surface Freight and Passenger Transport by Mode

Inland Surface Freight Transport (million ton-km)			Inland Surface Passengers Transport (million passenger-km)		
Road	Inland Waterways	Total	Road	Non-Motorized	Total
362.530	79.180	441.710	2,618.900	N/A	2,618.900

Source: International Road Federation 2016, data for 2012
Note: N/A = not available.

The Lao PDR has around 2,000km of urban roads of which 33% are paved. The remaining urban roads are gravel or earth. During the dry season, these roads produce significant dust pollution, while in the rainy season, slippery conditions limit public mobility, access to services and the collection of solid waste.

Looking at the number of vehicles, road transport is dominated by motorcycles, accounting for more than three-fourths of all vehicles in the Lao PDR (70% of all vehicles in Vientiane), followed by vans, pick-ups,

lorries and road tractors (about 20% of all vehicles), passenger cars (about 5% of all vehicles), and buses and motor coaches representing a quarter of a percentage of all vehicles (see Table 13).

Table 13 Composition of the Vehicle Fleet

	Passenger Cars	Buses and Motor-Coaches	Vans, Pick-Ups, Lorries, Road Tractors	Motorcycles	Total Motor Vehicles
Lao PDR	73,799	4,120	281,510	1,218,379	1,577,808
	5%	0.26%	18%	77%	
Vientiane	44,516	1,662	160,681	481,748	688,607
	6%	0.24%	23%	70%	

Sources: International Road Federation 2016; Ministry of Public Works and Transportation personal communication, January 2017

Another source reported that the number of registered vehicles in Vientiane reached a total of 692,016 units in 2015 (J&C Services 2015) and increased by about 70,000 units (10%) in 2016 (Ministry of Public Works and Transportation personal communication, January 2017). The Ministry of Public Works and Transportation estimated 481,748 motorcycles, 3,409 three-wheeled vehicles, 44,516 cars, 90,334 pick-ups, 18,598 jeeps, 25,379 vans, 26,370 trucks, and 1,662 public transport vehicles in Vientiane in 2015.

Traffic congestion is increasing and exacerbated by illegal and poorly enforced parking on major and minor roads, combined with traffic lights (where they exist) that are uncoordinated with increased traffic flows (Inthavongsa 2014). This trend is amplified by the limited options for public transport, which is currently geared to inter-urban rather than intra-urban services. In 2014, there were 42 public buses operating eight bus routes in Vientiane (Inthavongsa 2014) compared to more than 4,000 buses and motor coaches in the entire country (International Road Federation 2016). *Tuk-tuks*, taxi trucks and a small fleet of private taxis, however, are supplementing the public transport system.

Water Supply and Sanitation

Although 84% of the Lao PDR population have access to improved drinking water sources and 67% have access to improved sanitation facilities, these are generally below accepted hygiene standards (MPI 2016; ADB 2012). Ineffective sanitation regulations and unclear institutional responsibilities have meant that existing septic tanks are generally poorly designed and constructed, resulting in solids carrying over to drains or soak-ways, and leading to odors, blockages and overflows. Vientiane and the four secondary towns have sludge vacuum tankers for emptying septic tanks. However, only a few provincial and district towns have access to this service and it remains unclear whether any have proper disposal facilities for septic effluents.

Safe water comes from protected boreholes and wells and may still require additional treatment due to mineral and salinity content. Unhygienic practices, contaminated water and inadequate sanitation coverage in urban areas remain sources of outbreaks of cholera and diarrhea. Nakamura (2017) reported 1,158 cholera-related fatalities in the Lao PDR from 1993 to 1996, and the United Nations Children's Fund (2017) reported a 2008 cholera outbreak in southern Lao PDR.

6.4.2 8th NSEDP Initiatives for Urban Development and Transport

Sustainable urban planning is emphasized as an important element in the 8th NSEDP. The development and expansion of urban infrastructure and services are repeatedly mentioned, including waste management, access to potable water and sanitation, and planned public and private transport systems.

The document calls for developing a comprehensive environmental management plan at provincial and district levels, as well as establishing mechanisms to support the implementation of the national green growth strategy and link it with regional and international strategies. As a priority, the 8th NSEDP asks for completion of the concept note, mechanisms and manual on sustainable urban development. In this context, it envisions the implementation of pilot projects in at least 10 towns along the National Road No. 13 and the Mekong River. Identifying areas for new towns, including residences, public recreation areas, historical areas and cultural heritage areas are complementary initiatives of the 8th NSEDP.

Consistent with the other sectors discussed in this report, the 8th NSEDP emphasizes the development of integrated spatial planning tools for decision-making, combined with capacity building for local practitioners in the use of such tools. Standardized use across sectors, provinces and municipalities, and consistency in the collection and sharing of data are also considered important. Developing local expertise/technologies to calculate CO_2 and other GHG emissions, complemented by guidelines for integrated climate change adaptation, disaster risk reduction and mitigation of GHG effects are listed as extensions of planning capacity. According to the 8th NSEDP, enhanced planning capacity should be used to develop strategic and operational plans for the agriculture, forest, public works and transport sectors. The 8th NSEDP also lists projects to improve the land database (records, leases, concessions and registrations) in 18 provinces across the country as a source of reliable and accountable central revenue. See Table 14 for the full list of initiatives for urban development and transport mentioned in the 8th NSEDP.

Table 14 Initiatives for Urban Development and Transport Listed in the 8th NSEDP

Urban Development and Transport	
Outcome 1, Output 1 – Sustained and inclusive economic growth	• Continue to develop goods transportation systems at subregional and international levels, such as the GMS Corridor, Asian Highway, East-West Corridor and North-South Economic Corridor. • Construct facilities along highways, such as stopping or parking lots, and goods warehouses and vehicle stations. Build four logistics parks in Champasak, Nateuay, Savannakhet and Vientiane. • Construct the Vientiane-Boten Railway Project. • Survey and design new international airports in Champasack, Sayabouly and Vientiane.
Outcome 1, Output 4: Balanced regional and local development	• Support international integration and expand the road network from provincial municipalities to priority districts and zones. • Develop land, water and air transportation infrastructure.
Outcome 1, Output 3 – Integrated development planning and budgeting	• Increase public investments in basic infrastructure, such as roads, irrigation systems, schools, health centers, gravity water supplies and agro-technical research centers, to promote technical capacity as well as development of rural and remote areas.
Outcome 2, Output 4 – Access to high quality health care and preventative medicine	• 90% of the population use clean water. • 75% of the population use latrines.
Outcome 3, Output 1: Environmental	• Develop a comprehensive environmental management plan at provincial and district levels. • At least 50% of the provinces implement an integrated spatial plan.

protection and sustainable natural resources management	• Complete the concept note, mechanisms and manual on sustainable urban development; and implement pilot projects in at least 10 cities along the National Road No. 13 and the Mekong River. • Create mechanisms to support the implementation of the national green growth strategy, and link it with regional and international strategies.

6.4.3 Initiatives Proposed by Technical Experts for Urban Development and Transport

An important initiative proposed by technical experts envisages the establishment of processes to articulate development plans based on shared objectives. Such an initiative would foster inter-agency awareness and effective communication. It would help to overcome some of the obstacles identified in the current urban planning practices, such as lack of coordination among decision-makers and insufficient assessment of environmental impacts. For example, the MPI's decision to develop the Tat Luang wetlands differed from the Urban Planning Department's focus on wetland drainage in Vientiane and the use of wetlands for public fish catch.

Another suggested initiative is piloting the development of green villages as models for neighborhood planning that addresses issues such as solid waste and wastewater management, public transport, and green spaces. Public-private partnerships to foster economic diversification and innovation were also suggested. For example, waste collection and recycling cannot survive based on the current model that suffers from insufficient revenues and incentives for private contractors.

As in other sectors, technical experts supported initiatives to develop and implement integrated spatial tools to support decision-making, combined with specialized training for local practitioners. The use of these spatial tools should be standardized across sectors, provinces and municipalities, and be supplemented by the collection and sharing of relevant data. Such tools extend to local expertise/technologies to calculate CO_2 and other GHG emissions.

A comparison of the initiatives listed in the 8th NSEDP and suggested by technical experts is provided in Table 32 in Appendix 8.7, many of which are complementary.

6.4.4 Recommendations

Based on the projects suggested by technical experts during the interviews and projects detailed in the 8th NSEDP, the following recommendations for urban development and transport have been developed:

1. Establish a shared planning vision and objectives for the Lao PDR urban centers, and align urban planning with a green growth model, in order to balance current and projected urban growth with conserving/establishing green spaces. An example is the conservation of wetlands for urban drainage and biodiversity. Other shared objectives could include, restrictions on building height, flood mitigation construction, energy saving in buildings, strengthened protection of architectural heritage (such as Luang Prabang) and enforcement of development zones.

2. Promote the use of non-motorized transport (i.e., bicycles and foot traffic) as it continues to be an important means for mobility in the Lao PDR, and represents an important dimension among green mobility options. Therefore, the investigation of opportunities to improve facilities for cyclists and pedestrians for better and safer mobility is recommended. In this context, a comprehensive parking strategy, though not a green growth intervention in itself, can support non-motorized transport. Parking is a key aspect of congestion and one of the serious constraints to cyclists and pedestrians,

particularly in Vientiane. Cars park on footpaths as well as on the road, meaning that pedestrians are forced to walk on the road, while cycling carries severe risks of collisions.

3. Addressing urban transport challenges has been identified as a priority by the GoL. In this context, improve access to public transport and move toward lower carbon transport options. Firstly, an integrated public transport system will be essential for Vientiane and subsequently for other cities, in which services can be provided by one or more state or private entities. As a step in this direction, a public-private partnership project is recommended that coordinates bus routes with the travel requirements of public servants and school children, in order to reduce traffic congestion and contribute to the financial stability of private bus operators. Secondly, as part of the move toward lower carbon transport options, identify practical ways and support mechanisms to introduce electric vehicles, including electric buses, motorcycles and *tuk-tuks* to incrementally replace the current fleet. Pilot projects could involve hotels and travel agencies, as well as public servants.

4. Incorporate traffic management and improvement of urban roads into comprehensive urban development planning so that land-use decisions facilitate rather than hinder integrated transport solutions.

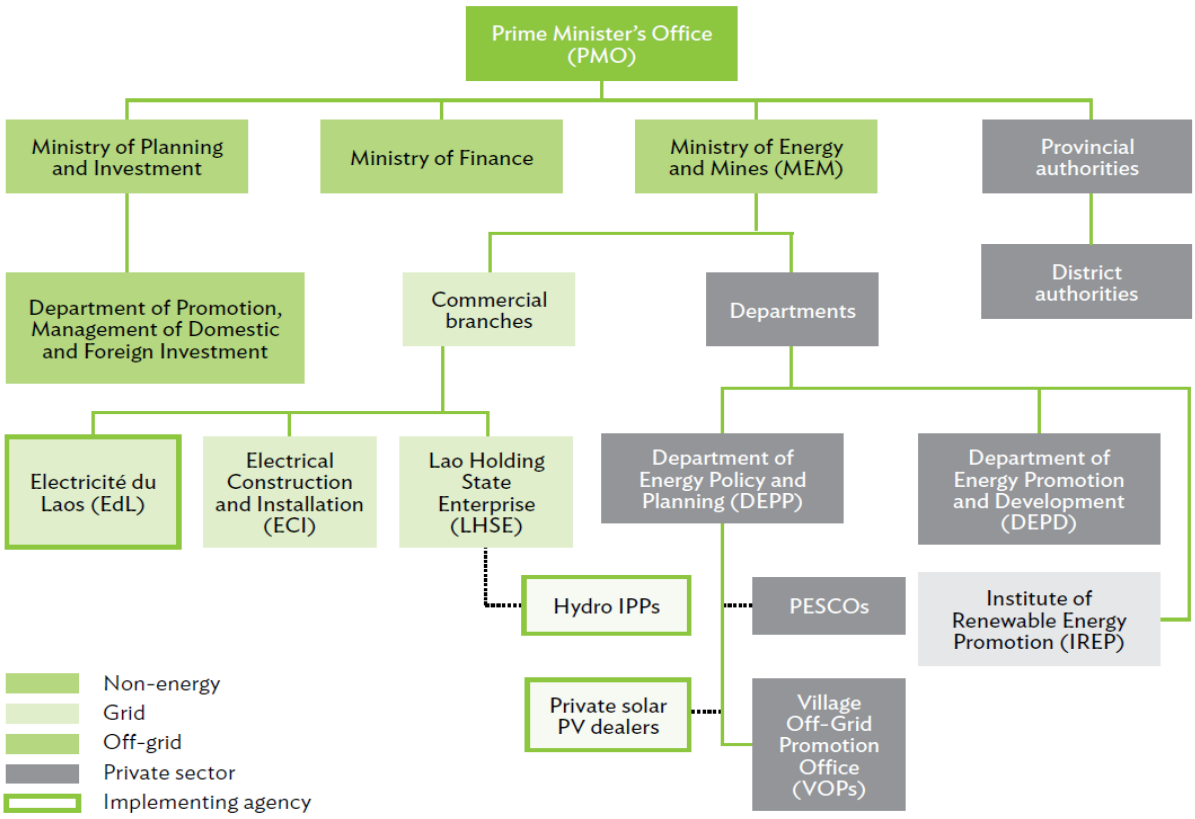
5. Increase waste collection rates, as well as divert waste from landfills by promoting recycling. In this context, support for public-private partnerships that develop sustainable business models to overcome current disincentives for private companies is recommended. Private business waste collection and recycling is currently unsustainable (particularly in Vientiane), mainly because revenues are insufficient. Furthermore, support the set-up of decentralized wastewater treatment systems to enhance sanitation and public health. Community-based decentralized wastewater treatment systems are a fast and cost-effective solution to improve sanitation conditions in urban areas.

6. As recommended for other sectors, develop spatial planning tools to support decision-making, and provide training for local practitioners in the use of these tools. Promote standardized use across sectors, provinces and municipalities, including the collection and sharing of relevant data.

6.5 Energy and Mines

The Lao PDR has abundant water and mineral resources. The hydropower and mines sector plays a crucial role in increasing export revenues and integrating the Lao PDR into the global economy. Energy and mines, together with agriculture and tourism are considered the main sectors for investment and industrialization in the Lao PDR. The MEM is the main agency responsible for the energy and mines sector. The Lao PDR institutional framework for the sector is illustrated in Figure 26. The MEM consists of two departments. Firstly, the Department of Energy Promotion and Development is responsible for renewable energy [15] development, rural electrification, electricity export, and developing plans for electricity generation, transmission and distribution. Secondly, the Department of Energy Policy and Planning is responsible for national policies and regulations (including tariff rates), as well as monitoring public and private energy suppliers. However, new project agreements are signed by the MPI.

Figure 26 Institutional Framework for the Energy and Mines Sector



Source: MEM 2014

Notes: IPP = independent power producer, PESCO = provincial electricity supply company, PV = photovoltaic.

[15] The GoL includes hydropower (small-scale and large-scale hydropower) under its definition of renewable energy. GGGI, however, treats hydropower (particularly large-scale hydropower) separately from renewable energy. The reason behind the GGGI distinction is that although hydroelectricity is a renewable source of energy, the construction of large-scale hydroelectric facilities can have significant and unavoidable negative environmental and social impacts. The most important of which are generally related to the flooding of land in the impoundment zone upstream of a dam, and changes to water flows and water levels downstream of a dam. Other impacts include, forced land acquisition and population displacement, changes in river regimens (which can affect fish, plants and wildlife), and flooding of land and wildlife habitats (through the creation of reservoirs). While the nature and severity of such impacts are highly site-specific and tend to vary in scale according to the size and type of the project, due to its environmentally disruptive impact, large-scale hydropower is considered separate from other renewable energy sources.

The MEM is also responsible for three commercial branches in the electricity sector as follows:

1. Electricité du Laos, a vertically-integrated utility responsible for electricity generation, transmission and distribution, as well as management of electricity imports and exports. It also manages four independent subregional power grids;
2. Lao Holding State Enterprise, which holds the government's shares of independent power producers (IPPs); and
3. Electrical Construction and Installation Company, which is Electricité du Laos' construction contractor for distribution and transmission projects.

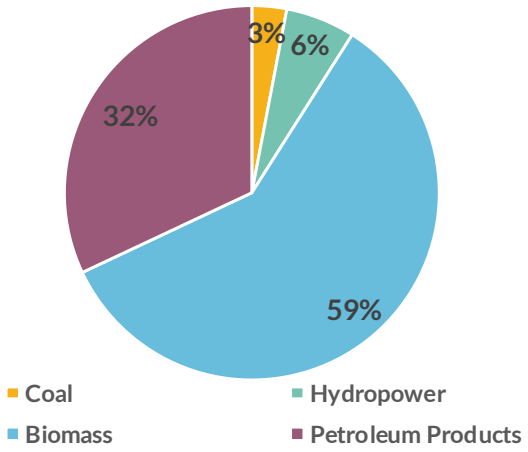
6.5.1 Relevance of the Energy Sector in the Lao PDR

Supply and Demand

As with other sectors discussed in this report, data availability and quality in the energy sector is a major constraint for the analysis. Considerable discrepancies exist between different data sources for key indicators such as supply and demand, which are propagated throughout the further analysis (e.g., breakdown by fuel, demand by sector). For the purpose of this report, the analysis is based on national figures, citing United Nations data for comparison when relevant.

The total primary energy supply shows a difference of nearly 30% when comparing national sources (2,576 ktoe, Phoutonesy 2015) with figures published in the United Nations' 2014 Energy Balances (1,938 ktoe, United Nations 2014). While discrepancies exist across all fuel types, the differences are particularly pronounced for energy supply from hydropower (with United Nations figures nearly three times higher than the Lao PDR national data), and from oil and oil products (with national statistics five times higher than United Nations figures).

Figure 27 Total Primary Energy Supply by Fuel, 2014



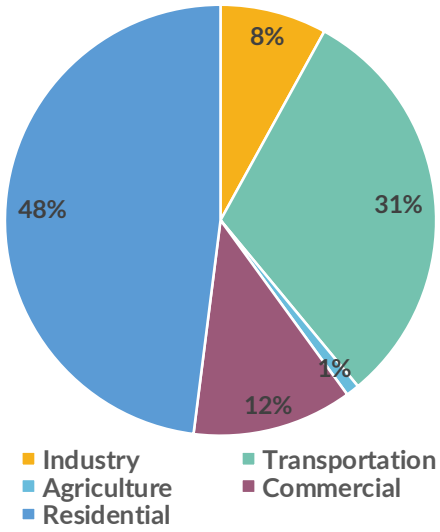
Source: Phoutonesy 2015

Sources agree that biomass, mainly consisting of fuel wood, represents the major fuel source with a share of between nearly 60% (Phoutonesy 2015) and 70% (United Nations 2016). National sources indicate that biomass is followed by petroleum products (accounting for about one third), hydropower (6%) and coal (3%) (see Figure 27). The United Nations' 2014 Energy Balances, however, indicate a considerably higher share for hydropower, representing nearly one quarter of total supply, and a significantly lower share for oil and oil products (8%).

Data for final energy consumption (demand) shows similar discrepancies, with national figures (2,519 ktoe, Phoutonesy 2015) about 30% higher than United Nations data (1,726 ktoe, United Nations 2014). The annual growth rate of energy consumption is estimated at about 4% (Pouthonesy 2015). Sources agree that consumption by the residential sector represents the largest share accounting for about half (Pouthonesy 2015) or up to four-fifths (United Nations 2016) of total final consumption.

