LAO PEOPLE'S DEMOCRATIC REPUBLIC

Technology Needs Assessment

Technology Action Plan for Climate Change Mitigation

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Technology Action Plan for Climate Change Mitigation

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DISCLAIMER

This action plan for developing and deploying mitigation technologies and practices for climate change mitigation in the forestry and agriculture sector in Lao PDR. The development goals and targets, actions, activities, budget and sources of funding results are entirely outputs from the coordinator, consultant and reviewers, and should not be attributed in any manner to the Global Environment Facility (GEF), which funded the production of this publication.

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Abbreviations

ASEAN	Association of South East Asia Nations
CCBA	Climate, Community and Biodiversity Alliance
CIFOR	Centre for International Forestry Research
CliPAD	Climate Protection through Avoided Deforestation
COP	Conference of the Parties
DAFO	District Agriculture and Forestry Office
DEP	Department of Environment Promotion (of MoNRE)
DFRM	Department of Forest Resource Management
DLF	Department of Livestock and Fishery
DOA	Department of Agriculture
DOF	Department of Forestry
DOFI	Department of Forest Inspection
EIA	Environmental Impact Assessment
EPF	Environmental Protection Fund
ESMP	Environmental and Social Management Plan
FAO	Food and Agriculture Organization (of the United Nations)
FCPF	Forest Carbon Partnership Facility
FF	Forest Fund
FFPRI	Forest and Forest Products Research Institute
FIM	Forest Information Management
FIP	Forest Investment Programme
FIPD	Forest inventory and Planning Division
FRDF	Forest Resource Development Fund
FSC	Forest Stewardship Council
GDP	Gross Domestic Product
GHG	Greenhouse gas
GIZ	Deutsche Gesellschaftffs Internationale Zusammenarbeit (German Agency for International Cooperation)
GOL	Government of Lao PDR
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
JICA	Japan International Cooperation Agency
kfW	Kreditanstalt fur Wiederaufbau (German Development Bank)
LEAF	Lowering Emissions from Asia's Forests
LUP-LA	Land Use Planning and Land Allocation
MAF	Ministry of Agriculture and Forestry
MEM	Ministry of Energy and Mines
MOF	Ministry of Finance
MONRE	Ministry of Natural Resource and Environment
MPI	Ministry of Planning and Investment
MRV	Monitoring, Reporting and Verification
MWBP	Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme
NAFES	National Agriculture and Forestry Extension Service

NAFRI	National Agriculture and Forestry Research Institute
NCCO	National Climate Change Office
NEC	National Environment Committee
NFI	National Forest Inventory
NFMS	National Forest Monitoring System
NGOs	Non-Government Organizations
NLMA	National Land Management Authority
NPA	National Protected Area
NSAP	National Strategy and Action Plan on Climate Change
NSCCC	National Steering Committee on Climate Change
NUOL	National University of Laos
NWFPs	Non-Wood forest products
ODA	Official Development Assistance
PAFO	Provincial Agriculture and Forest Office
PAREED	Participatory Land and Forest Management Project
PLUP	Participatory Land-use Planning
PSS	Profit Sharing System
RECOFTC	Centre for People and Forests
REDD	Reducing Emissions from Deforestation and Forest Degradation
REDD+	Reducing emissions from deforestation and forest degradation
REL	Reference Emissions Level
R-PP	Readiness Preparation Proposal
RRI	Rights and Resources initiative
SESA	Strategic Environmental and Social Assessment
SFM	Sustainable Forest Management
SIDA	Swedish International Development Agency
SNC	Second National Communication
SNV	Netherland Development Organisation
SUFORD	Sustainable Forestry and Rural Development
TFAP	Tropical Forest Action Plan
TWGs	Technical Working Groups
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WCS	World Conservation Society
WREA	Water Resources and Environmental Administration
WRI	World Resource Institute
WWF	World Wide Fund for Nature

Foreword

Effective mitigation of greenhouse gas necessitates research, development, deployment and diffusion of innovative and best technologies and practices. Lao PDR, under the financial support of the Global Environment Facility (GEF), implemented the TNA programme during 2011 and 2013 (phase I), and 2015-2018 (phase II). The TNA phase I focused on the prioritization of climate change mitigation and adaptation technologies, and as a result, 16 technologies or practices under 3 important sectors namely forestry, agriculture and water resources were selected as priority technologies to enhance climate change mitigation and adaptation in Lao PDR. The TNA phase II focused on Barrier Analysis and Enabling Framework (BAEFs) and Technology Action Plans (TAPs) including Project Ideas (PIs) of the prioritised mitigation and adaptation technologies. The Ministry of Natural Resources and Environment (MoNRE), particularly Department of Climate Change (DCC) took lead in the formulation of the BAEF and TAPs employing participatory approach and consultation with relevant organizations, especially the Ministry of Agriculture and Forestry (MAF) and technical working group on climate change (TWG-CC). Importantly, the report and action plans were reviewed by United Nations Environment Programme (UNEP)-Denmark Technical University (DTU) or UNEP-DTU and Asian Institute of Technology (AIT).