According to national statistics, the transport sector (accounting for nearly a third of total final consumption), commercial sector (12%) and industry sector (8%) follow in descending order of their shares (see Figure 28). Figures from the United Nations' 2014 Energy Balances differ in the share of the transport sector (4%) and commercial sector (0%).

Figure 28 Final Energy Consumption by Sector, 2014



Source: Phoutonesy 2015

Renewable Energy

The latest available data from 2011 shows that the Lao PDR has considerable potential for renewable energy. Yet, the current use of renewable fuel sources is limited. Small-scale hydropower projects accounted for more than 90% of renewable energy use. The UNDP and MEM (2015) reported that as of 2011, nearly 28 MW of small-scale hydropower capacity was connected to the grid (with 0.9 MW off-grid). In contrast, the ADB reported 12 MW of small-scale hydropower capacity as of 2013. In second place, solar power capacity accounted for less than 1 MW, with 0.64 MW off-grid and 0.24 MW grid-connected (ADB 2013; UNDP and MEM 2015).

Recognizing the large potential of renewable energy in the Lao PDR, the MEM launched the Renewable Energy Development Strategy in 2011. The main objectives of the strategy are to increase electricity generation for export, and mobilize domestic and foreign investments at the village level to increase access. The strategy specifies a target of increasing the share of renewable energy in the supply mix to 30% by 2025. The Renewable Energy Development Strategy considers biofuels, solar, wind, small-scale hydropower[16] and geothermal energy as renewable sources. Small-scale hydropower represents the highest potential (for electricity generation), followed by biomass (for electricity generation and cooking), biofuels (for transport), biogas (for electricity generation and cooking) and solar energy (for electricity generation) (see Table 15).

A draft government decree to promote small-scale hydropower projects provides guidelines for resource assessment and project planning, and includes tendering procedures and maintenance obligations (UNDP and MEM 2015).

An agency to promote biodiesel and bioethanol is expected to regulate oil crop plantations, establish price references and standardize biofuel specifications. The Renewable Energy Development Strategy aims for biodiesel and bioethanol to substitute 10% of gasoline and diesel use by 2025 (Cronin et al. 2016). However, this ambitious target could displace land areas for food crops and forests, and create concessions to foreign investors. So far, biofuel pilot projects in the Lao PDR have not been successful and have not been able to compete with declining petroleum prices.

For new solar projects, the Renewable Energy Development Strategy states the need for evaluation of previous solar projects, identification of suitable localities, development of pilot and demonstration projects, and their scaling up to service a large consumer base.

[16] Hydropower projects with a capacity of less than 15 MW are considered as small-scale hydropower in the Lao PDR Renewable Energy Development Strategy.

Table 15 Renewable Energy Targets

	Renewable Energy					
	Potential	2013	2020		2025	
Electricity Produced from	MW	MW	MW	ktoe	MW	ktoe
Small-scale hydropower	2,000	12	134	85	400	256
Solar	511	1	36	23	33	21
Wind	>80		12	8	73	47
Biomass	938		24	16	58	37
Biogas	313		19	12	51	33
Solid waste	216		17	11	36	23
Geothermal	59					
Biofuels	million liters	million liters	million liters	ktoe	million liters	ktoe
Ethanol	600		106	178	150	279
Biodiesel	1,200	0.01	205	239	300	383
Thermal Energy from	Ktoe	ktoe		ktoe		ktoe
Biomass	227			29		113
Biogas	444			44		178
Solar	218			22		109
Total	**6,766**			**668**		**1,479**

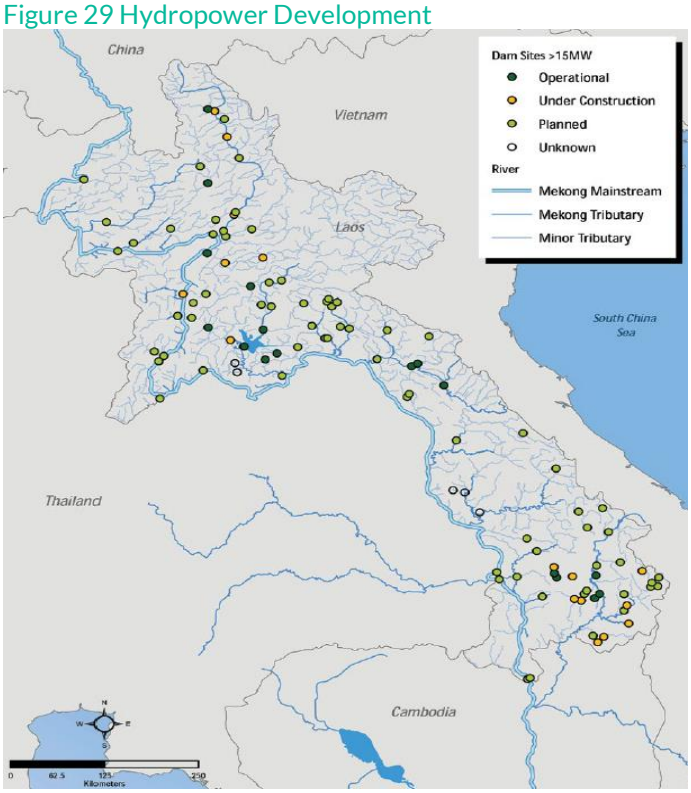
Source: ADB 2013
Notes: ktoe = kiloton of oil equivalent, MW = Megawatt.

Electricity

The electricity generation mix in the Lao PDR is dominated by hydropower and coal. Hydropower is the primary source for electricity generation with an estimated installed capacity of more than 6,000 MW (Lao Energy 2016) of which close to 90% belong to IPPs. In addition to hydropower, the Hongsa lignite power station is the main thermal power plant with a generating capacity of 1,878 MW.

The country's theoretical hydroelectric generating capacity is 26,500 MW, of which 18,000 MW are technically exploitable (Cronin 2016; Lamphayphan et al. 2015). The GoL has identified hydropower as a strategic sector for economic growth and aims to become the "battery of Southeast Asia". For that purpose, it has signed agreements for more than 70 new hydropower projects, which would increase the installed capacity considerably (see Figure 29).

Figure 29 Hydropower Development



Source: Cronin et al. 2016

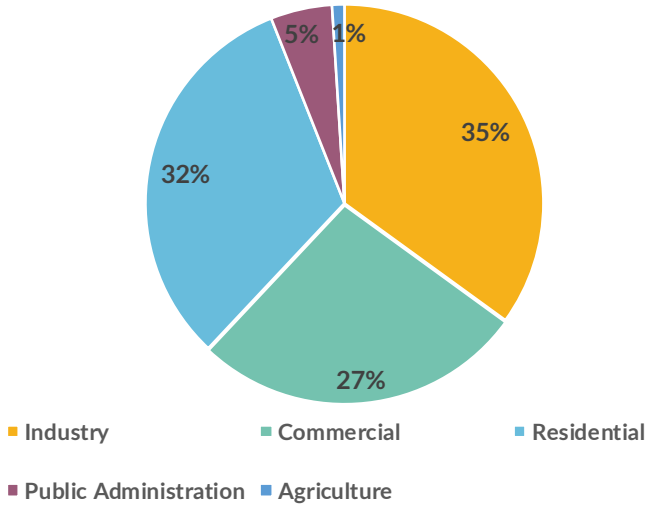
As of 2016, four-fifths of the total electricity generated from hydropower was exported, mainly to Thailand. The remaining one-fifth covered about 80% of domestic electricity demand.

The potential for solar energy is estimated to amount to 11.7 TWh/year. However, more than a third of the land area in the Lao PDR is not suitable for large-scale solar projects due to the mountainous topography (especially in the north). Only a few large-scale solar power plants have been built in the country so far. Off-grid solar home systems, however, represent a cost-efficient solution to electrifying rural Lao PDR households, and about 13,000 off-grid solar home systems have been installed in rural areas (Laspho 2015; UNDP 2016).

The potential for wind energy in the Lao PDR is subject to debate, with estimates ranging from 80 MW (ADB 2013) to 180 GW (MoNRE 2015). The highest wind potential lies in the mountainous region close to the border with Vietnam. Wind energy offers a promising alternative to hydropower, as electricity generated from wind power is usually higher during the dry season when electricity generation from hydropower is lowest. A 600 MW wind farm at a cost of USD 1.5 billion is under construction in southern Lao PDR. After completion in 2020, it will be the largest wind farm in the ASEAN region. The electricity produced will be exported to Thailand (OECD 2016).

Total electricity consumption in 2014 was 4,475 GWh with the industry and residential sectors each representing about a third of total consumption, and the commercial sector accounting for about a quarter (see Figure 30). The per capita electricity consumption in 2014-2015 was 470 kWh/year (Laspho 2015). The ADB (2013) estimate for electricity consumption per capita was about 20% lower at 376 kWh/year. The discrepancies in consumption estimates (accounting for estimates derived for 2013 and 2014) highlight once more the lack of reliable data in the energy sector.

Figure 30 Final Electricity Consumption by Sector, 2014



Source: Phoutonesy 2015

Total electricity consumption in the Lao PDR has been rising since 1990 at a relatively stable rate of approximately 1.2% annually (Vongsay 2013). However, demand projections show considerable discrepancies and some of them fail to distinguish between physical demand and installed capacity (ADB 2013; Lao Energy 2015; ICEM 2010).

The Department of Energy Policy and Planning estimated that 88% of households had access to electricity in 2015, and has set a target of 90% by 2020 and 98% by 2030. Despite an impressive increase of the electrification rate from 15% in 1995 to 88% in 2015, approximately 30% of the rural population still have no access to electricity (Laspho 2015).

Electricity tariffs are currently set by Electricité du Laos. Based on a GoL regulatory framework, Electricité du Laos sets prices depending on usage and sector (Vongsay 2013), with tariffs ranging from USD 0.09/kWh to USD 0.17/kWh, and peak prices during the dry season (Intercedent Asia 2016). There is a certain trade-off between providing affordable electricity to achieve the government's goals of rural electrification and 90% electricity access by 2020 (ADB 2013), and making sure electricity prices reflect generation and systems maintenance costs. Electricity losses, including both technical and non-technical

losses, were reported at 12% as of 2009 (ADB 2010). Sufficient investment in the distribution and transmission system is essential to further reduce losses and provide reliable service for consumers.

Cronin et al. (2016) argued that the electricity infrastructure in the Lao PDR is highly inefficient and mostly constructed for the benefit of neighboring countries — a consequence of limited planning capacity and over-dependence on partnerships with foreign lenders, investors and developers. Hydropower dams and transmission lines are now being financed and built by the foreign private sector, particularly Thai developers, Thai state-owned banks, the Electrical Generating Authority of Thailand, as well as Chinese state-owned banks and state-owned enterprises. The authors stated that the GoL seeks short-term benefits from the exploitation of its hydropower potential through a project-by-project approach to development rather than a long-term, coordinated strategy based on balancing the trade-offs among electricity generation, revenues, the environment and livelihoods on a basin scale.

Energy Efficiency

The GoL has set a preliminary energy savings target of 10% by 2025 although the country is at an early stage in the deployment of energy efficiency measures. A strategy and policy for energy efficiency and conservation is currently being negotiated for approval by the government. Energy efficiency guidelines have been prepared for the residential, building and industry sectors, including highly practical means of improving efficiency in government buildings, and IEC standards for selected electrical and electronic products. Moreover, public awareness efforts have been emphasized. However, lacking a strong institutional, policy and regulatory framework for energy efficiency, "expected developments in energy efficiency have not materialized" (ADB 2011).

According to the ADB (2015), projections point to discrepancies between energy supply and demand in the future, which makes energy efficiency measures all the more relevant. ADB (2015) modeling reflecting different assumptions about baseline and growth estimates provided no clear assessment as to whether the highest energy saving potential will be gained in the industry, residential or commercial sector. The lack of conclusive results suggest more robust analysis for the Lao PDR is needed. However, the authors were of the opinion that significant savings can be achieved with a well-designed and well-implemented energy efficiency strategy and policy (ADB 2015).

6.5.2 Relevance of Mining in the Lao PDR

The mining sector is an important pillar of the Lao PDR economy that contributed 7% of the country's GDP between 2010 and 2014. Five hundred and seventy mineral deposits have been identified consisting of gold, silver, copper, zinc, lead and potash. The GDP contribution of mining production in the Lao PDR increased from USD 8 million in 2002 to USD 340 million in 2014-2015 (Bank of the Lao PDR 2015). Due to the negative impacts of mining on local communities and the environment (e.g., village resettlements, air pollution, forest loss and degradation), the GoL currently maintains a moratorium on new mining concessions. The number of mining operations declined from 180 to 107 as projects have either been completed or have expired (MEM, 2014).

6.5.3 8th NSEDP Initiatives for Energy and Mines

Increasing the capacity of electricity generation is a central theme within the 8th NSEDP. The construction of power plants and related infrastructure is seen as a means of generating local income and revenues from export, providing stable electricity supply, and expanding access to electricity. The development of renewable energy is mentioned in the context of electrifying rural areas and achieving a more diversified electricity mix.

Related to mining, the 8th NSEDP envisions increased domestic processing of minerals and reduced export of unprocessed minerals to contribute to local incomes and improve livelihoods. The 8th NSEDP also emphasizes the establishment of mechanisms for sustainable financing and funding to manage natural resources and protect the environment. These include the introduction of natural resource taxes and fines against non-performing and non-compliant concession holders, in addition to the current regime of royalties from the energy and mines sector. See Table 16 for the full list of initiatives for energy and mines mentioned in the 8th NSEDP.

Table 16 Initiatives for Energy and Mines Listed in the 8th NSEDP

Energy and Mines	
Outcome 1, Output 1 – Sustained and inclusive economic growth	• Strive to complete 15 hydroelectricity power dams, such as Sayabouly Dam with installed capacity of 1,285 MW (2019), Xe Pien-Xe Namnoi with installed capacity of 410 MW (2019), Sekhamane 1 with installed capacity of 322 MW (2016), Nam Ou 5 with installed capacity of 240 MW (2017), and others. • Focus on hydropower development, thermal electric power, solar energy and industrial plants energy in order to turn the power sector into a sustainable income-generating sector to support various productions and contribute to poverty alleviation. • Implement policy and regulation to ensure that the revenues derived from mining contribute to the social and economic development of the Lao PDR population. • Promote mineral processing and reduce the export of unprocessed minerals to increase the value of mineral products.
Outcome 1, Output 3 – Integrated development planning and budgeting	• Mobilize and promote domestic and foreign private sector investments, including hydropower construction, mining, SEZ and UEZ development, processing industries, construction materials, vehicle spare parts assembly industries, tourism development and railway construction.
Outcome 1, Output 7: Regional and	• Ensure that the energy sector is sustainable and regionally competitive. • Ensure access to reliable electricity (no blackouts/brownouts), and focus on achieving a more diversified energy mix.

international cooperation and integration	• Research new power sources and increase the use of renewable energy and other alternative energy sources (solar power, wind power, bioenergy, biogas) with a focus on remote regions. • Combine energy generation with the protection of forests and water sources. • Continue mining survey and concession inventory. • Expand electricity coverage to 90% in rural, remote and hard-to-access areas by 2020. • Continue to develop energy for export. Three projects are under construction with a total power installation of 3,428 MW: Hongsa Lignite Thermal Power Project (1,878 MW), Xayyaboury Hydro Project (1,260 MW) and Xe Khaman 1 Hydro Project (290 MW). • In the next five years, finalize project and concession development agreements to commence the construction of 24 projects, and expand the electricity sector by an average of 32% per year. • Reduce the negative balance of electricity export and import by limiting electricity imports to no more than 20% of the country's usage by 2020. • Conduct a study and develop a master plan for rural electricity, focusing on small-scale hydropower projects, or on solar power or diesel power generation where hydropower projects are not feasible.
Outcome 3, Output 1: Environmental protection and sustainable natural resources management	• Manage mineral resources. • Conduct land surveys and allocation, and establish mechanisms and databases on mineral resources (50% of pending areas). • Estimate the extent of mineral deposits, and plan and designate 12 conservation areas for the protection of minerals over an area of 27,950.82km^2. • Complete the improvement of the laboratory and geological museum.

6.5.4 Initiatives Proposed by Technical Experts for Energy and Mines

Many of the initiatives proposed by technical experts are in line with those listed in the 8th NSEDP. The technical experts suggested enhancing rural and remote areas' access to electricity by developing small-scale hydropower and solar projects of less than 1 MW. Such off-grid renewable sources avoid costly grid extensions, and the major investments required for centralized electricity generation. Off-grid solutions, such as micro-hydro and solar installations, have the additional benefits of minimizing electricity losses associated with long distance transmission, avoiding resettlement conflicts, as well as reducing fish losses and related protein deficiencies associated with large-scale hydropower. An example of such projects (although larger than the proposed scale) is the installation of the 10 MW solar complex outside Vientiane with rural grid connection. The technical experts also proposed an initiative to evaluate the feasibility and impacts of a floating solar farm on Nam Ngum 1.

A comparison of the initiatives listed in the 8th NSEDP and suggested by technical experts is provided in Table 32 in Appendix 8.7.

6.5.5 Recommendations

Based on the projects suggested by technical experts during the interviews and projects detailed in the 8th NSEDP, the following recommendations for the energy and mines sector have been developed:

1. Promote off-grid renewable energy, such as small-scale (less than 1 MW) micro-hydro and solar installations, to increase electricity access in rural and remote areas. The provision of microfinance

services to assist households and communities in acquiring and maintaining the necessary equipment, particularly in remote areas, is an important support mechanism for successfully increasing electrification using renewable sources.

2. Seek technical and financial assistance to standardize the protocols and implementation checks used in concession negotiations and agreements. Such an initiative should aim to assist the Lao PDR (MPI or MoNRE) complete a comprehensive and accessible concession inventory. The lack of an inventory severely constrains rigorous evaluation of concession management and performance. Furthermore, assistance should be provided to MEM to coordinate concession agreements and their enforcement between district, provincial and central authorities.

3. Assess the costs and benefits associated with measures to enhance energy efficiency in the Lao PDR. Previous modeling suggests significant energy savings are achievable with a well-designed and well-implemented energy efficiency strategy and policy. However, more robust analysis for the Lao PDR is needed.

4. In line with the recommendations made for other sectors, develop tools for spatial analysis to support decision-making, as well as planning and management of sustainable use of natural resources, including land, forests, minerals and water. Use of such tools across different ministries and departments can support cross-sectoral coordination.

5. In line with the recommendation for the forestry and land use sector, increase resource rents and royalties paid by mining companies. As in other sectors, developers do not currently pay for access to the entirety of affected natural resources (and subsequent losses) as part of concession arrangements. Therefore, it is recommended that concessions account for the full costs reflecting the value of the entirety of affected resources.

6.6 Education

6.6.1 Relevance of Education in the Lao PDR

Workshop participants and technical experts understood education in the context of the GGPA to be much more than formal primary, high school and college or university training. Education was viewed as central to the effectiveness and performance in many sectors and green growth areas discussed in this report. In that respect, education represents the primary green growth connective element, and therefore assumes prominence in the development of green growth strategies and interventions for the Lao PDR.

Education was viewed by workshop participants and technical experts as the catalyst for elevating households out of poverty, although the characteristics of household entitlements, endowments and capacities were seen as critical factors. Vocational training to improve the skills of the Lao PDR labor force was considered as equally important as academic training. A focus was placed on ensuring that labor skills align with the imperative to expand the current value chain and include more activities related to the processing of natural resources and agricultural products.

Limited professional training, prevailing cultural traditions and constrained resources to balance increasing Western influences and the Lao PDR educational traditions are significant challenges for the Lao PDR policymakers in the education sector, as well as for teachers and students. Navigating between existing practices built on the residuals of the former colonial as well as royalist eras and the present socialist era remains an additional source of tension (Chounlamany 2014). The Lao PDR has implemented a series of constitutional amendments and decrees to address these challenges.

Article 19 of the Lao PDR Constitution states that, "educational, cultural, and scientific activities are the means to raise the level of knowledge, patriotism, love of the people's democracy, the spirit of solidarity between ethnic groups, and the spirit of independence." Article 22 asserts that, "the State and society shall endeavor to improve the quality of national education system, to create opportunities and favorable conditions for all the people to receive an education, particularly the inhabitants of remote and isolated areas, ethnic minorities, women, children, and disadvantaged persons."

The Decree on Compulsory Primary Education of 1996 formalized constitutional aspirations by making primary education free and compulsory for all children. All schools were mandated to comply with a national curriculum, standardizing minimum requirements of education for all schools. The Lao PDR Education Law (2000 and 2007) reasserts the right proclaimed in the Lao PDR Constitution that "all Lao citizens have the right to education without discrimination," and establishes that the government has a duty to expand education for "the development of Lao citizens' necessary knowledge and capacity for their occupation or further study." (Borgen Project 2015; State University 2017).

The MoES administers and manages the Lao PDR education services. The National Education System Reform Strategy (2006-2015) identified systematic changes required for the MoES to improve effectiveness in achieving "Education For All" (EFA) commitments. The EFA action plan has three major goals: (1) equitable access; (2) improved quality and relevance; and (3) strengthened education management for formal and non- formal education at all levels (EFA 2015). The MoES has commenced the revision of its organizational structure to enhance the implementation of educational development and EFA goals. To further improve the effectiveness of educational development, the GoL drafted the Educational Sector Development Plan 2011- 2015 to complement the Reform Strategy.

The four key performance indicators used in the 2014-2015 EFA assessment (see Table 17) suggest the Lao PDR has succeeded in meeting national targets for pupil-teacher ratios (24 compared to the target of

33) and net enrollment rates (98% compared to the target of 97.8%). The net intake ratio and survival rate to last grade of primary school, however, have remained below national targets.

Table 17 Assessment of Indicators for Primary Education

Key Indicators	National Plan Target (2015)	Performance Indicators		Difference (Target-2014)
		2006	2014	
Net Intake Ratio	100%	70.4%	96.3%	-3.7%
Net Enrollment Rate	97.8%	86%	98.0%	+0.2%
Survival Rate to Last Grade of Primary	95%	61.6%	77.5%	-17.5%
Pupil Teacher Ratio	33	31	24	+7

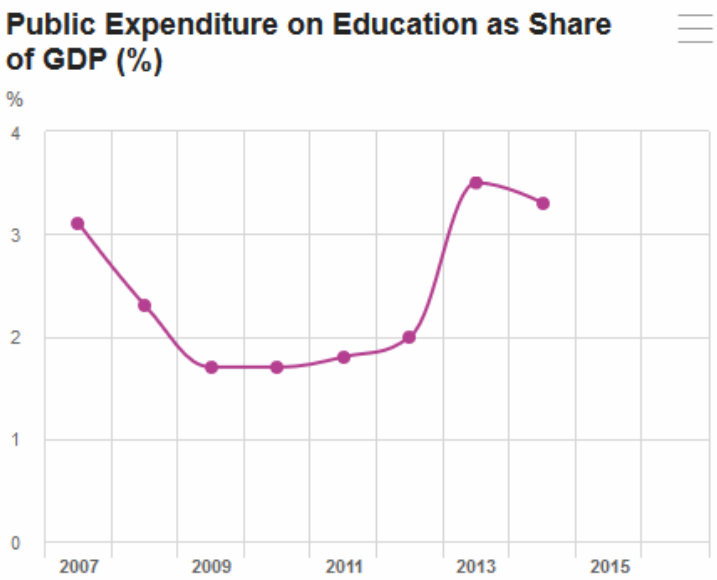
Source: EFA 2015

EFA (2015), Chounlamany (2014) and Hays (2014) noted the Lao PDR educational system is evolving under severely constraining conditions, including inadequately prepared and poorly paid teachers, insufficient funding, shortages of facilities, and an often ineffective allocation of the limited resources available. There are significant geographic, ethnic, gender and wealth disparities in the distribution of educational services, and inequalities exist at every level of the system (EFA 2015). For example, the 2012 literacy rate for females aged 15-24 years ranged from 28% (poorest respondents) to 94% (wealthiest respondents) — the mean was 69%. Literacy evaluation for young males was not conducted.

Educational disparities are narrower in urban areas, while gaps between rural and urban areas are considerable. The rural areas record some of the lowest educational indicators in the country, and the gaps continue to widen (Hays 2014). Those living in remote areas are the most disadvantaged and cut off from services, many of whom are ethnic groups. Indeed, a significant proportion of children — especially girls and ethnic groups in remote areas remain out of school.

Some of these findings are confirmed by other sources. The World Bank estimated the Lao PDR's public expenditure on education was 3.3% of GDP (see Figure 31) compared to 1.9% in Cambodia, 4.1% in Thailand and 5.7% in Vietnam (all 2014 values). Considering the differences in GDP per capita and assuming similar age structures among the populations of these four countries, public spending on education in the Lao PDR has been significantly lower than in Thailand and Vietnam.

Figure 31 Public Expenditure on Education, 2007-2014



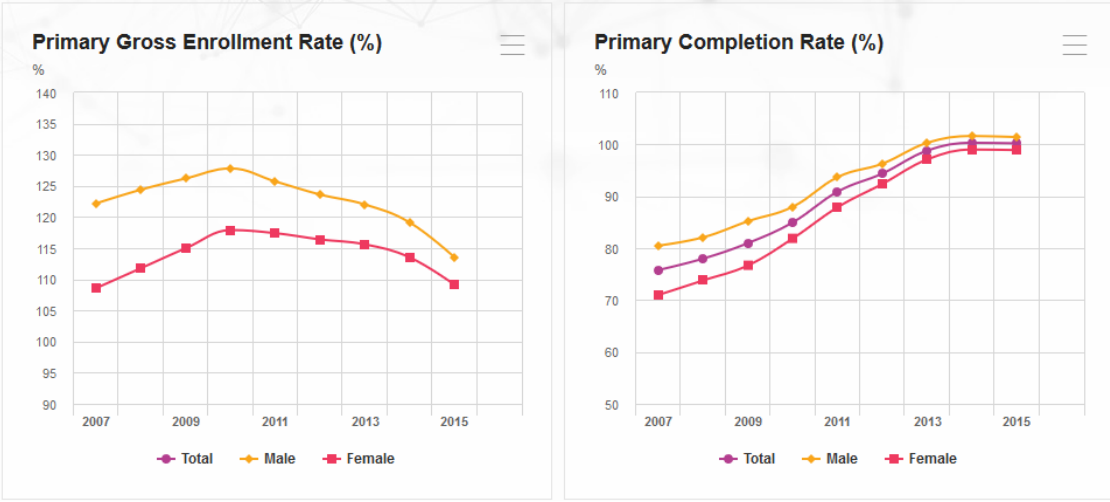
Source: Global Partnership for Education 2017, derived from World Bank data

EFA (2015) estimated the Lao PDR's public expenditure on education was 4.7% of GDP in 2013, an expenditure increase of 1.7 percentage points compared to 2006 (3% of GDP), and 2.3 percentage points since 2002 (2.4% of GDP). Education expenditure represented

16.7% of the 2013 national budget. The discrepancies in the World Bank and EFA estimates suggest either different estimating methods, or inadequacy of data sources.

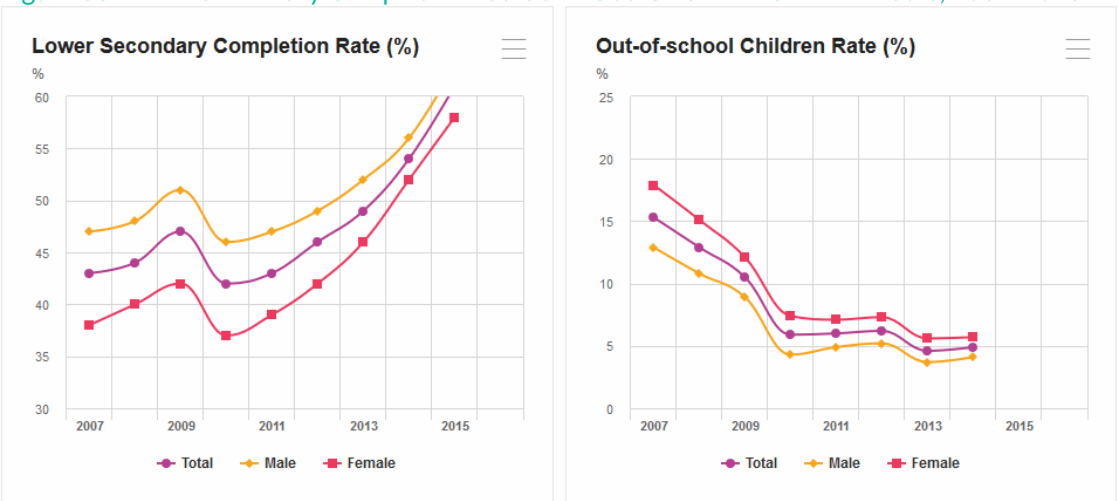
The Global Partnership for Education has developed a set of country specific education measures based on data collected by the World Bank. It includes primary gross enrollment rate,[17] primary completion rate, lower-secondary completion rate and the proportion of out-of-school children. The data suggests the Lao PDR has reached the national target of 100% primary school completion (see Figure 32). Although the national targets for secondary school completion and out-of-school rate are not reported, the data indicates substantial advances during the period from 2007 to 2015 for both these measures (see Figure 33). But while the gender gap for enrollment rates and completion rates have generally decreased, data shows that significant differences remain when looking beyond primary education.

Figure 32 Enrollment Rates and Primary Completion Rates, 2007-2015



Source: Global Partnership for Education 2017

Figure 33 Lower-Secondary Completion Rates and Out-Of-School Children Rates, 2007-2015

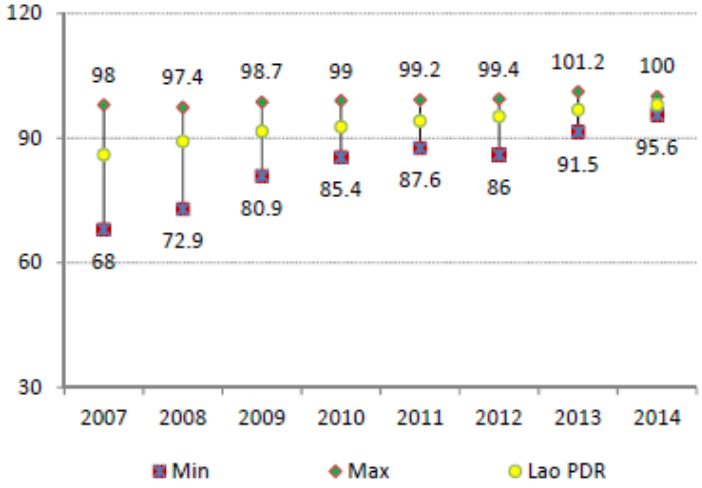


Source: Global Partnership for Education 2017

[17] UNESCO defines gross enrollment rate as the total enrollment within a country in a given level of education, regardless of age, expressed as a percentage of the official school-age population corresponding to the same level of education. http://uis.unesco.org/en/glossary-term/gross-enrolment-ratio.

The net enrollment rate in primary education, a key indicator of education development, has steadily increased in the Lao PDR, and in 2015, the national target of 98% was achieved. The gender disparity in primary net enrollment rate was minimal in 2013-2014 — 97.6% for female and 98.4% for male — but disparities were more apparent in provincial-level comparisons. In contrast to Hays (2014), the EFA (2015) minimum-maximum comparisons from 2007 to 2014 indicated that provincial disparities have been decreasing (see Figure 34). EFA (2015) reported that disparities in repetition rate[18] have been more pronounced than in the net enrollment rate. Aggregate minimum repetition rates for 2015 were 2.1% compared to 14.4% maximum, with repetition rates for male students being slightly higher than for female students.

Figure 34 Net Enrollment Rates, 2007-2014



Source: EFA 2015

Equality in the education sector is not limited to giving students access to the system, independent of their gender, ethnicity or social background. Equality is also a relevant issue when looking at teachers. Available data shows that pre-school education is dominated by female instructors, while the share between female and male teachers is balanced in primary and secondary schools. University education shows a lower presence of female teachers, with a share of less than 40%. The total number of female and male teachers across all education levels is shown in Table 18.

Table 18 Number of Female and Male Teachers by Education Level

	Number of Teachers by Education Level							
	Pre-Primary		Primary		Secondary		University	
	Female	Male	Female	Male	Female	Male	Female	Male
Public	8,520	110	17,116	17,059	17,611	17,287	469	740
Private	2,679	22	1,551	343	1,197	547		

Source: MoES 2017

EFA (2015) and Chounlamany (2014) suggested two additional constraints on education development and quality. Firstly, as teachers are paid irregularly (as are other public servants) they are forced to spend substantial time farming or engaged in other livelihood activities, which means that in many locations classes are actually held for only a few hours a day. Secondly, the multiple purposes of primary and secondary education and the different languages spoken by students adds an additional layer of complexity to improving the quality and relevance of education in the Lao PDR. Hays (2014) argued that:

> Graduation of local people is needed for future supply of teachers and other skilled workers, but also to improve the productivity of subsistence farmers. The former requires an

[18] UNESCO defines repetition rate as the number of repeaters in a given grade in a given school year, expressed as a percentage of enrollment in that grade the previous school year. High repetition rate reveals problems in the internal efficiency of the educational system and possibly reflect a poor level of instruction. http://uis.unesco.org/en/glossary-term/repetition-rate-grade.

academic approach linked to transition to secondary and tertiary education, while the latter requires a greater focus on basic technology and applied science. In the context of poor subsistence farming communities, literacy and numeracy as the sole aims of primary education are not enough, particularly among ethnic minorities where Lao is not the first language and where their own language has no written form. In such communities, there is a need to introduce content of primary education that will directly improve their income and living condition.

6.6.2 8th NSEDP Initiatives for Education

The 8th NSEDP lists a suite of initiatives to achieve the education and vocational objectives for the next five years in the Lao PDR (see Table 19). In summary, the main targets include the following:

- The existing infrastructure is to be enhanced for kindergartens, primary schools, secondary schools, vocational schools and technical schools. Laboratories and other necessary rooms are to be built to focus less on learning-by-theory/rote learning and more on experiential learning and practice.

- The quality of learning, teachers and teaching tools is to be improved. More vocational teachers are needed while standardized tests should allow students to obtain comparable certificates.

- The educational administrative system is to be improved, from the central to the provincial level.

- Scientific research and the application of research results into practice as an active learning and teaching process are mentioned as priorities in order to raise the quality of education.

- The curriculum for vocational and university education should be updated and improved.

- International cooperation is to be increased in order to mobilize financial and technical assistance for the development of labor skills and the quality of the labor force.

Table 19 Initiatives for Education Listed in the 8th NSEDP

Education	
Outcome 1, Output 5 – Improved public/private labor force capacity	• Increase well-regulated and efficient recruitment by collaborating with technical and vocational education and training (TVET) institutions in improving the teaching-learning curriculum, aligning it with the development situation and responding to employers' demands. • Provide skills development to 658,000 people. • Test and issue skill standards certificates for 10 professions in the construction area, 7 professions in automobiles, 6 professions in information technology and 4 professions in tourism.
Outcome 1, Output 6: Develop entrepreneurs, technical experts and professionals	• Build at least one technical school in each province, and upgrade technical schools in some provinces, if applicable, to colleges that can provide training at various levels in many more ways. • Create more opportunities to enroll in vocational schools and training courses for 60% of graduates at general education level. • Focus on improving and updating curriculum for vocational and university education. • Develop the capacity of vocational teachers in various professions (technical specialization and pedagogy) at different levels, domestically

	and internationally, and provide sufficient employment opportunities in vocational and training institutions across the country.
Outcome 2, Output 3: Universal access to quality education	• Develop the basic educational infrastructure, especially extending kindergartens and primary schools in villages without permanent schools, extending lower- and upper-secondary schools, improving the quality of education and sports, and building a vocational school for each region. • Improve the quality of learning and teaching by improving teacher quality and improving learning-teaching tools, and build laboratories and other necessary rooms to focus less on learning by theory and more on learning by actual experiment and practice. • Improve the educational administrative system from central to the provincial level. • Prioritize more scientific research and the application of research results in the learning and teaching process to raise the quality of education. • Prioritize the improvement of physical learning, in particular, enhance the capacity of trainers and selected athletes with talent to join the national sports teams. • Provide school meals. They are a pull factor for education and a social safety net for children in remote and rural areas.
Outcome 2, Output 6: Protection of national traditions and cultures	• Increase coordination between central and provincial governments in improving the curriculum on tourism for each level of higher education, including bachelor's degree courses.
Outcome 3, Output 1: Environmental protection and sustainable natural resources management	• Encourage the development and utilization of an environmental studies curriculum at all levels of education.

6.6.3 Initiatives Proposed by Technical Experts for Education

Teacher development in all regions, on-the-job training, ongoing and overseas deployments, and formal support by concession holders are initiatives recommended by technical experts. Additional suggestions included projects to develop skills that match the demands of high-value processing, and the establishment of partnerships between educational institutions and the business sector to develop curricula and degrees in sustainable development and subjects related to climate change. These initiatives are in line with the 8th NSEDP (see Table 32 in Appendix 8.7).

6.6.4 Recommendations

Based on the projects suggested by technical experts during the interviews and projects detailed in the 8th NSEDP, the following recommendations for education have been developed:

1. Promote partnerships between educational institutions and the business sector to develop interdisciplinary curricula and degrees in sustainable development, nature-based tourism and natural resource management.

2. Integrate subjects related to different aspects of climate change into primary, secondary and university education, with emphasis at high school level as it can reach a large proportion of the Lao PDR population and begin to change behaviors and attitudes toward the natural environment.

3. Promote vocational training programs through public-private partnerships to improve the match between labor skills and business demands, improve household incomes, and increase economic output and tax revenues. For example, there is a strong impetus for the Lao PDR to increase value-adding activities and processing of its natural resources, which requires skilled labor that is currently not available.

4. Train more women as teachers, trainers, entrepreneurs and university lecturers to correct the current gender imbalance.

5. Conduct more scientific research and encourage the application of research results in the learning and teaching process to raise the quality of teacher and student education.

7. Conclusion

GGGI together with the World Bank is assisting MPI and NIER in drafting a national green growth strategy. Conducting a GGPA is an essential part of this process. The combination of quantitative analysis and stakeholder consultation allows the identification of relevant green growth interventions. It also allows for a systematic analysis of the economic, environmental and social dimensions of green growth, while ensuring government ownership. The rationale behind this inclusive process is to build the country's green growth agenda by giving the government and other stakeholders the leading role in the process, as opposed to externally-imposed solutions.

The primary objectives of the GGPA of the Lao PDR were to:

- Identify a set of green growth priorities shared across the Lao PDR ministries;
- Identify the primary sectors associated with the management of these green growth priorities;
- Identify green growth initiatives to assist the Lao PDR improve the performance in the selected priority areas and sectors; and
- Provide an evidence-based contribution to the formulation and effective implementation of green growth policy and institutional arrangements in the Lao PDR.