In my capacity as the National Project Director for preparing Technology Need Assessment (TNA) for Lao PDR, I confirm that the BAEFs and TAPs are in accordance with Laos's context and the government's national priorities including strategic sectors, programmes, the Nationally Determined Contribution (NDC), national plans and commitment to the United Nations Framework Convention on Climate Change (UNFCCC).

I am pleased to endorse the BAEF reports and TAP. I would also like to express sincere thanks to GEF for financial support, and UNEP-DTU and AIT for technical support in this project.

Sincerely,

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Executive Summary

Technology transfer under the Articles 4.3, 4.5 and 4.7 of the United Nations Framework on Climate Change Convention (UNFCCC) necessitates a technology action plan (TAP). This TAP, in response to the requirement, was formulated following the prioritisation of the climate change mitigation technologies or practices and a Barrier Analysis and Enabling Framework (BAEF), which are first and second step of the Technology Needs Assessment (TNA) needed for the TAP. The prioritisation of the mitigation technologies and BAEF were led by the Ministry of Natural Resources and Environment (MoNRE), particularly Department of Climate Change (DCC) and relevant organisations, especially the Ministry of Agriculture and Forestry (MAF) and working group on climate change (TWG-CC). The technology prioritisation brought about selection of eight technologies and practices for climate change mitigation in the forestry and the agriculture sector as follows.

1. Effective protected area management (EPAM)
2. Sustainable community forest management
3. Optimal or sustainable plantation forests
4. Optimal agroforestry
5. Animal feed improvement
6. Organic farming
7. Biogas
8. Biomass (agricultural residue-based energy)

The BAEF of the eight technologies was carried out based on a barrier analysis processes, which barriers were identified, screened, decomposed, analysed of its root causes and then prioritised by DCC including TNA project team and climate change technical working group (CC-TWG) through stakeholder's consultations and focus group meetings. The BAEF highlighted that, there are eight common barriers that have hindered development and deployment of the eight technologies in effective and sustainable manner. Financially and economically, 1) financial resources and support for development and deployment are insufficient, 2) Investment cost is high, 3) access to finance is limited and financing including subsidy mechanisms is insufficient or unclear. In addition, there are other or non-financial and economic barriers such as 1) insufficient technical knowledge and skills about the technologies including development and deployment of best practices, 2) insufficient legal framework and enforcement, and 3) inadequate information and awareness, 4) insufficient reference projects. Overall, these barriers however can be addressed by implementing following measures:

1. Enhance financial resources including the public budget, resources mobilisation, access to finance, improve and apply appropriate financing mechanisms,
2. Strengthen organisational capacity including and human resources, and coordination among stakeholders,
3. Develop and improve relevant policies enforcement,
4. Research and develop necessary information for planning, decision making and development of the technologies such as financial and economic feasibility, cost-effective tools, best technologies and reference projects for effective and sustainable development and deployment of the eight technologies.

This TAP was formulated based on BAEF as well as the barriers and measures to overcome the barriers. Importantly, the TAP, after being drafted by DCC including TNA project team, was consulted and elaborated in the stakeholder consultation and focus group meetings in March and November 2017. Furthermore, prior to finalisation, it went to feedback and review process involving TWG-CC and leadership of the Ministry of Natural Resources and Environment (MoNRE) as well as by Asian Institute and Technology (AIT) and UNEP-DTU.

The TAP defines actions and activities, funding sources, responsible organisations, timeframe, risks, success criteria and indicators for M&E, financial and human resources for the implementation. However, to be effective, capacity building of the relevant organisations, especially MAF, MoNRE and MEM are needed to strengthen both technical aspects of the technologies and project management skills. In addition, it is prerequisite to ensure financial supports and resources for implementation of the TAPs. Totally investment cost of this TAP implements from mid of 2018 to end of 2022 is estimated to be about 135.08 USD, which USD 76.30 is needed for the forestry and 58.78 million for the agriculture sector.

Chapter 1: Introduction

This Technology Action Plans (TAP) for climate change mitigation is the third outcome of the Technology Needs Assessment (TNA) project, following TNA and Barrier Analysis and Enabling Framework (BAEF). It is prepared by Department of Climate Chang (DCC), Ministry of Natural Resources and Environment (MoNRE) and relevant organisations (Annex 1) and reviewed by Asian Institute of Technology (AIT), Thailand and TUD-UNEP.