This report described the process and results of the GGPA. It synthesized the results of all three elements of the assessment process, including: (1) the findings of the initial data analysis; (2) the outcomes of the stakeholder consultation, with green growth priorities identified by the Lao PDR ministries; and (3) potential entry points and a series of recommended interventions in relevant sectors. Based on the results of this assessment, GGGI aims to support the GoL in translating its findings and recommendations into formulating its national green growth strategy, articulating concrete policies and developing bankable projects.

Relevant initiatives, interventions and recommendations were identified and formulated based on two criteria. Firstly, recommendations were based on the goals set out in the 8th NSEDP and the suggestions made by technical experts during consultation. Establishing the conjunction of the 8th NSEDP with the suggestions by technical experts was regarded as a criterion that had the highest probability of identifying recommendations that will be considered as relevant to advancing green growth in the Lao PDR. Technical experts emphasized that green growth initiatives must align with the 8th NSEDP to avoid rejection or project failure. This will also be important when using the results of the GGPA as an input to formulate the Lao PDR's national green growth strategy. This strategy and the interventions envisioned in it should build on the actions mentioned in the 8th NSEDP. However, these need to be adjusted or refined in terms of their effectiveness in achieving green growth goals for the Lao PDR. A summary of the initiatives listed in the 8th NSEDP and suggested by technical experts for each sector is provided in Table 32 in Appendix 8.7.

Secondly, recommendations were selected and formulated based on their potential to successfully address problems that are common to multiple sectors, as improving coordination across sectors and ministries is a central aspiration articulated by both technical experts and the 8th NSEDP (see Table 33 in Appendix 8.7).

A summary of the recommendations suggested in this report is provided below.

Agriculture and Fisheries

1. Develop projects that promote community participation in climate-smart agriculture and forestry, and are guided by data analysis and research. To support this set of projects, actively promote and invest in agricultural modernization through targeted small-scale irrigation and the introduction of modern seed/fertilizer technologies. At the same time, offer training in ecologically-based, climate-adapted farming approaches, and increase public expenditures in agricultural research and extension services. Undertake research to understand the capacity, as well as the prevailing cultural and behavioral impediments, to adapt to changed livelihood conditions and activities.

2. Reconsider investments to expand large-scale irrigation, which often privileges the land holding elite and disadvantages the most vulnerable and poor (see for example, Kandulu and Connor 2017; Smajgl and Ward 2013). Irrigation infrastructure should not be limited to large dams. Instead, it is recommended to rely on a combination of targeted small, medium and large irrigation projects that address multiple aspects of green growth, and align with biophysical, ecological and economic needs.

3. Invest in projects to develop and train agencies in integrated spatial land-use planning tools. Spatial planning can be used to improve green growth performance in several areas, as follows:

    - Map areas at potential risk from disasters, including floods, droughts, landslides, and disease outbreaks in plant and animal populations.
    - Address land-use suitability to assist the Lao PDR rice farmers in diversifying into high-value rice and crop production, such as specialty coffee and organic products.
    - Undertake spatial land-use mapping to provide secure title deeds to farmers, and improve farmers' access to financial services (including savings, credit and insurance), which is likely to contribute to higher farm incomes and income stability.
    - Carry out assessments and analyses to minimize social and economic losses associated with poorly planned or ad hoc decisions. For example, assess large agricultural concessions to ensure they create skilled employment, allow technology transfer to small farm enterprises, and discourage farmers from migrating to non-farm jobs, which can add to urban congestion and poverty.

4. Improve agricultural extension services, particularly in the following ways:

    - Provide farmers with business and marketing services such as market information, product packaging and certifications. A clear delineation of extension roles and agency responsibility will avoid costly duplication of such services.
    - Since the exposure to agrochemicals is currently the third most important public health issue in the Lao PDR (Ministry of Health personal communication, April 2017), pilot a scheme, potentially using smartphone technologies, to teach farmers and district extension staff about the safe use of agrochemicals.

5. In line with the recommendations for the energy sector, develop pilot small-scale hydropower and other renewable energy projects to reduce losses in capture fisheries associated with large-scale hydropower development. Fish catch is a critical protein source that can reduce the incidence of malnutrition — one of the main obstacles to the Lao PDR's graduation from LDC status.

Forestry and Land Use

1. Consistent with the other sectors, conduct a comprehensive review of land-forest concessions and regulatory instruments, and compile a concession inventory. The review should address or remove inconsistencies observed between provincial interpretation, implementation and enforcement, and clarify the roles and responsibilities across ministries. The technical experts emphasized the Lao PDR's need for assistance to develop enforceable guidelines to clarify the responsibilities of forestry and plantation concession holders in: (1) protecting environmental and social values; (2) avoiding or minimizing negative impacts; and (3) ensuring extensive community consultation. These guidelines should specify support mechanisms that allow for effective enforcement, including the suspension or termination of concessions that consistently fail to meet audits and regulatory requirements or deliver environmental and social benefits. Any new regulation should ensure that communities affected by a specific project have access to independent arbitration.

2. Develop and train the Lao PDR agency staff in tools for spatial analysis to support decision-making and manage the sustainable use of natural resources, with the aim to improve the capacity of relevant ministries to effectively review, monitor and enforce concession compliance, as well as carry out EIAs and SIAs, among others.

3. Explore potential PES and MES. PES generally represent government or philanthropic subsidy programs with ongoing maintenance and transaction costs. MES rely on independent market transactions between buyers and suppliers, but generally require more stringent tenure rights and contracting conditions. Both options warrant further exploration as viable financial mechanisms to balance the imperatives of conservation and utilization.

4. Encourage private-public partnerships in the development of training programs to ensure that the Lao PDR skilled labor force could contribute to high-value wood processing. This might also include overseas deployments.

5. Encourage community forest restoration. Recognizing customary ownership structures, community forest restoration promotes awareness of the importance of functioning forest ecosystems to livelihoods. Thereby, it fosters the adoption of sustainable forestry. Village-Based Forest Associations that are consistent with ADB projects would be effective partners in this initiative.

6. Establish supply chain mechanisms that document compliance with regulatory requirements, including reporting requirements on processors and exporters of timber products. The technical experts suggested the documentation of timber supply and processing chains as a first step in reducing illegal logging and exports.

7. In line with recommendations for other sectors, increase resource rents and royalties. Developers do not currently pay for access to the entirety of affected natural resources (and subsequent diminishment of those resources) as part of concession revenues. Currently, developers pay 5-6% royalty but only for a single resource — water. The technical experts suggested retaining the current royalty contribution, and in addition, introduce non-market valuations and full-cost accounting in order for concessions to reflect the value of the entirety of affected resources.

Tourism

1. Attract tourists beyond current target markets (i.e., Thailand and Vietnam) through strengthened business associations with experienced high-end tourist operators in other ASEAN countries. The

tourism sector needs broadening in terms of attracting more tourists from high-income countries and having them spend more time in-country, in order to enhance the sector's revenue. Design these collaborations in a way that ensures management by the Lao PDR nationals, conserves the aesthetics of tourist attractions and minimizes tourist revenue leakage.

2. Set up tourism management programs to develop high-value and sustainable tourist sites. The quality of the Lao PDR tourism products does not currently correspond with consumer demands, particularly the increasing numbers of high-spending Korean and non-Asian tourists. The GoL has identified new sites and new directions for tourism, such as eco-tourism, adventure-related and cultural tourism. The mountain and sub-mountain terrain is ideally suited to these tourism opportunities.

3. Build capacity of tour operators and local authorities to ensure that tour operations do not cause ecological damage or impinge on cultural traditions (particularly cultural traditions of vulnerable ethnic minorities). In this context, the development of eco-tourism field guides is recommended.

4. Implement a vocational training program to develop a skilled labor force and foster the professional management of tourism operations, as well as a university degree in nature-based, cultural and sustainable tourism.

5. Increase tourism-related resource rents and royalties where applicable. Developers do not currently pay for access to the full suite of affected natural resources (and subsequent losses) as part of concession revenues. Therefore, it is recommended that concessions account for the full costs, reflecting the value of the entirety of affected resources.

Urban Development and Transport

1. Establish a shared planning vision and objectives for the Lao PDR urban centers, and align urban planning with a green growth model, in order to balance current and projected urban growth with conserving/establishing green spaces. An example is the conservation of wetlands for urban drainage and biodiversity. Other shared objectives could include, restrictions on building height, flood mitigation construction, energy saving in buildings, strengthened protection of architectural heritage (such as Luang Prabang) and enforcement of development zones.

2. Promote the use of non-motorized transport (i.e., bicycles and foot traffic) as it continues to be an important means for mobility in the Lao PDR, and represents an important dimension among green mobility options. Therefore, the investigation of opportunities to improve facilities for cyclists and pedestrians for better and safer mobility is recommended. In this context, a comprehensive parking strategy, though not a green growth intervention in itself, can support non-motorized transport. Parking is a key aspect of congestion and one of the serious constraints to cyclists and pedestrians, particularly in Vientiane. Cars park on footpaths as well as on the road, meaning that pedestrians are forced to walk on the road, while cycling carries severe risks of collisions.

3. Addressing urban transport challenges has been identified as a priority by the GoL. In this context, improve access to public transport and move toward lower carbon transport options. Firstly, an integrated public transport system will be essential for Vientiane and subsequently for other cities, in which services can be provided by one or more state or private entities. As a step in this direction, a public-private partnership project is recommended that coordinates bus routes with the travel requirements of public servants and school children, in order to reduce traffic congestion and contribute to the financial stability of private bus operators. Secondly, as part of the move toward

lower carbon transport options, identify practical ways and support mechanisms to introduce electric vehicles, including electric buses, motorcycles and *tuk-tuks* to incrementally replace the current fleet. Pilot projects could involve hotels and travel agencies, as well as public servants.

4. Incorporate traffic management and improvement of urban roads into comprehensive urban development planning so that land-use decisions facilitate rather than hinder integrated transport solutions.

5. Increase waste collection rates, as well as divert waste from landfills by promoting recycling. In this context, support for public-private partnerships that develop sustainable business models to overcome current disincentives for private companies is recommended. Private business waste collection and recycling is currently unsustainable (particularly in Vientiane), mainly because revenues are insufficient. Furthermore, support the set-up of decentralized wastewater treatment systems to enhance sanitation and public health. Community-based decentralized wastewater treatment systems are a fast and cost-effective solution to improve sanitation conditions in urban areas.

6. As recommended for other sectors, develop spatial planning tools to support decision-making, and provide training for local practitioners in the use of these tools. Promote standardized use across sectors, provinces and municipalities, including the collection and sharing of relevant data.

Energy and Mines

1. Promote off-grid renewable energy, such as small-scale (less than 1 MW) micro-hydro and solar installations, to increase electricity access in rural and remote areas. The provision of microfinance services to assist households and communities with these installations, particularly in remote areas, is an important support mechanism for successfully increasing electrification using renewable sources.

2. Seek technical and financial assistance to standardize the protocols and implementation checks used in concession negotiations and agreements. Such an initiative should aim to assist the Lao PDR (MPI or MoNRE) complete a comprehensive and accessible concession inventory. The lack of an inventory severely constrains rigorous evaluation of concession management and performance. Furthermore, assistance should be provided to MEM to coordinate concession agreements and their enforcement between district, provincial and central authorities.

3. Assess the costs and benefits associated with measures to enhance energy efficiency in the Lao PDR. Previous modeling suggests significant energy savings are achievable with a well-designed and well-implemented energy efficiency strategy and policy. However, more robust analysis for the Lao PDR is needed.

4. In line with the recommendations made for other sectors, develop tools for spatial analysis to support decision-making, as well as planning and management of sustainable use of natural resources, including land, forests, minerals and water. Use of such tools across different ministries and departments can support cross-sectoral coordination.

5. In line with the recommendation for the forestry and land use sector, increase resource rents and royalties paid by mining companies. As in other sectors, developers do not currently pay for access to the entirety of affected natural resources (and subsequent losses) as part of concession

arrangements. Therefore, it is recommended that concessions account for the full costs reflecting the value of the entirety of affected resources.

Education

1. Promote partnerships between educational institutions and the business sector to develop interdisciplinary curricula and degrees in sustainable development, nature-based tourism and natural resource management.

2. Integrate subjects on different aspects of climate change into primary, secondary and university education, with emphasis on climate change education at high school level as it can reach a large proportion of the Lao PDR population and begin to change behaviors and attitudes toward the natural environment.

3. Promote vocational training programs through public-private partnerships to improve the match between labor skills and business demands, improve household incomes, and increase economic output and tax revenues. For example, there is a strong impetus for the Lao PDR to increase high-value processing of its natural resources, which requires skilled labor that is currently not available.

4. Train more women as teachers, trainers, entrepreneurs and university lecturers to correct the current gender imbalance.

5. Conduct more scientific research and encourage the application of research results in the learning and teaching process to raise the quality of teacher and student education.

8. Appendices

8.1 GGPA Performance Indicators, Associated Metrics and Sources

Table 20 Green Growth Indicators, Units and Data Sources

Theme	Sub-Theme	Area	Indicator	Unit	Description	Source
Resource Efficient Growth	Energy Efficiency	Energy Intensity	Energy Intensity of the Economy	MJ / unit of GDP (2011 USD PPP)	Energy intensity indicates how much energy is used to produce one unit of economic output. It is the ratio between total primary energy supply (TPES) and GDP. TPES is defined as energy production plus energy imports, minus energy exports, minus international bunkers, minus stock changes. GDP is measured at purchasing power parity (GDP: 2011 USD PPP). http://data.worldbank.org/indicator/EG.EGY.PRIM.PP.KD	World Bank
		Electricity Losses	Transmission and Distribution Losses of Electricity	% of output	Electricity losses refer to transmission and distribution losses. This includes both technical and non-technical losses. Technical losses are caused by physical characteristics of the grid and the electricity generating system. The amount of losses is mainly dependent on the size of the country (length of power lines), voltage of transmission and distribution, and quality of network. Transmission and distribution losses comprise of all losses due to transport and distribution of electrical energy, including losses in overhead transmission lines and distribution networks, as well as losses in transformers that are not considered as integral parts of the power plants. Non-technical losses mainly refer to electricity theft. http://data.worldbank.org/indicator/EG.ELC.LOSS.ZS	

Resource Efficient Growth	Resource Productivity	Material Intensity	Material Intensity	kg of domestic consumption / unit GDP (constant 2005 USD)	Material intensity refers to the quantity of material used to produce goods and services. It is the ratio between GDP and the total amount of domestically extracted/produced materials (construction and industrial materials, minerals, metal, ores, fossil fuels and biomass). It does not account for any amounts of imported and exported materials. http://www.materialflows.net/data/datadownload (flow type "Extraction" flow sub-type "Used" reference parameter "Per GDP", GDP in constant 2005 USD)	SERI
		Waste Generation	Municipal Solid Waste Generation Intensity	kg of waste / unit of GDP (constant 2005 USD)	Municipal solid waste is defined as the waste produced by households. It includes similar waste generated by commerce, offices and public institutions. The indicator is defined as the ratio between GDP (at constant 2010 USD) and the amount of municipal solid waste collected by or on behalf of municipal authorities and disposed of through the waste management system. The indicator does not capture any informal waste collection. http://www.atlas.d-waste.com (for municipal solid waste generation) http://data.worldbank.org/indicator/NY.GDP.MKTP.KD (for GDP)	Dwaste, World Bank
		Waste Recycling	Recycling Rate of Solid Waste	% of waste generated (constant 2010 USD)	Recycling rate of municipal solid waste refers to the amount of municipal solid waste (MSW) recycled as a proportion of total MSW generated and collected within the formal waste sector. http://www.atlas.d-waste.com	Dwaste
		Water Productivity	Water Productivity	unit of GDP / m^3 of freshwater withdrawal (constant 2010 USD)	Water productivity indicates how water intense a country's economy is. It is defined as GDP (in constant 2010 USD) divided by the total annual freshwater withdrawal. http://data.worldbank.org/indicator/ER.GDP.FWTL.M3.KD	World Bank
		Land-Use Productivity (Agriculture)	Agricultural Land Productivity	unit of GDP / km^2 (constant 2004-2006 USD)	Agricultural land productivity is defined as agricultural production divided by total area of arable land under permanent crops and under permanent pastures. The economic value of agricultural output has been calculated by multiplying gross production in	FAO, World Bank

					physical terms by output prices at the farm gate. Since intermediate uses within the agricultural sector (seed and feed) have not been subtracted from production data, this value of production aggregate refers to the notion of "gross production". http://faostat3.fao.org/download/Q/QV/E (gross production value constant 2004-2006) http://data.worldbank.org/indicator/AG.LND.AGRI.K2 (for further description of agricultural land)	
Eco-Friendly Growth	Other Productivity Factors	Labor Productivity	Labor Productivity	unit of GDP / worker (constant 2005 USD)	Labor productivity is defined as the total volume of output (measured in terms of GDP) produced per unit of labor (measured in terms of the number of employed persons) during a given time reference period. The economically active population comprises all persons of either sex, ages 15 and older who furnish the supply of labor for the production of economic goods and services as defined by the United Nations System of National Accounts during a specified time-reference period. http://www.ilo.org/global/statistics-and-databases/research-and-databases/kilm/lang--en/index.htm https://stats.oecd.org/glossary/detail.asp?ID=730	ILO
		Logistics Performance	Logistics Performance Index	1 - 5 (higher scores indicate better performance)	Logistics performance measures countries' performance in six areas that capture the most important aspects of the current logistics environment (efficiency of customs clearance process, quality of trade- and transport-related infrastructure, ease of arranging competitively priced shipments, quality of logistics services, ability to track and trace consignments, and frequency with which shipments reach the consignee within the scheduled time). http://data.worldbank.org/indicator/LP.LPI.OVRL.XQ http://siteresources.worldbank.org/INTLAC/Resources/ConnectingtoCompete.pdf	World Bank
		Technology	Technological Readiness	1 - 7 (higher scores indicate higher readiness)	Technological readiness is a proxy to measure the agility with which an economy adopts existing technologies to enhance the productivity of its industries, with specific emphasis on its capacity to fully leverage information and communication technologies	WEF

Eco-Friendly Growth					(ICTs) in daily activities and production processes for increased efficiency and enabling innovation for competitiveness. Whether the technology used has or has not been developed within national borders is irrelevant to its ability to enhance productivity. The central point is that the firms operating in the country need to have access to advanced products and blueprints and the ability to absorb and use them. Among the main sources of foreign technology, FDI often plays a key role, especially for countries at a less advanced stage of technological development. The index covers the following areas: (1) technological adoption (availability of latest technologies, firm-level technology absorption, FDI and technology transfer); and (2) ICT use (internet users, broadband internet subscriptions, internet bandwidth, mobile broadband subscriptions, mobile telephone subscriptions and fixed telephone lines). http://www3.weforum.org/docs/gcr/2015-2016/Global_Competitiveness_Report_2015-2016.pdf	
	Quantity of Natural Assets	Fishing Pressure	Coastal Shelf Fishing Pressure	tons / km^2	Coastal shelf fishing pressure is defined as the total catch from trawling and dredging equipment divided by the total area of a country's exclusive economic zone. http://epi.yale.edu/sites/default/files/2016EPI_Raw_Data_0.xls	EPI
		Forest Cover Changes	Changes in Forest Cover	annual change (%)	Changes in forest cover capture the annual percent change in forest cover between 2005 and 2015. Forests are defined as land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10%, or trees able to reach these thresholds in situ. Areas that are predominantly under agricultural or urban land use is not included. http://faostat3.fao.org/download/R/RL/E	FAO
		Water Consumption	Water Stress Index	0 – 5 (higher scores indicate greater competition among users)	The Water Stress Index measures water stress, which is defined as the ratio between total annual water withdrawals (municipal, industrial and agricultural) and total renewable supply. The index serves as a proxy for the level of competition among users and depletion of the resource. Focusing on competition and depletion	WRI

Eco-Friendly Growth					makes this indicator an effective way to measure the hydrological context at the catchment scale. http://www.wri.org/sites/default/files/aqueduct_coutnry_rankings_010914.pdf	
		Natural Resource Depletion	Natural Resource Depletion	% of GNI	Natural resource depletion is defined as the sum of net forest depletion, fossil fuel depletion and mineral depletion, as a percentage of gross national income (GNI). Net forest depletion is unit resource rents times the excess of round wood harvest over natural growth. Fossil fuel depletion is the ratio of the value of the stock of fossil fuel resources to the remaining reserve lifetime (capped at 25 years). It covers coal, crude oil and natural gas. Mineral depletion is the ratio of the value of the stock of mineral resources to the remaining reserve lifetime (capped at 25 years). It covers tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite and phosphate. http://data.worldbank.org/indicator/NY.ADJ.DRES.GN.ZS	World Bank
	Quality of Natural Assets	Endangered Species	Threatened Species	number of threated species in a country/ number of threated species worldwide	This indicator serves as a proxy for measuring biodiversity and environmental conservation efforts. The indicator is defined as the number of threatened species, as defined by the International Union for Conservation of Nature (IUCN), in a country divided by the number of threatened species worldwide. http://cmsdocs.s3.amazonaws.com/summarystats/2016-3_Summary_Stats_Page_Documents/2016_3_RL_Stats_Table_5.pdf http://cmsdocs.s3.amazonaws.com/summarystats/2016-3_Summary_Stats_Page_Documents/2016_3_RL_Stats_Table_6a.pdf http://cmsdocs.s3.amazonaws.com/summarystats/2016-3_Summary_Stats_Page_Documents/2016_3_RL_Stats_Table_6b.pdf	IUCN
		Water Quality	Water Quality Index	0 – 100 (higher scores indicate higher quality)	The Water Quality Index uses three parameters to determine the water quality of a country's freshwater bodies, measuring nutrient levels (dissolved oxygen, total nitrogen and total phosphorus) and two parameters measuring water chemistry (pH and conductivity). http://www.epi.yale.edu/files/2010epi_data.xls	EPI

		Soil Quality	Trends in Soil Health Index	0 – 50 (higher scores indicate better soil health)	The Trends in Soil Health Index measures the physical part related to loss of soil mass and structure, and the long-term chemical well-being of the soil in terms of nutrients and absence of toxicities built up. http://www.fao.org/nr/lada/index.php?option=com_docman&task=doc_download&gid=773&lang=en	FAO
		Air Quality	Population-Weighted Exposure to $PM_{2.5}$	µg / m^3	The indicator measures the average exposure to $PM_{2.5}$, particles less than 2.5 micrometers in diameter. Three-year rolling population-weighted average of the $PM_{2.5}$ values are used to calculate indicators for national annual average exposure to $PM_{2.5}$ in micrograms per cubic meter. Population-weighted average exposure values are calculated using population data from the Global Rural Urban Mapping Project (2011) database. http://epi.yale.edu/sites/default/files/2016EPI_Raw_Data_0.xls	EPI
Climate Resilient Growth	Climate Change Mitigation	CO_2 Emissions	CO_2 Emissions Trend	annual growth rate (%)	CO_2 emissions trend captures a country's annual growth rate in national emissions of CO_2 over the latest five years available. http://data.worldbank.org/indicator/EN.ATM.CO2E.KT	World Bank
		Carbon Intensity	Carbon Intensity	$kgCO_2$ / unit GDP (constant 2010 USD)	Carbon intensity is defined as the amount of CO_2 emissions (stemming from the burning of fossil fuels and the manufacture of cement) per unit of gross domestic production (GDP in constant 2010 USD). http://data.worldbank.org/indicator/NY.GDP.MKTP.KD (for GDP) http://data.worldbank.org/indicator/EN.ATM.CO2E.KT (for CO_2)	
		Renewable Energy	Renewable Energy Production	% of total electricity output	Renewable energy production refers to the share of electricity generated from renewable sources of energy within total electricity generation, including geothermal, solar, tidal and wind power, as well as electricity generated from biomass and biofuels. It excludes hydroelectric sources. http://data.worldbank.org/indicator/EG.ELC.RNWX.ZS	
		Carbon Stock Changes	Carbon Stock in Living Forest Biomass	annual change in million tons	Annual change in carbon stock refers to the quantity of carbon contained in a reservoir or system of living forest biomass that has the capacity to accumulate or release carbon.	FAO

					http://www.fao.org/3/a-i4808e.pdfhttp://www.fao.org/docrep/013/i1757e/i1757e14.pdf	
Climate Resilient Growth	Climate Change Adaptation	Exposure	Climate Change Exposure	0 - 1 (higher scores indicate higher exposure)	Climate change exposure indicates the degree to which a society and its supporting sectors (defined as food, water, health, ecosystem, human habit and infrastructure) are exposed to significant climate change from a biophysical perspective. It is a component of vulnerability independent of socio-economic context. Exposure reflects projected impacts for the coming decades and is therefore invariant overtime. http://index.gain.org/ranking/vulnerability/exposure	ND-GAIN
		Sensitivity	Climate Change Sensitivity	0 - 1 (higher scores indicate higher sensitivity)	Climate change sensitivity indicates the degree to which a society and its supporting sectors (defined as food, water, health, ecosystem, human habit and infrastructure) are affected by climate-related perturbations. The factors increasing sensitivity include the degree of dependency on sectors that are climate-sensitive and proportion of populations sensitive to climate hazard due to factors such as topography and demography. http://index.gain.org/ranking/vulnerability/sensitivity	
		Adaptive Capacity	Adaptive Capacity to Climate Change	0 - 1 (higher scores indicate lower adaptive capacity)	Adaptive capacity to climate change reflects the ability of society and its supporting sectors to adjust in order to reduce potential damage and to respond to the negative consequences of climate events. Indicators used for this index include electricity access and disaster preparedness. http://index.gain.org/ranking/vulnerability/capacity	
Socially Inclusive Growth	Quality of Life	Poverty	Poverty Headcount Ratio at USD 1.90 a day (2011 PPP)	% of population	The poverty headcount ratio indicates the percentage of the population living on less than USD 1.90 day. http://data.worldbank.org/indicator/SI.POV.DDAY	World Bank
		Hunger	Prevalence of Undernourishment	% of population	Prevalence of undernourishment is defined as the percentage of population whose calorific intake is insufficient to meet dietary energy requirements continuously (at least one year). http://data.worldbank.org/indicator/SN.ITK.DEFC.ZS	World Bank

Socially Inclusive Growth		Health and Well-being	Healthy Life Expectancy at Birth, Total	years	Healthy life expectancy (HLE) is used as a proxy to measure the overall health of a population. The HLE indicates the average equivalent number of years of full health that a newborn could expect to live if they were to pass through life subject to the age-specific death rates and average age-specific levels of health states for a given period. http://apps.who.int/gho/data/view.main.HALEXv	WHO
		Education	Net Primary Enrollment Rate	%	Net primary enrollment rate is defined as the number of children enrolled in primary school who belong to the age group that officially corresponds to primary schooling, divided by the total population of the same age group. http://data.uis.unesco.org/Index.aspx?queryid=145	UNESCO
	Inequality	Gender Inequality	Gender Inequality Index (GII)	0 - 1 (higher scores indicate greater inequality)	The Gender Inequality Index measures gender inequality across three aspects of human development: (1) reproductive health, measured by maternal mortality ratio and adolescent birth rates; (2) empowerment, measured by proportion of parliamentary seats occupied by females and proportion of adult females and males aged 25 years and older with at least some secondary education; and (3) economic status, expressed as labor market participation and measured by labor force participation rate of female and male populations aged 15 years and older. http://hdr.undp.org/en/composite/GII	UNDP
		Income Inequality	GINI Index	0 - 100 (higher scores indicate greater inequality)	The GINI Index measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution. http://data.worldbank.org/indicator/SI.POV.GINI	World Bank
	Governance	Good Governance	Corruption Perception Index	0 - 100 (higher scores indicate lower levels of corruption)	The Corruption Perception Index scores and ranks countries/territories based on how corrupt a country's public sector is perceived to be. It is a composite index based on a combination of surveys and assessments of corruption, compiled by a variety of reputable institutions. https://www.transparency.org/cpi2015/results	TI

		Public Expenditure	Public Expenditure on Health and Education	% of GDP	Public expenditure on health consists of recurrent and capital spending from government (central and local) budgets, external borrowings and grants (including donations from international agencies and non-governmental organizations), and social (or compulsory) health insurance funds. Public expenditure on education (current, capital and transfers) consists of government expenditure for all levels of education, and includes expenditure funded by transfers from international sources to government. http://data.worldbank.org/indicator/SH.XPD.PUBL.ZS (Public health expenditure) http://data.worldbank.org/indicator/SE.XPD.TOTL.GD.ZS (Government expenditure on education)	World Bank

8.2 Technical Expert Interview Results

Table 21 Summary of Interview Responses from Technical Experts

Interview Questions	Technical Expert Responses	# Responses
Primary Organizational Role	Government:	21
	University:	2
	NGO Staff:	2
	International Research Consultant:	2
Familiar with Green Growth Principles	Yes:	13
	No:	14
Primary Green Growth Principle	Global Resource Flows:	3
	Economic Growth:	10
	Environmental Protection:	6
	Low Carbon Development:	1
	Technology and Innovation:	2
Sector-Area Expertise	Agriculture and Fisheries with	
	• Natural Resource Depletion	7
	• Adaptive Capacity to Climate Change	2
	• Soil Health	2
	• Agricultural Productivity	2
	Forestry and Land Use with	
	• Natural Resource Depletion	3
	• Adaptive Capacity to Climate Change	2
	Industry with	
	• Natural Resource Depletion	1
	• Technological Readiness	1
	Education with	
	• Natural Resource Depletion	2
	• Technological Readiness	2
	• Adaptive Capacity to Climate Change	1
	Energy and Mines with	
	• Natural Resource Depletion	7
	• Technological Readiness	2
	Urban Development and Transport with	
	• Natural Resource Depletion	1
	• Technological Readiness	1
Critical Sector Integration	• Education with All	7
	• Energy and Mines with All	9
	• Energy and Mines, with Agriculture and Fisheries, and Forestry and Land Use	10
	• Agriculture and Fisheries with Forestry and Land Use	6
	• Agriculture and Fisheries, Forestry and Land Use, with Urban Development	1
	• Agriculture and Fisheries, Forestry and Land Use, with Industry	1

	• Urban Development with Industry, Education, and Forestry and Land Use	3
Remarks	• Green growth initiatives and strategies must align with those set out in the 8th NSEDP. • All policy initiatives require *ex ante* research to evaluate effectiveness. • Green growth objectives and principles need to be clearly stated and differentiated from sustainable development. • Clarify the arrangements between the World Bank and GGGI – this is currently a source of confusion and uncertainty. • Gender and distributional equality need to be included as green growth principles.	

Table 22 Causes of Low Performance Suggested by Technical Experts

Priority Areas / Priority Sectors	Natural Resource Depletion	Technological Readiness	Adaptive Capacity to Climate Change	Soil Health	Agricultural Productivity
Agriculture and Fisheries	• Limited provincial enforcement of policies. • Limited access and capacity to use technology and spatial tools in urban management and planning. • Uncertain and limited funding. • Incomplete land-use planning – land use mapped into zones but not for best and balanced use. • Lack of coordination at all levels. • Lack of capacity and willingness for policy enforcement. • Concessions encroaching on protected areas (FDI mainly). • EIA and SIA guidelines are not enforced and often non-compliant.	• Inconsistent interpretation of central policy by provinces and districts. • Variable implementation, enforcement and monitoring.	• High sensitivity to flood and drought as a result of forest depletion and lack of environmental protection. • Agricultural production affecting soil and forest cover, which influences local rainfall. • Lack of continuity in assessing adaptation due to short-term projects with limited follow up on effectiveness. • Need internal technical capacity (with external assistance) for GHG monitoring and establishing GHG inventories.	• Poor farmer knowledge of safe agrochemical use. • Illegal imports of banned chemicals. • Incorrect labeling. • Incentive for merchants to promote over usage rather than apply recommended amounts.	• Inconsistent interpretation of central policy by provinces and districts. • Variable implementation, enforcement and monitoring. • Poor farmer knowledge of safe agrochemical use. • Market value of subsistence farming not accounted for. • Not making use of competitive advantages – organic production and specialized rice. • Poor regional market integration of agricultural production. • Lao PDR processing only 10%. • Production geared toward self-sufficiency, not external demands. • Limited capacity for farmers to improve agricultural productivity.

	• No registering and auditing of EIA practitioners. • Low agricultural productivity implies increased natural resource depletion and larger areas converted. • Reduced attention to increasing agricultural productivity. • Expanding agriculture at the expense of degraded watersheds.				• Link between improved productivity, reduced ecosystem services and well-being not understood. • Low productivity but improved nutrition from non-forest timber products. Opposite may occur with intensified farming. • LDC graduation priorities – improved income with potential increase in malnutrition, degraded ecosystem services and reduced total economic output.
Forestry and Land Use	• Inconsistent interpretation of central policy by provinces and districts. • Variable implementation, planning, enforcement and monitoring by provinces. • Extractive industries are attempting to increase forest cover – problem is the lack of a standard forest classification. • No dissemination of current assessments.	• Technology for satellite forest monitoring?	• Inconsistent interpretation of central policy by provinces and districts. • Variable implementation, enforcement and monitoring. • Tourism development has been at expense of environmental degradation. • Poor understanding of the importance of	• Deforestation is a big contribution to unhealthy soil.	

	• Illegal logging coupled with rapid rates of land-use change.		conservation for sustainable tourism. • Lack of regulation and enforcement, and willingness to enforce. • Limited research into climate change and tourism relations. • Elevated demands for quality tourism products not matched by local developments.		
Industry and Tourism	• Tourism development has been at expense of environmental degradation. • Poor understanding of the importance of conservation for sustainable tourism. • Lack of regulation and enforcement, and willingness to enforce. • District and provincial level concession approvals often diverge from policy requirements. • Tourism needs to be a separate sector.	• Limited capacity for planning and implementation of identified needs. • Lack of technology for planning and enforcement (e.g., water pollutants). • No training and technology for regulation of site restoration. • Nikon in special economic zone in the Lao PDR is a good example of green growth industry.	Tourism sector's adaptive capacity to climate change is very low.		

	• Limited university training in nature-based, cultural and sustainable tourism. • Transfer of concessions without any investments or operations. • 30-year and 50-year concession periods with tax holiday up to 10 years and 15 years (health care, education and technical development). • Revenue with no hypothecation or control of budget allocation. • Poor data sharing.	• Low capacity and willingness of people to use technology, and not willing to adapt.			
Education	• Vocational education constrained by funding and low private contributions. • Inconsistent quality of education. • Poor business skills, and lack of ongoing education (updating and lifelong). • Limited knowledge and teaching on natural resource conservation and impacts of natural resource exploitation. • Natural resource management not in	• Vocational education constrained by funding and low private contributions. • Inconsistent quality of education. • Poor business skills, and lack of ongoing education (updating and lifelong). • Education capacity has not kept pace with rapid development.	• Vocational education constrained by funding and low private contributions. • Inconsistent quality of education. • Poor business skills, and lack of ongoing education (updating and lifelong). • Lack of sector partnering in developing curriculum and	• Vocational education constrained by funding and low private contributions. • Inconsistent quality of education. • Poor business skills, and lack of ongoing education (updating and lifelong).	

	curriculum, and no specific subject on sustainable development. • Lack of knowledge about technological connection between agriculture and natural resource functions. • Cultural attitudes, behaviors, history and lack of perceived scarcity are barriers to adaptation. • Competing uses for natural resources – the politically stronger sector wins rather than rigorous debate. • Decisions based on financial and political influence.	• Limited rural access to technology and access limited to urban centers.	degrees in sustainable development and scaling up climate change subjects.		
Energy and Mines	• Increased FDI without balanced planning for water quality and environmental protection. • FDI revenues poorly managed and monitored. • No standard for concession negotiations, agreements and checks. • EIAs do not meet international standards, and are characterized by low compliance and enforcement levels. • Cumulative impacts not evaluated and poorly understood. • Provincial approval of small concessions inconsistent with central policy requirements.			• Irrational mining has led to soil degradation.	Lack of reliable and affordable electricity is one of the key reasons for low productivity in the agricultural sector.

	• Poor enforcement of rigorous policy regulations for large FDI, in exploration, construction, operations and site restoration. • Lack of a comprehensive concession inventory. • Weak provincial and district enforcement of policy regulations. • Limited community participation. • Limited coordination of concession agreements between provincial and central agencies. • Current concession agreements not addressing predicted rainfall changes (no water, no power). • No financial instruments to guarantee developer compensation for natural resource losses.				
Urban Development and Transport	• Limited agency access and capacity to use technology and spatial tools in urban management and planning. • Poor implementation and enforcement of planning decisions. • Uncertain and limited funding and political will, which is more acute in larger cities. • Land management and planning not well coordinated. • Substantial duplication of functions leading to ineffective administration. • Lack of a unified urban planning vision.	• Lack of a unified urban planning vision. • Uncertain and limited funding and political will, which is more acute in larger cities. • Poor implementation and enforcement.	• Inconsistent interpretation of central policy by provinces and districts. • Variable implementation, enforcement and monitoring.		

	• High priority for infrastructure, but very low priority for the environment.				

Table 23 Policy Responses to Improve Performance Suggested by Technical Experts

Priority Areas / Priority Sectors	Natural Resource Depletion	Technological Readiness	Adaptive Capacity to Climate Change	Soil Health	Agricultural Productivity
Agriculture and Fisheries	• Ensure effective policies are in place. • Ensure sufficient resources for enforcement and address the lack of willingness to enforce. • Prime Minister Decree 15 is a progressive step. • Strengthen implementation and capacity (willingness) to enforce. • Improve provinces' compliance across most sectors. • Improve policies and regulations with incremental		• Research and develop evidence-based policies prior to announcement not after (e.g., NSEDP selection of options including estimated costs). • University rarely consulted on policy development. Rely on research rather than trial and error.	• GoL in process of regulating agrochemical use and canceling non-compliant concessions. • Clearly define delegation of authority and expectations. • Encourage sustainable management practices through regulatory approaches coupled with incentive mechanisms.	• Ensure active community participatory planning. • Agencies to manage their own research and mandates.

	assessments and evaluations. • Learn and adapt from lessons of effective and ineffective policy implementation.				
Forestry and Land Use			• Revise and adequately resource the National Adaptation Programme of Action to Climate Change 2009. • Rapid assessments require details and sectoral coordination. • Align the mining concessions 2030 vision with the 5-year action plan. • Map provincial land use into use zones (not just mapping of existing use). • Urgently conduct integrated spatial social and economic assessments of planning initiatives. • Despite investment interest, many projects are not profitable. Reduce electricity rates for operators.		