This TAP includes actions and activities, timeframe, resources needs and stakeholders to achieve sustainable development including mitigation targets of the prioritized technologies, apart from poverty reduction, for environmental protection and climate change mitigation in the forestry and agriculture sectors. The TAP was formulated based on BAEF and TAP process (Chapter 2) as well as mitigation potentials and gaps outlined in the Table 1 below.

Table 1 An overview of mitigation technologies or practices

Technology/ Practice	Importance and potential for development and mitigation	Status and gaps
Effective protected area management (EPAM)	EPAM is promising and has great potential to prevent deforestation and degradation of the existing dense forests in protected areas-PA (2.04 million ha), restore the potential forest in PA (0.78 million ha or 23% of the PA) and degraded forest (0.58 million ha, 17% of total PA). Fulfilling these not only crucial socioeconomic development, environmental protection but also climate change mitigation.	EPAM mechanisms, model or practices is not fully developed and deployed. PA is understaffed, underfinanced and lack of management plans and forest restoration. Critically, it is being converted and encroached (MAF, 2010; Vientiane Time, 2016 a, b).
Sustainable community forest management	Apart from its important for local livelihood and environment, village forests also have great potential for climate change mitigation. Reducing deforestation, and enhancing forest protection and restoration by smallholders, for example, could possibly reduce emissions from 15,000 to 120,000 tCO_2 annually (MAF, 2010),	Village forest demarcation, resources assessment and development planning are incomplete. It is underfinanced, staffed and underdeveloped so that its socioeconomic and environmental benefits have not been either fully exploited or maximized. Critically, some of the village forests are being overexploited, converted and further degraded.
Optimal or sustainable plantation forests	Total plantation area is approximately 400,000 ha, and by 2020, the plantation is expected to reach 500,000 ha (MAF, 2005; MPI, 2015). Establishment of the plantation on degraded land in accordance with the forest law (2007) and developed under the Forest Stewardship Certificate (FSC) and forest law enforcement, governance and trade (FLEGT) mechanism	Sustainable plantation practices have not fully and effectively deployed. Sustainable plantation regulation and guidelines has not been developed. Only few plantations registered under FSC or FLEGT.

Technology/ Practice	Importance and potential for development and mitigation	Status and gaps
	should lead to reduce emissions or a sustainable development.	
Optimal agroforestry	Agroforestry, apart from its role on national, local economy and poverty reduction, has substantial mitigation potential. A medium rubber-based agroforestry system was expected to reduce 1.17 million tCO2 in 30 years. A small-holder agroforestry may reduce 27, 000 tCO_2 in 15 years.	Optimal agroforestry systems that possibly generate maximum socioeconomic and environmental including climate change mitigation are neither defined or fully deployed.
Feed improvement	Feed improvement and optimization such as restoration and increase productivity of degraded and low productivity forage/pastoral systems, appropriate feed and concentrates formula could substantially reduce greenhouse gas.	Existing and potential pasturelands for animal-raising is approximately 0.65 million ha and 1.14 million ha, respectively (MAF, 2015). However, improved fodder systems are less than 10%. None of appropriate feed concentrate has defined and developed to optimise livestock production and reduction of emissions.
Organic farming	More than 70% of Lao farmers engaged in agricultural practices, which 70% of them are chemical-free or organic farming by default. Organic farming is also known as an environmentally friendly practice or technology, which is essential for carbon sequestration and restoration. In addition, it could avoid GHG emissions from fertilizer production and application.	Currently, certified organic farm area and production 3,002 ha and produce about 3,375 tonnes (MAF, 2016), which is relatively small compared to its potential.
Biogas	Biogas, per households, could save 4.8kg/day of wood, 8.17kg/day of LPG, US$ 23/month from electricity and replacement of kerosene (SNV, 2006). Importantly, fulfilling the biogas development target or develop and supply energy equivalent to 19MW of electricity by 2020 and 51MW by 2025 could sustainably offset the emission.	Biogas is underdeveloped compared to the potential and the targeted. So far, about 20% of the target was achieved.
Biomass (agricultural residue-based energy)	Biomass-based electricity is expected to reach 24MW by 2020 and 58MW by 2025. This too would reduce emissions to great extent in compensation of fossil fuel-based energy.	So far, about 50% of the target was achieved.