			• Integrate information technology as part of high school curriculum (with resources). • Develop policies to match vocational labor skills and demand. • Connect labor needs with training. • Public-private partnerships not widely implemented (e.g., Phu Bia Mining and Sayabouly Dam). • Teacher training requires on-the-job training, with concession requirements for ongoing training and overseas deployments.		
Tourism					
Education	• Education policy not implemented due to constrained family incomes, increased farm labor and teacher capacity.	• Education policy not implemented due to constrained family incomes, increased farm labor and teacher capacity.	• Education policy not implemented due to constrained family incomes, increased farm labor and teacher capacity.		• Education policy not implemented due to constrained family incomes, increased farm labor and teacher capacity.
Energy and Mines	• Policy framework strong but need enforcement of concession agreements.	• Develop new policy to retain forests.			

	• Small (class 1 <15 MW) policy review under way, currently approved by provinces. Possible to manipulate generating capacity (e.g., 60 MW = 4 X 15 MW turbines); • Compensate for natural resource loss. • Urgently safeguard resettled communities. • Align mining concessions 2030 vision with the 5-year action plan. • Map provincial land use into use zones (not just mapping of existing use). • Urgently conduct integrated spatial social and economic assessments of planning initiatives. • Develop official and consistent process for concession approval, including local investment and spend during the construction phases, not just royalties.	• Promote local processing as step to manage headwaters. • Develop policy to delegate and standardize approvals based on new Investment Promotion Law (under review) – led by Deputy Prime Minister and Minister of MPI and MoF. • Coordinate policy design between ministries and administrative levels for implementation.			

	• Stronger focus on environmental and social impact assessments and cumulative impact assessments. • Environmental compliance database to increase transparency with ongoing projects. • Introduce a register of EIA practitioners. • Impose substantial fines for non-compliance.				
Urban Development and Transport					

Table 24 Pilot Projects and Initiatives to Improve Performance Suggested by Technical Experts

Priority Areas / Priority Sectors	Natural Resource Depletion	Technological Readiness	Adaptive Capacity to Climate Change	Soil Health	Agricultural Productivity
Agriculture and Fisheries	• Align with the Forestry in GMS Corridor Programme, prioritize community engagement in forest restoration, and promote stewardship and	• Develop integrated spatial decision-making platforms. • Promote standardized use and sharing of data across sectors.	• Develop SEZ pilots for balanced development (e.g., green growth zone). • Large projects – limited analysis. Require evaluation of income	• Pilot scheme to teach farmers and district extension staff about the safe use of agrochemicals.	• Urgently conduct integrated spatial land-use planning (not just land-use mapping). • Conduct cross-sectoral (forests, agriculture and mining), cross-

	custodianship principles. • Promote willingness to conserve. • Value-added projects – currently non-transparent and limited border control. • High-value processing requires skilled labor (not currently available). • Develop small-scale hydropower systems to improve fish catch (critical control point). • Pilot to revise profit incentive for multiple benefits – water quality, fish, flows, food security. • PES and REDD++.		effects and short-run costs and benefits. • Develop capacity for the Lao PDR to fund own projects. • Evaluate cross-sector effects and trade-offs, for example, impacts of the Kunming Railway on airlines. • Assess spatial and temporal distribution of poverty effects.		governance and regional (north, central, south) planning.
Forestry and Land Use	• Promote public-private partnerships for infrastructure development in the National Protected Areas (e.g., Paksong, Na Ha, Phou Khao Kawai, Limestone Mountain, Houaphan). • Account for natural attractions and needs in	• Develop integrated spatial decision-making platforms. • Promote standardized use and sharing of data across sectors.	• World Bank Green Growth – database sharing one of the funding prerequisites. • Develop integrated spatial modeling capacity in at least one district, province and central area (e.g., wood forestry sector).		

	developments specific to each area.		• Refine GGGI to priority NSEDP sectors.		
Industry and Tourism	• PES and REDD++.				
Education	• Teacher development in all regions. • Teacher training requires on-the-job training, with concession requirements for ongoing training and overseas deployments.	• Teacher development in all regions. • High-value processing requires skilled labor (not currently available)	• Teacher development in all regions.	• Teacher development in all regions.	• Teacher development in all regions.
Energy and Mines	• Install <1 MW micro-hydro or hybrid-hydro systems. • Floating solar farm on Nam Ngum 1 (Korean project).				
Urban Development and Transport	• Develop local expertise/technologies to calculate CO_2 and GHG emissions. • Implement development plans based on shared objectives coupled with awareness and communication (e.g., MPI decision for Tat Luang differed from Urban Planning, which	• Promote public-private partnerships to establish economic and innovation diversity (e.g., rubbish collection and recycling cannot survive with current model). Insufficient revenues and incentives for private contractors.			

	would have kept Tat Luang intact as wetland). • Pilot green villages as examples of neighborhood planning. • Planned urban design – inclusive of solid waste, wastewater management, public transport and green spaces.				

Table 25 Financial Instruments and Initiatives Suggested by Technical Experts

	Proposed Initiatives
Financial Instruments	• Establish green SEZ. • Standard 24% tax rate for all sectors. • PES, incentives for swidden agriculturalists to conserve and farm. • Compensation from downstream to upstream forest management for water quality (e.g., World Bank project). • Focus on non-timber forest products not swidden agriculture – trade-offs geared to growth at expense of environmental and social costs. • Increase resource rents and royalties. Currently, no payment for restoration (e.g., concession bond). Developers do not pay for full suite of natural resources (and losses) as part of concession. Introduce non-market valuations and full-cost accounting. Currently, developers pay 5-6% royalty but only for water – need to expand the set of natural resources but retain 5-6%. • Environmental tax for use of land and water – specific fund for science and research development and equitable access for revenue access. • Fuel tax and road-user fees. • Low-interest loan assistance for operators to purchase new efficient trucks – high leasing and purchase interest compared to Thailand. • Subsidy for bus services – low population means most are non-viable (e.g., public servants and school children with planned routes). • Housing construction control (e.g., heritage listing for Luang Prabang indicates this is possible).

	• Shared land financing (government, private and community cooperatives). • Tax schemes to promote training and education (e.g., delayed tax or royalty payments). • Full-cost accounting for compensation of natural resources drawdown. • Transparent GoL investment in productivity and debt reduction. • Clarify and standardize how investors can contribute to NSEDP priorities and strategies. • Enforcement of penalties for non-compliance. • Rewards for compliance (e.g., continued license to operate, and high rank in the compliance register/database). • Develop standards and "Letters of No Objection" to access Green Climate Fund and Global Environment Facility. • Lower the duration of concession agreements to no more than 25 years. • Water and land rights with secure tenure vested with individuals.
Initiatives to Promote Cross-Sectoral Coordination	• Integration and coordination are poorly understood concepts, requiring a new approach (e.g., Ministry of Health has no planning authority or enforcement capacity). Needs delegation and resourcing. • Analyze each "coordinating committee" and previous successes and failures through review of existing GoL coordination strategies. • Security of funding and resources is a powerful motivation for sustained integration. • Ensure consultation and agreement between budget and planning departments. • Facilitate development of shared future visions, priorities and objectives of ministries and sectors. • Cross-level working group to develop coordinated objectives and disseminate outcomes (e.g., National Green Growth Committee). • Ensure private sector is invited into deliberations. • Develop protocols for standardized data compilations and sharing. • Standardize and monitor policy implementation and enforcement across all governance levels. • Substantial capacity development required, with MPI as a central coordinating ministry. • City development plans required by Prime Ministerial decree – detailed plans developed but not enforced. Enforcement would assist integration across urban centers. • Coordination critical between MoLSW, MEM, MAF and MoI, and the private sector. • Lao PDR needs a coordination-integration framework administered by MPI – presently rhetorical rather than operational. Avoid duplication – delegate authority with funds to match. • Apply green growth principles as the central coordinating framework (see Green Growth Steering Committee). • Make available integrated spatial planning capacity and tools, inclusive of social and economic modeling, to all sectors, including the private sector. • Resolve discretionary provincial implementation and enforcement hindering coordination. • Integration is currently unidirectional (i.e., ministries do not coordinate with Tourism and Education, but Tourism and Education attempt to coordinate with other ministries).

	• GoL endorsement and action required to resolve existing agency duplication and staff re-assignments.
Implementation of Initiatives and Pilots	• All technical experts recommended phased or sequenced introduction of initiatives. • Provinces and districts were identified as the appropriate governance level for pilot implementation, with guidance and coordination with central ministries and the National Green Growth Committee. • Literacy and numeracy capacities of district offices needs to be addressed. • Government task force needed for supervision and coordination, with power to enforce and sufficient resources for operations, monitoring and evaluation. MPI nominated as the best candidate.
Identified Trade-Offs	• Minimize trade-offs through integrated and coordinated cross-sectoral decision-making. • FDI may decrease with implementation of green growth principles (e.g., hydropower projects may be associated with low internal rates of return if additional green growth regulations, enforced penalties for non-compliance, and full accounting of environmental and social costs introduced). • Green growth initiatives may introduce a new source of graft and corruption (e.g., an EIA, SIA compliance register). • Increased development and growth at expense of equitable distribution, including cultural and social impacts.

8.3 Summary of Outcomes and Outputs of the 8th NSEDP

Table 26 Outcomes and Outputs of the 8th NSEDP

Outcome 1	
Output 1	Sustained and Inclusive Economic Growth
Output 2	Macroeconomic Stability
Output 3	Integrated Development Planning and Budgeting
Output 4	Balanced Regional and Local Development
Output 5	Improved Public/Private Labor Force Capacity
Output 6	Local Entrepreneurs are Competitive in Domestic and Global Markets
Outcome 2	
Output 1	Improved Living Standards through Poverty Reduction and Three-Builds Implementation
Output 2	Food Security Ensured and Incidence of Malnutrition Reduced
Output 3	Access to High Quality Education
Output 4	Access to High Quality Health Care and Preventative Medicine
Output 5	Enhanced Social Welfare
Output 6	Protection of Traditions and Culture
Output 7	Political Stability, Order, Justice and Transparency
Outcome 3	
Output 1	Environmental Protection and Sustainable Natural Resources Management
Output 2	Preparedness for Natural Disasters and Risk Mitigation
Output 3	Reduced Instability of Agricultural Production

Source: MPI 2016

8.4 GGPA Workshop Report

Green Growth Potential Assessment in Lao PDR

Summary Workshop Report

8 December 2016
Landmark Mekong Riverside Hotel
Vientiane, Lao PDR

This abridged version of the GGPA Lao PDR workshop report has been provided for reference purposes. The original unabridged document can be obtained from the Lao PDR office of GGGI.

Main Findings

The results of identifying priority areas for green growth during the consultation workshop are as follows (see Table 27):

- Natural resource depletion remained the highest ranked area;
- Importance of technological readiness increased (from fourth to second place);
- Importance of agricultural land productivity decreased (from second to fifth place);
- Renewable energy was omitted in the second voting round;
- Importance of adaptive capacity to climate change increased (from fifth to third place); and
- Soil health was ranked as the fourth most important area in the second voting round, but not included in the first voting round.

Table 27 Selected Priority Areas for Green Growth

Ranked Performance Indicators: Round One	Ranked Performance Indicators: Round Two
1. Natural resource depletion	1. Natural resource depletion
2. Agricultural land productivity	2. Technological readiness
3. Renewable energy production	3. Adaptive capacity to climate change
4. Technological readiness	4. Soil health
5. Adaptive capacity to climate change	5. Agricultural land productivity

The sectors related to each of the priority areas are illustrated in Table 28. In summary:

- The agriculture and fisheries sector was relevant to all five priority areas;
- The forestry and land use sector was relevant to all the priority areas, except technological readiness;
- The energy and mines sector was relevant to natural resource depletion and technological readiness;
- The industry sector was relevant to natural resource depletion and technological readiness;
- The education sector was relevant to all five priority areas; and
- The urban development sector was relevant to natural resource depletion, technological readiness and adaptive capacity to climate change.

Table 28 Sectors Related to Selected Priority Areas for Green Growth

Priority Areas / Related Sectors	Natural Resource Depletion	Technological Readiness	Adaptive Capacity to Climate Change	Soil Health	Agricultural Productivity
Agriculture and Fisheries	x	x	x	x	x
Forestry and Land Use	x		x	x	x
Industry	x	x			
Education	x	x	x	x	x
Energy and Mines	x	x			
Urban Development	x	x	x		

Results of the Green Growth Potential Assessment Workshop

The results of the two rounds of voting to prioritize among a set of 24 potential areas for green growth in the Lao PDR are detailed in Table 27. Each of these areas was represented by a quantitative indicator. Table 30 details the sectors selected by the workshop participants identified as being related to/responsible for managing the priority areas identified in the first two voting rounds.

Participants were invited to vote for up to five indicators they believed represent issues that are most important for green growth development in the Lao PDR. Two rounds of voting to identify these priority issues were conducted. Both rounds were conducted in a plenary after a comprehensive explanation of the resource efficient, eco-friendly and climate resilient green growth indicators, and a presentation of the comparison of the Lao PDR scores with those of the lower middle-income countries.

A written set of instructions was provided to participants to assist with the individual prioritization of the performance indicators using the voting devices, detailed below.

Instructions to Assist with the Prioritization of Green Growth Areas

i. One of your first tasks today is the selection of priority areas for green growth in the Lao PDR.
ii. We will first present and explain the indicators used to measure three different aspects of green growth: resource efficient growth, eco-friendly growth and climate resilient growth.
iii. We will next ask you to discuss the indicators and the areas they represent. An MPI and NIER facilitator will help you with your discussions.
iv. We will then invite you to individually select a total of five out of the twenty-four areas that you think are of priority for the Lao PDR. You will be able to select these using your voting devices.
v. You can only select from a set of eight areas at any one time. There will two rounds of voting. We will explain this process during the presentation.
vi. We will show you three blocks of eight areas. You can see the three blocks on the next page. Please note: only select a **total of five priority areas from the three blocks**.
vii. Please ask your facilitator for help if you have any questions.

Table 29 Results of Participant Voting to Identify Priority Areas for Green Growth[19]

	Priority Area	Round 1 Number of Votes	Round 2 Number of Votes	Change in Voting Scores
Resource Efficient Growth	Energy Intensity	11	9	-2
	Electricity Losses	4	4	0
	Material Intensity	14	9	-5
	Waste Generation	10	7	-3
	Recycling Rate	12	10	-2
	Water Productivity	1	5	+4
	Agricultural Land Productivity	23	16	-7
	Labor Productivity	14	7	-7
	Logistics	9	10	+1
	Technological Readiness	17	20	+3
Eco-Friendly Growth	Changes in Forest Cover	15	11	-4
	Water Stress	2	2	0
	Natural Resource Depletion	26	29	+3
	Threatened Species	2	7	+5
	Water Quality	9	9	0
	Soil Health	10	17	+7
	Exposure to $PM_{2.5}$	13	9	-4
Climate Resilient Growth	CO_2 Emissions Trend	4	13	+9
	Carbon Intensity	14	3	-11
	Renewable Energy	17	10	-7
	Carbon Stock	2	1	-1
	Climate Change Exposure	7	12	+5
	Climate Change Sensitivity	8	13	+5
	Adaptive Capacity to Climate Change	16	19	+3

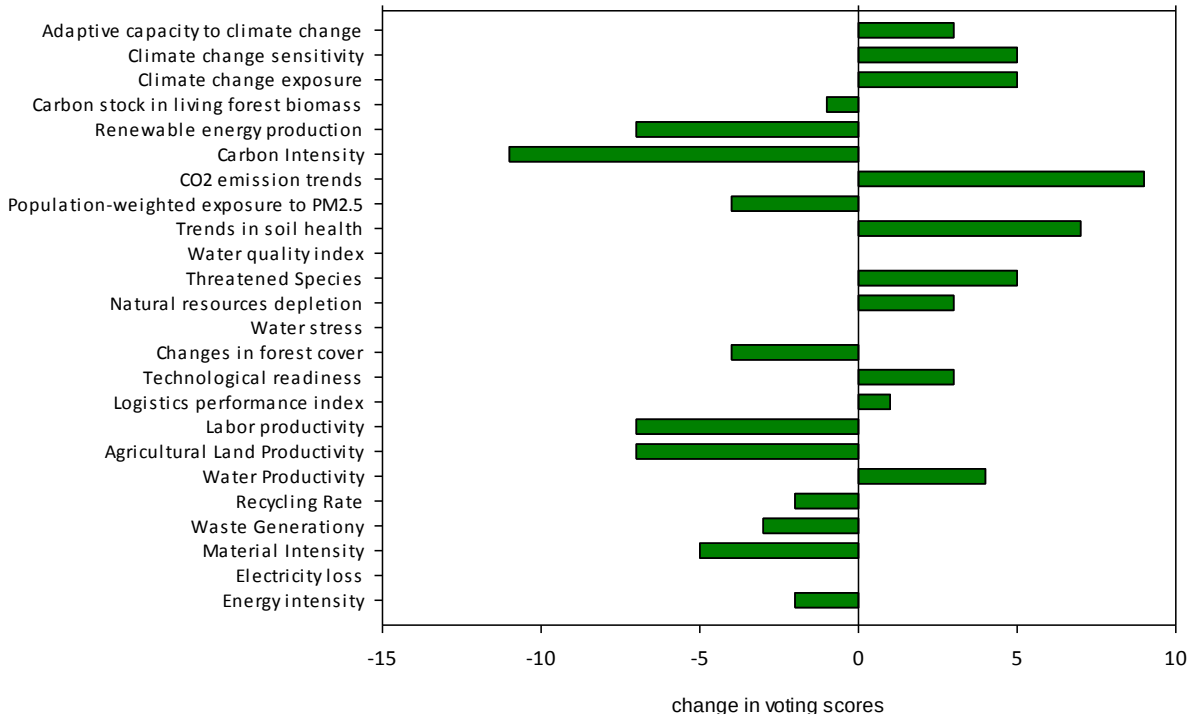
The five top ranked areas after the first and second voting rounds are detailed in Table 27 (from highest voting score to lowest) and illustrated in Figure 35. The voting round results indicate that:

- Natural resource depletion remained the highest ranked area;
- Importance of technological readiness increased (from fourth to second place);
- Importance of agricultural land productivity decreased (from second to fifth place);
- Renewable energy was omitted in the second voting round;
- Importance of adaptive capacity to climate change increased (from fifth to third place); and
- Soil health was ranked as the fourth most important area in the second voting round, but not included in the first voting round.

The change in voting scores illustrated in Figure 35 were calculated as the aggregate scores of voting round two minus the aggregate scores of voting round one.

[19] Chosen priority areas are highlighted.

Figure 35 Change in Voting Scores Between Round 1 and 2



Identification of Related Sectors

After identifying the priority areas for green growth, participants were invited to match these areas to the most relevant sectors that are most likely to manage and implement changes in each of the areas. First, participants were split into breakout groups and instructed to select three priority areas and assign three sectors related to each of these areas. Second, participants were asked to vote in the plenary. For that purpose, participants were asked to choose up to three sectors relevant to the top five priority areas identified in the prior voting rounds. One round of voting was conducted using the electronic voting devices to select from the 14 sectors (listed in Table 30), followed by plenary discussion to revise and amend the original selection as required. The voting scores for each priority areas are detailed in Table 30 and summarized in Table 31.

A written set of instructions was provided to assist the group discussions in assigning relevant sectors to the identified priority areas, detailed below.

Instructions to Assign Relevant Sectors to the Identified Priority Areas

i. You have selected the five most important green growth areas for the Lao PDR.
ii. We now invite you to discuss which sectors are most relevant to these areas, will manage these areas, and implement any changes and new policies in these areas.
iii. Please discuss the sector-area relations in your breakout groups. An MPI and NIER facilitator will help you with your discussions.
iv. First, your group will need to select the **three indicators representing the three issues** that you think are the most important for green growth in the Lao PDR.
v. Second, please select the sectors that are most relevant and will likely manage each of the **three indicators** your group selected.
vi. Finally, using your voting devices, for each of the top five priority issues identified in the prior voting rounds, please select the **three most important sectors**.
vii. Please ask your facilitator for help if you have any questions.

Table 30 Voting Scores of Sectors Related to Selected Priority Areas for Green Growth

Sector \ Areas	Natural Resource Depletion	Technological Readiness	Adaptive Capacity to Climate Change	Soil Health	Agricultural Productivity
1. Agriculture and Fisheries	19	18	12	17	28
2. Industry	14	28	15	4	11
3. Commerce	6	8	4	0	11
4. Energy and Mines	22	11	6	5	0
5. Transportation	3	19	5	0	5
6. Water and Sanitation	3	2	5	2	2
7.Waste Management and Disposal	7	8	6	6	3
8. Forestry and Land Use	21	11	13	27	27
9. Urban Development	13	12	13	7	9
10. Housing and Buildings	2	5	2	3	1
11 Education	12	21	15	9	17
12. Health Services	2	4	9	3	3
13. Public Administration	3	10	7	5	6
14. Household Consumption	4	7	8	3	3

The sectors with the highest voting scores and the respective priority areas are summarized and highlighted in Table 31. As a result of the plenary discussion, the industry sector was excluded as a relevant sector related to adaptive capacity to climate change, as was urban development as a relevant sector related to soil health. Six sectors were selected as most relevant to the five priority areas. These sectors are: (1) agriculture and fisheries; (2) education; (3) energy and mines; (4) forestry and land use; (5) industry; and (6) urban development.

- The agriculture and fisheries sector was relevant to all five priority areas.
- The education sector was relevant to all five priority areas.
- The forestry and land use sector was relevant to all the priority areas, except technological readiness.
- The energy and mines sector was relevant to natural resource depletion and technological readiness. The energy and mines sector was initially not among the most relevant sectors for green growth identified during the workshop. However, the energy and mines sector received the highest votes for natural resource depletion and a high relative score for technological readiness (Table 31). The sector was included post workshop following consultation with MPI representatives.
- The industry sector was relevant to natural resource depletion and technological readiness. The high voting score matching the industry sector and adaptive capacity to climate change was revised and dropped as a result of the plenary discussion.
- The urban development sector was relevant to natural resource depletion, technological readiness and adaptive capacity to climate change. Participants selected the urban development sector as related to natural resource depletion, technological readiness and adaptive capacity to climate change. Its initially established relevance to soil health was dropped as a result of the plenary discussion. As a result of post-workshop discussion, transportation was included as part of urban development.

Table 31 Sectors Related to Selected Priority Areas for Green Growth

Priority Area / Related Sector	Natural Resource Depletion	Technological Readiness	Adaptive Capacity to Climate Change	Soil Health	Agricultural Productivity
Agriculture and Fisheries	x	x	x	x	x
Forestry and Land Use	x		x	x	x
Industry	x	x	deleted round 2		
Education	x	x	x	x	x
Energy and Mines	x	x			
Urban Development		x	x	deleted round 2	

A key finding from the workshop was the need for coordination, cooperation and integration between sectors to implement and achieve green growth targets and objectives. The results presented in Table 31 indicate that priority areas are likely to be relevant to and managed by multiple sectors. It also shows that individual sectors will most likely be relevant to and mange changes across multiple priority areas.

Integration across agencies and sectors is an administrative and policy objective prescribed by the National Assembly of the Lao PDR. However, the necessary capacity is currently lacking to coordinate decisions across sectors concerned with natural resource management, agricultural productivity, adaptive capacity, land-use change and technological readiness. An acute knowledge gap remains in the Lao PDR when designing and implementing development investments and initiatives. Generally, policy formulation remains geared toward single-sector objectives and decisions.

Similarly, assessments of development interventions that consider trade-offs between different areas remain underdeveloped in the Lao PDR. Limited cross-sectoral collaboration and failure to account for the interdependencies of areas lead to:

- Lack of crucial debate and missed opportunities to design integrated policies and investment decisions capable of promoting green growth strategies that balance resource use with gender-specific livelihood outcomes and sustained ecosystem functionality; and

- Possible negative and unintended economic and ecological consequences, as well as distributional disparities affecting the poorest and most vulnerable.

8.5 Participant List

No.	Affiliation	Title
1.	Department of Meteorology and Hydrology, Ministry of Natural Resources and Environment	Deputy Director of Division
2.	Lao Front for National Construction	Head of Planning and Investment
3.	Lao Youth Union	Deputy Head Officer
4.	Ministry of Agriculture and Forestry	Director of STD
5.	Ministry of Agriculture and Forestry	Deputy Head of Division
6.	Ministry of Agriculture and Forestry, Department of Forest Resource Management	Deputy Director General
7.	Ministry of Agriculture and Forestry, Department of Forestry	Director
8.	Ministry of Energy and Mines	Technical Officer
9.	Ministry of Energy and Mines, Department of Energy Business	Staff
10.	Ministry of Energy and Mines, Department of Mines	Technical Officer
11.	Ministry of Energy and Mines, Institute of Renewable Energy Promotion Structure	Officer
12.	Ministry of Finance	Officer
13.	Ministry of Finance, Tax Department	Deputy Director
14.	Ministry of Industry and Commerce	Officer
15.	Ministry of Industry and Commerce	Technical Officer
16.	Ministry of Industry and Commerce, Department of Small and Medium Enterprise Promotion	Director
17.	Ministry of Labor and Social Welfare	Deputy of Cabinet
18.	Ministry of Natural Resources and Environment, Department of Pollution Control	Staff
19.	Ministry of Natural Resources and Environment, Department of Disaster Management and Climate Change	Technical Officer
20.	Ministry of Natural Resources and Environment, Department of Water Resources	Technical Officer
21.	Ministry of Planning and Investment, Department of Investment Promotion	Deputy Director General
22.	Ministry of Planning and Investment	Deputy Director General
23.	Ministry of Planning and Investment	Officer
24.	Ministry of Planning and Investment	Officer
25.	Ministry of Planning and Investment	Technical Official
26.	Ministry of Planning and Investment, Department of International Cooperation	Deputy Director of Division
27.	Ministry of Planning and Investment, Department of Planning	Official
28.	Ministry of Planning and Investment, Department of Planning	Official
29.	Ministry of Planning and Investment, Department of Planning	Deputy Head of Unit
30.	Ministry of Planning and Investment, Department of Planning	Deputy Director General
31.	Ministry of Planning and Investment, Department of Planning	Technical Officer
32.	Ministry of Planning and Investment, Department of Planning	Official
33.	Ministry of Planning and Investment, Department of Planning and Investment	Vice of Division
34.	Ministry of Public Works and Transportation, Department of Planning and Cooperation	Deputy Director General

35.	Ministry of Public Works and Transportation, Department of Transport	Technical Staff
36.	Ministry of Public Works and Transportation, Department of Housing and Urban Planning	Deputy Director
37.	Ministry of Public Works and Transportation, Department of Housing and Urban Planning	Divisions Director
38.	Ministry of Public Works and Transportation	Public Park Division
39.	Ministry of Science and Technology, Department of Planning and Investment	Staff
40.	National Agriculture and Forestry Research Institute	Deputy Director General
41.	National Assembly	Official
42.	National Assembly	Deputy
43.	National Assembly	Technical Staff
44.	National Assembly, Department for Planning and Budgeting	Technical Staff
45.	National Economic Research Institute	Researcher
46.	National Economic Research Institute	Deputy Director
47.	National Economic Research Institute	Deputy of Division
48.	National Economic Research Institute	Deputy of Division
49.	National Economic Research Institute	Deputy Director General
50.	National Economic Research Institute	Acting Director of Division
51.	National Economic Research Institute	Researcher
52.	National Economic Research Institute	Technical Official
53.	National Economic Research Institute	Technical Official
54.	National Economic Research Institute	Officer
55.	National University of Laos, Faculty of Economics and Business Administration	Vice Dean
56.	National University of Laos, Faculty of Agriculture	Deputy Director of Unit
57.	National University of Laos, Faculty of Environmental Science	Head of Unit
58.	National University of Laos, Faculty of Law and Political Science	Staff
59.	National University of Laos, Faculty of Social Science	Head of Research Division
60.	Prime Minister's Office	Economic Department
61.	Vientiane Cabinet	Vice Cabinet

8.6 Interview Questionnaire

Green Growth Potential Assessment in Lao PDR
Interview Questionnaire

Questionnaire introduction and technical expert approval.

We are conducting a survey on behalf of the Global Green Growth Institute (GGGI), who have partnered with the Ministry of Planning and Investment to conduct a Green Growth Potential Assessment for the Lao PDR. We invite you to give us your thoughts and observations about potential sectoral interventions that may assist the Lao PDR Government advance their green growth objectives.

Your answers will provide an important foundation for GGGI, the Ministry of Planning and Investment and the Lao PDR Government to evaluate the effectiveness of their green growth strategies and implementation. The information collected will only be used for research purposes to help improve green growth programs. All information will be kept strictly confidential. We will not record your name and none of your responses will be linked directly to you. The series of questions will take about 30 minutes of your time to complete. We thank you in advance for your valuable and important contribution.

I acknowledge that:
I have agreed to participate in the interview being conducted by Emerging Markets Consultancy on behalf of the GGGI.

- I have been provided with information about the project and had any questions regarding my participation and any associated risks and benefits answered to my satisfaction. I understand my contribution to the research will involve participation in an interview.
- I have been provided with contact details of the investigating officers and understand that I can contact them at any point during the study.
- I understand that my participation in the project is entirely voluntary and that I am free to withdraw participation at any time and without having to provide a reason for my withdrawal.
- I understand that because my interview contribution will be collected and synthesized in an unidentifiable way, if I decide to withdraw from the study, my contributions cannot be removed from the group so will remain for analysis and reporting.
- I understand that the information I provide for this research will be used to write reports for use by partner organizations and to inform the development of green growth programs in the Lao PDR. I understand the information I provide will be treated confidentially. I will not be identified in any documents resulting from the study except where I have given my written permission for this to occur.
- Information provided by me will only be accessed by members of the research team and used for the purposes outlined above. It will be stored securely by the Global Green Growth Institute and retained for a period of one year after which it will be destroyed.

Next: Q 1 Single Select Answer Required
Question Text Answers

- A 1

Yes, I understand and agree to continue

- A 2

No, I do not agree

Next: Q 2 Single Select Answer Required
Question Text
Could you please help us understand your primary role by answering one of the following? I am:
Answers

- A 1

A Government officer/employee

- A 2

A staff member of a private commercial organization

- A 3

A University staff member or Researcher

- A 4

A staff member of an NGO concerned with green growth

- A 5

Private consultant

- A 6

Other

Next Q3 Single Select Answer
Question Text Could you please tell us the main activities of your organization. (*Could insert classes for easier coding*)
Answers Text

Next Q4 Question Text Single Select Answer
Are you familiar with the Global Green Growth Institute?
Answers

- A 1

Yes

- A 2

No

Next Q5 Single Answer Required
Question Text Which of these terms best describes your understanding of green growth principles.
Answers

- A 1

Global Resource Flows and Trade

- A 2

Economic Growth

- A 3

Environmental Protection

- A 4

Low Carbon Development

- A 5

Quality of Life (Well-being)

- A 6

Poverty Reduction

- A 7

Climate Risk Reduction

- A 8

Technology and Innovation

Next Q6 Multiple Select Answer
Question Text The following green growth priority areas and the sectors related to them have been identified by Ministry staff as relevant to the Lao PDR. Please look at the table and select the number of the sector/area

pair that you have knowledge and expertise in, and tell us in your own words, what are the underlying causes for low performance of the Lao PDR in these areas? There are no right or wrong answers. You can select as many of the sector-issue pairs as you feel you can provide input on.

Priority Area / Related Sectors	Natural Resource Depletion	Technological Readiness	Adaptive Capacity to Climate Change	Soil Health	Agricultural Productivity
Agriculture and Fisheries	1	2	3	4	5
Forestry and Land Use	6		7	8	9
Industry	10	11			
Education	12	13	14	15	16
Energy and Mines	17	18			
Urban Development (including Transport)	19	20	21		

Answers
Number (1-20)
Text
Number (1-20)
Text
Number (1-20)
Text
Number (1-20)
Text
Number (1-20)
Text
Number (1-20)
Text
Number (1-20)
Text

Next Q7 Multiple Select Answer
Question Text Please select the number of the sector/area pair that you have knowledge and expertise in, and tell us in your own words what policies could assist the Lao PDR Government improve the performance within the chosen area. There are no right or wrong answers. You can select as many of the sector-area pairs as you feel you can provide input on.

Next Q7.1 Multiple Select Answer
Question Text Please select the number of the sector/area pair that you have knowledge and expertise in, and tell us in your own words what other initiatives or pilot projects could assist the Lao PDR Government improve the performance within the chosen area. There are no right or wrong answers. You can select as many of the sector-area pairs as you feel you can provide input on.

Next Q7.2 Multiple Select Answer
Question Text Please select the number of the sector/area pair that you have knowledge and expertise in, and tell us in your own words what financial instruments could assist the Lao PDR Government improve the performance within the chosen area. There are no right or wrong answers. You can select as many of the sector-area pairs as you feel you can provide input on.

Next Q8 Multiple Select Answer
Question Text Do you foresee trade-offs between the interventions in the sector/area pair that you have selected and other sector/area pairs? There are no right or wrong answers. You can select as many of the sector-area pairs as you feel you can provide input on.

Next Q9 Multiple Select Answer
Question Text Do you have any ideas on whether the Central Government or Provincial Governments would be best placed to seek funding for the interventions you have identified?

Next Q10 Multiple Select Answer
Question Text Who would be best placed to implement the initiatives, instruments or policies you identified in the previous question?
Answer Text

Next Q11 (Text or Multiple Select) Answer
Question Text Do you think Lao PDR Ministries will be able to coordinate and cooperate to achieve these interventions?
Answer

- A 1

Yes (why and who?)

Text

- A 2

No. What do you see as necessary for such coordination/cooperation to happen?
Text

Next Q12 Text Answer
Question Text Do you think the initiatives you identified would be most effective if they were implemented in a phased or sequenced program or implemented at a single point in time. If you think a sequenced approach is best, do have any ideas how this might be accomplished?
Answer

- A 1

Sequenced
Text

- A 2

Phased or Not sequenced

Next Q13 Multiple Select Answer
Question Text Lao PDR representatives have indicated that cross-sectoral cooperation and collaboration is likely to improve the progress of green growth. For the sector-area pairs you identified in the previous question, are there cross-sector collaborations (or integration) that would improve performance? Please select the number of the sectors in the table and in your own words tell us why that would improve the performance of the related areas.

Agriculture and Fisheries	1	Education	4
Forestry and Land Use	2	Energy and Mines	5
Industry (including Tourism)	3	Urban Development and Transport	6

Answer sector numbers (e.g., 1 with 2)
Text
Answer sector numbers (e.g., 1 with 2)

Text
Answer sector numbers (e.g., 1 with 2)
Text
Answer sector numbers (e.g., 1 with 2)
Text

Next Q14
Question Text Thank you for your time and valuable contributions. Would you like us to keep you updated on the results of the interviews and the progress of green growth activities in Lao PDR?
Answer

- A 1

Yes (contact details)

- A 2

No thank you

Question Text would you be willing to participate in future interviews if the need arises?

- A 1

Yes

- A 2

No

Thank you for contributing your valuable time and advice.

8.7 Comparison of Initiatives Proposed in the 8th NSEDP and by Technical Experts

Table 32 Sectoral Initiatives Listed in the 8th NSEDP and Recommended by Technical Experts

Sector	8th NSEDP	Technical Experts
Agriculture and Fisheries	• Full and comprehensive determination and evaluation of land concessions, with community participation. • Modernize agricultural production. • Increase local processing of agricultural production and improve export marketing. • Integrated water resource management. • Spatial mapping for floods, droughts and other disasters. • Spatial mapping tools to plan and allocate agricultural production areas. • PES and REDD++ • Train farmers to safely manage toxic chemicals and hazardous waste.	• Full and comprehensive determination and evaluation of land concessions, with community participation. • Modernize agricultural production. • Increase in-country processing of agricultural production and improve export marketing. • Integrated water resource management. • Spatial mapping tools for floods, droughts and other disasters, and for planning and allocating agricultural production areas. • PES and REDD++, environmental tax. • Train farmers to safely manage toxic chemicals and hazardous waste.
	• Develop research and policies to measure, monitor and manage climate change with local community participation. • Reduce GDP contribution to 19% by 2020. • Expand irrigation to 476,000 ha. • Climate-resilient agriculture.	• Focus on smaller-scale targeted irrigation. • Develop small-scale hydropower systems to reduce losses in fish catch. • Create incentives for multiple-benefit projects (e.g., water quality, fish, environmental flows and food security). • Evaluate cross-sector trade-offs, and conduct comprehensive analysis of income effects and short-run costs and benefits. • Assess the spatial distribution of poverty effects. • Increase resource rents.
Forestry and Land use	• Ensure community participation. • Full and comprehensive determination and evaluation of land concessions, with community participation. • Standardize data sharing, and develop spatial mapping tools to plan, classify and allocate areas for forest production. • Train farmers to safely manage toxic chemicals and hazardous waste. • Implement and enforce EIAs and SIAs. • Assess the environmental, social and economic impacts of natural resource exploitation projects. • PES and REDD++. • Establish economic mechanisms and instruments to finance the sustainable management of natural resources and	• Ensure community participation. • Full and comprehensive determination and evaluation of land concessions, with community participation. • Standardize data sharing, and develop spatial mapping tools to plan, classify and allocate areas for forest production. • Train forest users to safely manage toxic chemicals and hazardous waste. • Implement and enforce EIAs and SIAs. • Assess the environmental, social and economic impacts of natural resource exploitation projects. • PES and REDD++. • Establish economic mechanisms and instruments to finance the sustainable management of natural resources and

	ecological systems to balance conservation with livelihood improvement.	ecological systems to balance conservation with livelihood improvement.
	• Reduce illegal logging and log exports. • Develop research and policies to measure, monitor and manage climate change with local community participation.	• Evaluate supply chains and cross-sector trade-offs, and conduct comprehensive analysis of income effects and short-run costs and benefits. • Assess the spatial distribution of poverty effects. • Increase resource rents. • Train labor for high-value processing.
Education	• Teacher development in all regions. • Prioritize scientific research in the learning and teaching process to raise the quality of education for teachers and students. • Develop coordination between the public and private sectors in training skilled technical staff. • Train skilled labor for high-value processing – vocational training. • Develop green growth-related curricula.	• Teacher development in all regions. • Prioritize scientific research in the learning and teaching process to raise the quality of education for teachers and students. • Develop coordination between the public and private sectors in training skilled technical staff. • Train skilled labor for high-value processing – vocational training. • Develop green growth-related curricula. • Sector partnering in developing curricula and green growth-related subjects.
	• Focus more on learning by experiment and practice. • Improve the educational administrative system from central to the provincial levels. • Issue skill standards certificates for laborers to build confidence and trust between laborers and employers. • Improve school meals to increase attendance.	• Actively encourage more women teachers.
Tourism	• Ensure community participation. • Promote public-private partnerships to mobilize resources for infrastructure development in the National Protected Areas. • Increase the number of tourists and revenues per arrival. • Establish tourism curriculum. • Developments must account for the conservation of natural attractions, ecological systems and cultural traditions.	• Ensure community participation. • Promote public-private partnerships to mobilize resources for infrastructure development in the National Protected Areas. • Increase the number of tourists and revenues per arrival. • Establish tourism curriculum. • Developments must account for the conservation of natural attractions, ecological systems and cultural traditions.
	• Support tourism development through water, roads and electricity infrastructure. • Promote cultural villages as tourist destinations.	• Evaluate cross-sector trade-offs, and conduct comprehensive analysis of income effects and short-run costs and benefits.

Energy and Mines	• Full and comprehensive determination and evaluation of land concessions, with community participation. • Standardize data sharing, and conduct spatial mapping tools to plan, classify and allocate areas for hydropower and mining. • Evaluate cross-sector trade-offs, and conduct comprehensive analysis of income effects and short-run costs and benefits. • Increase rural electrification.	• Full and comprehensive determination and evaluation of land concessions, with community participation. • Standardized data sharing, and conduct spatial mapping tools to plan, classify and allocate areas for hydropower and mining. • Evaluate cross-sector trade-offs, and conduct comprehensive analysis of income effects and short-run costs and benefits. • Install in rural areas, <1 MW micro-hydro or hybrid hydro-solar systems.
	• Complete 15 new hydropower dams – expand electricity sector by 32%. • Increase local mineral processing. • Secure and diversify electricity generation.	• Increase resource rents. • Assess the spatial distribution of poverty effects. • Floating solar farm on Nam Ngum 1. • Develop small-scale hydropower systems to reduce losses in fish catch. • Estimate the costs and benefits of energy efficiency measures.
Urban Development and Transport	• Develop comprehensive planning tools and technical capacity – 50% of provinces have integrated spatial plans. • Enforce planning regulations. • Promote public-private partnership to mobilize resources for recycling and solid waste management. • Plan public transport and green spaces.	• Develop comprehensive planning tools and technical capacity. • Enforce planning regulations. • Promote public-private partnership to mobilize resources for recycling and solid waste management. • Plan public transport and green spaces.
	• Expand transport network. • 90% of population have access to clean water and 75% access to latrines.	• Revise and enforce parking strategy. • Design and develop pilot green villages. • Pilot green SEZ for balanced development.

Note: Shaded area indicates initiatives and projects that were suggested by both the 8th NSEDP and the technical experts.

Table 33 Cross-Sectoral Programs, Initiatives and Projects Documented in the 8th NSEDP and Proposed by Technical Experts

Cross Sectoral NSEDP Priorities	Cross Sectoral Recommendations by Technical Experts
Communities must actively participate in planning and decision-making.	Communities must actively participate in planning and decision-making.
Establish economic mechanisms and instruments to finance the sustainable management of natural resources and ecological systems to balance conservation with livelihood improvement. These include: natural resource taxes and fines; royalties from the energy, agriculture and mining sectors; private investment in developing rural areas;	*Increase resource rents and royalties.* Developers do not currently pay for access to the full suite of affected natural resources (and subsequent losses) as part of concession revenues. Introduce non-market valuations and full-cost accounting. Currently developers pay 5-6% royalty but only for a single resource — water. Therefore, expand and

promoting eco- and cultural tourism; and improving rural livelihoods to ensure job security and reduce urban migration and congestion.	aggregate the value of the full suite of affected resources, but retain the 5-6% royalty contribution. *Develop and test pilot finance mechanisms, including environmental taxes and a fuel tax to fund a proposed Environmental Protection Fund and support annual sector-agency budgets.*
Develop plans to reduce GHGs and systematically collect data on GHG emission rates (in the areas of land use, forestry, agriculture, energy, industry and waste management). Create guidelines to coordinate research and decisions on climate change, disaster risk reduction and mitigation of GHG effects – include outputs in the strategic and operational plans of the agriculture, forest, public works and transport sectors.	Standardize data systems, data sharing and modeling platforms as a catalyst for cross-sectoral coordination.
Improve mechanisms to coordinate provincial, district and village level decision-making and policy implementation, especially in remote areas. Establish regulations and procedures on hand-over rights and responsibilities of the local authorities following the Three-Builds directive.	Improve the coordination between central, provincial and districts administrations, primarily to facilitate coordination as well as improve policy implementation and enforcement.
Develop tools and capacity to conduct spatially-explicit planning capable of integrating changes in ecological, social and economic domains – develop and improve the land database (records, leases, concessions and registration) in 18 provinces across the country to create revenue from land holdings (we assume land tax).	Develop spatially-referenced decision-making platforms (capable of integrating changes in biophysical, social and economic domains) and conduct extensive training programs for the Lao PDR agency staff.
Classify the Lao PDR organizations into various categories and set standards and conditions for each class – organizational classes include ministries, ministry-equivalent organizations, mass organizations and technical service units.	Develop the capacity of the Lao PDR ministries and managing agencies to design and fund their own green growth projects.
	Conduct a comprehensive review of agricultural, hydropower, mining and land-forest concessions, develop systematic regulatory instruments, and compile a thorough concession inventory. The program/initiative should aim to remove inconsistencies observed between provincial interpretation, implementation and enforcement, and clarify the roles and responsibilities across ministries. Assist the Lao PDR to develop enforceable guidelines to clarify the responsibilities of concession holders in: (1) protecting ecological and social values; (2) avoiding or minimizing negative impacts; and (3) ensuring extensive community consultation. The guidelines would also specify support mechanisms that allow for effective

	enforcement, including the suspension or termination of concessions that consistently fail to meet audits and regulatory requirements, or deliver environmental or social benefits. All projects should ensure affected community have access to independent arbitration.
	Evaluate cross-sector trade-offs, and conduct comprehensive analysis of income effects and short-run costs and benefits. Assess the spatial distribution of poverty effects.

Note: Shaded area indicates initiatives and projects addressing challenges in multiple sectors that were suggested by both the 8th NSEDP and the technical experts (emphasis added).

8.8 Responsibilities of Different Ministries under the Renewable Energy Development Strategy

• **The Ministry of Agriculture and Forestry**, in collaboration with the Ministry of Natural Resources and Environment and provincial authorities, will determine and develop policies related to the most effective use of lands for plantation of crops for fuel and industrial uses, carry out participatory land-use planning and local land-use zoning, and monitor and enforce the implementation of the policy.

• **The Ministry of Natural Resources and Environment** is responsible for undertaking research on the use of water resources, and will collaborate with the Ministry of Energy and Mines on studies concerning production of hydrogen fuels. Further, it is responsible for developing and enforcing requirements and guidelines to minimize the environmental and social impacts of renewable energy development through oversight of Initial Environmental Examinations. It also conducts environmental impact assessments.

• **The Ministry of Science and Technology** has the role of conducting research and pilot tests on science and technologies developed from different countries, for renewable energy applications.

• **The Ministry of Industry and Commerce** facilitates the importation of equipment and machinery, seeds and vehicles related to the development of renewable energies, as well as supports the construction of gas stations for biofuel distribution.

• **The Ministry of Public Works and Transportation** will be responsible for the introduction of policies that promote the use of alternative fuels in individual vehicles, public transportation systems, freight and air transport.

• **The Ministry of Finance** determines appropriate tax and duties policies for land use, vehicles and equipment in renewable energy projects, and assists in raising funds for renewable energy development.

• **The Central Bank of Lao PDR** will consider carbon credits and low-interest loans as sources of financing for renewable energy projects and activities, agricultural promotion, fuel crops plantation development, and projects carried out by small and medium-sized enterprises.

9. References

ADB. 2010. Sector Assistance Program Evaluation for the Energy Sector in Lao People's Democratic Republic. https://www.oecd.org/countries/laopeoplesdemocraticrepublic/47180387.pdf.

———. 2011. *Lao People's Democratic Republic: Country Partnership Strategy (2012–2016)*. Mandaluyong City.

———. 2012. *Lao People's Democratic Republic: Urban Development Sector Assessment, Strategy, and Road Map*. Mandaluyong City.

———. 2013. *Lao People's Democratic Republic: Energy Sector Assessment, Strategy, and Road Map – 2013 Update*. Mandaluyong City.

———. 2015. *Energy Efficiency Developments and Potential Energy Savings in the Greater Mekong Subregion*. Mandaluyong City. https://www.adb.org/sites/default/files/publication/161894/energy-efficiency-savings-gms.pdf.

Aphaylath, K. 2015. *Solid Waste Management City Profile*. Vientiane: Climate and Clean Air Coalition Municipal Solid Waste Initiative.

Bank of the Lao PDR. 2015. *Annual Economic Report*. Vientiane. https://www.bol.gov.la/together_use/Annual%20Report%202015_ENG.pdf.

Borgen Project. 2015. Education in Laos. https://borgenproject.org/education-laos/.

Chounlamany, K. 2014. School Education Reform in Lao PDR: Good Intentions and Tensions? Revue internationale d'éducation de Sèvres. Accessed April 2017. http://ries.revues.org/3766.

Cronin, R. B. E., B. Eyler, and C. Weatherby. 2016. *Letters from the Mekong: A Call for Strategic, Basin-Wide Energy Planning in Laos*. Washington, D.C.: Stimson Center.

DECIDE. 2013. Land Concessions and Leases in the Lao PDR. http://www.decide.la/en/downloads/index/Policy-Brief_02.pdf.

EFA. 2015. National Review Report: Lao People's Democratic Republic. http://unesdoc.unesco.org/images/0023/002314/231489e.pdf.

FAO. 2015. *The State of Food Insecurity in the World 2015*. Rome. http://www.fao.org/hunger/en/.

FAO. 2017. FAOSTAT. http://www.fao.org/faostat/en/#home.

Global Partnership for Education. 2017. Lao PDR. http://www.globalpartnership.org/country/lao-pdr.

GoL. 2007. *Lao Forestry Law 2007*. Vientiane. http://extwprlegs1.fao.org/docs/pdf/lao89474.pdf.

GoL. 2015. *Intended Nationally Determined Contribution*. Vientiane.

Green Growth Knowledge Platform. 2016. Measuring Inclusive Green Growth at the Country Level. Working Paper 02. http://www.greengrowthknowledge.org/.

Hays, J. 2014. Facts and Details: Education in Laos. Accessed April 2017. http://factsanddetails.com/southeast-asia/Laos/sub5_3d/entry-2981.html.

Heinimann, A. et al. 2014. On the Right Path? Land Concessions in Laos. CDE Policy Brief No. 3. Center for Development and Environment.

Hirsch, P. and N. Scurrah. 2015. The Political Economy of Land Governance in Lao PDR. Mekong Region Land Governance. Accessed May 2017. http://mrlg.org/resources/political-economies-of-land-governance/.

Hodgdon, B. D. 2008. "The Political Culture of Logging and Development on the Periphery in Laos." *Kyoto Journal* 69. http://www.kyotojournal.org/the-journal/nature/frontier-country/.

ICEM. 2010. *MRC Strategic Environmental Assessment (SEA) of Hydropower on the Mekong Mainstream*. Hanoi.

Intercedent Asia. 2016. ASEAN Cleantech Market Report: A Review of Market Dynamics & Opportunities. Canadian Trade Commissioner Service.

International Road Federation. 2016. *IRF World Road Statistics*. Geneva.

Inthavongsa, P. 2014. Current Status of Urban Transport System in Vientiane Capital. Paper presented at the National Capacity Building Workshop on Sustainable and Inclusive Transport Development in Vientiane, Lao PDR on 3-4 July.

IPCC. 2003. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Kanagawa. http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/GPG_LULUCF_FULL.pdf.

J&C Services. 2015. Vehicle Registration Sees Increase of 31,000 to June. 17 July. http://jclao.com/vehicle-registration-sees-increase-of-31000-to-june/.

Kandulu, J. M. and J. D. Connor. 2017. "Improving the Effectiveness of Aid: An Evaluation of Prospective Mekong Irrigation Investments." *International Journal of Water Resources Development* 33 (2): 270-291. http://iahr.tandfonline.com/toc/cijw20/33/2.

Lamphayphan, T. et al. 2015. "Export Supply of Electricity from Laos to Thailand: An Econometric Analysis." *International Journal of Energy Economics and Policy* 5 (2): 450-460.

Lao Energy. 2015. Demand Forecast Main Report. http://www.laoenergy.la/download_free.php.

———. 2016. Hydropower Generation. http://laoenergy.la/admin/upload_free/cb0bfaff9558d1d767476cca252b287dabaff293aabf23b3b71df822d5811b17e653cbef9b02885f95f4085e094cb948Update%20Hydro%20Power%20improve30.06.2016%20-%20Final.pdf.

Laspho, L. 2015. Lao Rural Electrification. Presentation made at the SE4ALL Consultation Workshop: Monitoring the Status of Asia Pacific in Manila, Philippines on 14 June. https://www.slideshare.net/energyforall/laos-rural-electrification.

Linstone, H. A. and M. Turoff, eds. 2002. The Delphi Method: Techniques and Applications. https://web.njit.edu/~turoff/pubs/delphibook/delphibook.pdf.

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

Manivong, T. 2016. An Overview of the Ecotourism Sector in Lao PDR. Presentation. http://www.dmr.go.th/download/lao_thai56/pdf_dat/Persentation%20of%20Ecotourism.pdf.

Mekong River Commission. 2017. Council Study Interim Report. Unpublished.

MEM. 2014. *Annual Report of Energy and Mining Sectors (2013–2014) and Year Plan (2014-2015)*. Vientiane.

MoES. 2017. Statistics 2015-2016. http://www.moe.gov.la/index.php/lang-en/statistics.

MoICT. 2016. *Lao PDR Tourism Strategy 2006-2020*. Vientiane. http://www.tourismlaos.org/files/files/Lao%20PDR%20Tourism%20Strategy%202006-2020%20in%20English.pdf.

MoNRE. 2013. *Second National Communication on Climate Change of Lao PDR*. Vientiane.

———. 2015. *National Biodiversity Strategy and Action Plan 2016-2025*. Vientiane.

MPI. 2016. *8th Five-Year National Socio-Economic Development Plan 2016-2020*. Vientiane.

MPI and UNDP. 2017. *Graduation from Least Developed Country Status: Lao PDR 5th National Human Development Report 2017*. Vientiane.

Nachtergaele, F. O. et al. 2010. LADA Technical Report N. 17: Global Land Degradation Information System. http://projects.inweh.unu.edu/kmland/getdocument.php?F=900649576_4c71e3b277d102.81760322.

Nakamura, A. 2012. "Cholera in Lao PDR: Past and Present." In *Cholera*, edited by Sivakumar Gowder, 33-56. Intech. http://cdn.intechopen.com/pdfs/34050.pdf.

Nishimura, H. et al. 2016. *Lao PDR at the Crossroads: Industrial Development Strategies 2016–2030*. Economic Research Institute for ASEAN and East Asia.

OECD. 2016. Economic Outlook for Southeast Asia and India 2016: Enhancing Regional Ties.

Phouthonesy, P. 2015. Energy Policy of Lao PDR. Presentation made at the Energy Policy Training Program (B) in Japan on 21 June – 11 July. https://eneken.ieej.or.jp/data/6233.pdf.

PreventionWeb. 2014. Lao People's Democratic Republic: Disaster & Risk Profile. http://www.preventionweb.net/countries/lao/data/.

Saunders, A. F. 2015. *Forest Conversion in Lao PDR: Implications and Impacts of Expanding Land Investments*. Washington, D.C.: Forest Trends.

Schönweger, O. et al. 2012. *Concessions and Leases in the Lao PDR: Taking Stock of Land Investments*. Centre for Development and Environment, University of Bern. Bern and Vientiane: Geographica Bernensia.

Smajgl, A. and J. Ward, eds. 2013. *The Water-Food-Energy Nexus in the Mekong Region: Assessing Development Strategies Considering Cross-Sectoral and Transboundary Impact*. New York: Springer.

Smajgl, A. et al. 2015. "Visions, Beliefs, and Transformation: Exploring Cross-Sector and Transboundary Dynamics in the Wider Mekong Region." *Ecology and Society* 20 (2): 15. http://dx.doi.org/10.5751/ES-07421-200215.

———. 2016. Watershed-Scale Vulnerability and Adaptation Assessments (W-VAA) Guidelines. Paper presented at the GMS Roundtable on Climate Adaptation in Bangkok, Thailand.

State University. 2017. Lao – History & Background, Constitutional & Legal Foundations, Educational System—overview, Preprimary & Primary Education, Secondary Education. http://education.stateuniversity.com/pages/814/Lao.html.

Stephenson, J. K. L. 2014. *Community Forestry Adaptation Roadmap to 2020 for Lao PDR*. Bangkok: RECOFTC – The Center for People and Forests.

Thomas, I. 2015. Drivers of Forest Change in the Greater Mekong Subregion: Lao PDR Country Report. United States Agency for International Development.

UNDP. 2002. *E-Readiness Assessment in the Lao PDR*. Vientiane: UNDP/UNV.

UNDP and MEM. 2015. *Nationally Appropriate Mitigation Action (NAMA) for the Renewable Energy Sector of Lao PDR*. Vientiane.

United Nations. 2014. Energy Balances. https://unstats.un.org/UNSD/energy/balance/2014/bgl.pdf.

———. 2016. *2014 Energy Statistics Yearbook*. New York. https://unstats.un.org/UNSD/energy/.

United Nations Children's Fund. 2017. Lao PDR Suffers First Cholera Outbreak in Nearly Eight Years. https://www.unicef.org/infobycountry/laopdr_42701.html.

University of Notre Dame. 2017. The Notre Dame Global Adaptation Index 2015. http://index.gain.org/.

Vongsay, A. 2013. Energy Sector Development in Lao PDR. Presentation made at the Energy Policy Training Course in Tokyo, Japan on 24 June – 12 July. https://eneken.ieej.or.jp/data/5021.pdf.

Ward, J. et al. 2016. *A Compilation and Summary Analysis of Nam Xong Household Livelihoods: Exploring Cross Sectoral Futures for the Nam Xong, Lao PDR*. Bangkok: Mekong Region Futures Institute.

Wellmann, D. 2012. The Legal Framework of State Land Leases and Concessions in the Lao PDR. GIZ.

Wells-Dang, A. et al. 2016. "A Political Economy of Environmental Impact Assessment in the Mekong Region." *Water Alternatives* 9 (1): 33-55.

World Bank. 2016. Lao People's Democratic Republic: Systematic Country Diagnostics. http://documents.worldbank.org/curated/en/374281478761369501/pdf/110034-PGID-P159956-Concept-Box396326B-PUBLIC-Disclosed-11-8-2016.pdf.

———. 2017a. World Bank Data Bank: Lao PDR. Accessed April 2017. http://data.worldbank.org/country/lao-pdr.

———. 2017b. World Development Indicators 1960-2016. http://data.worldbank.org/data-catalog/world-development-indicators.

World Economic Forum. 2015. *The Global Competitiveness Report 2015–2016*. Geneva. http://www3.weforum.org/docs/gcr/2015-2016/Global_Competitiveness_Report_2015-2016.pdf.

World Population Review. 2017. Laos Population 2017. Accessed April 2017. http://worldpopulationreview.com/countries/laos-population/.

World Travel and Tourism Council. 2015. *Travel & Tourism Economic Impact 2015: Laos*. London https://www.wttc.org/-/media/files/reports/economic%20impact%20research/countries%202015/laos2015.pdf.

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