Chapter 2: General Methodology for Preparation of Action Plan

The TAP, as mentioned, in general, was developed by Department of Climate Change, Ministry of Natural Resources and Environment (MoNRE), which was supported from relevant organisations. The development was carried through four main steps as follows:

1. **Draft of the TAP:** Initially, the TAP was drafted by the TNA project team following six main steps. Firstly, the measures, especially the broad and unactionable measures were broken down into sub- or actionable measures. Secondly, because there are numbers of measures, and to be more effective, the measures to include as actions in the TAP were prioritised by assessing its effectiveness, efficiency, cost-benefits, co-benefit and sustainability by scoring. Thirdly, set of activities were identified according to its relevance to the identified actions. After that, stakeholders and timeframe to implement the actions and activities were identified based on assessment of mandates and roles of relevant organisations with the actions and activities. The fifth step, cost and sources of funding implementation of the actions and activities were estimated and defined based on the needs, timeframe and cost of similar activities of previous projects. Lastly, the risk assessment and contingency plan was formulated by listing risks and identifying measures for addressing the risks through the team consultation.

2. **Stakeholder consultation meetings** were organised to validate the drafted TAP in March 2017, and the list of participants is in Annex 1. The consultation meeting including presentation and focus group discussion which each TAP was reviewed and consulted among the relevant organisations. As a result, it led to agreement and adjustment of some actions, activities, timeframe, primary stakeholders to implement the TAP. The budget was also revised to fit in the needs and context.

3. **Review of the TAP and focus group meeting:** were carried out by the internal and external stakeholders. Internally, following the stakeholder consultation and revision by TNA project team, the TAP was then resent to the key stakeholders to revisit before MoNRE to recheck and endorse. Mutual meetings between DCC including TNA project team with and relevant ministries such as Renewable Research Institute (RRI) of the Ministry of Energy and Mines (MEM), Department of Forestry (DoF), Agriculture (DoA), Livestock and Fishery (DOLF) of the Ministry of Agriculture and Forestry (MAF) were also held in November 2017 to address the comments and seek for consensus on the TAP. Consequently, the TAP was technically agreed.

   Externally, the TAP was reviewed by Asian Institute of Technology (AIT), Thailand and UNEP-DTU Partnership who facilitate the TNA process. The review was carried out twice, once in December 2017 and lastly February 2018, so that the TAP could be past to the approval process.

4. **Approval:** was done by MONRE through an internal review and consultation meeting. This internal meeting was conducted in February 2018. Compliance of the TAP with national and MONRE's policies were re-affirmed and how to get TAP implemented was emphasised before voting for approving the TAP.

Chapter 3: Technology Action Plan for Climate Change Mitigation in Forestry Sector

3.1 Action Plans for Effective Protected Area Management-EPAM

3.1.1 Description of EPAM

Effective Protected Area management (EPAM), in this context, means an effective or full implementation of measures to maximise income from ecosystem services and external support, and deploy best practices for maintaining and preventing from deforestation and degradation of existing PAs (4.4 million ha) for, apart from conservation and sustainable use of biodiversity, ecosystems, natural, historical, cultural and tourism resources, and climate change mitigation.

Laos has protected area (PA) of about 4.4 million ha, which accounts for about 18.58% of total land area of the country. It comprises 223 PAs since establishment 1994. Of which, 22 PAs are classified as national biodiversity conservation areas (NBCA), and 57 and 144 are provincial and district conservation areas, respectively. Abandoned forests[1] covered approximately 60%, potential forest[2] 23% and other forest land included degraded forest 17% (MAF, 2012)

Currently, the PAs, despite increased the government efforts for the management, are not fully protected and restored. Number of PAs are converted and encroached due to development projects, unstainable wood and non-timber forest product (NTFP) extraction. Degraded forests have not entirely rehabilitated. Revenue from ecosystem services such ecotourism, carbon credits and NTFP have not maximised and sustainably utilised.

3.1.2 Development goals and targets

This action's objective is to take actions to meet the overarching goals and targets of the EPAM which outlined in the Table 2 below. Specifically, it is to deploy effective protected area management systems (EPAMS) including best practices for managing all the 24 National Protected Areas (NPAs) or Biodiversity Conservation Areas (NBCAs) sustainably by 2030. In addition, it is expected that the sustainable NPAs would provide guidance and push provincial, district and village PAs to be managed in sustainable or effective manure throughout the country.

Table 2 Overarching goals climate change mitigation targets of the EPAM

Overarching goals	Climate change mitigation targets
To conserve nature, biodiversity, ecosystems and other valuable natural, historical, cultural, tourism sites for sustainable use, educational and scientific research experiments (GOL, 2007).	1. Most of the protected areas (PAs) including resources, ecological functions, services and values are well-maintained and/or enhanced by 2025 and onward; 2. 70% of potential forests of about 1.3 million ha in the PAs are preserved, regrown and become primary forests by 2030; 3. At least 80% of total degraded forestland areas of 0.6 million ha in the PAs are restored by 2020 and totally by 2030; 4. Forest encroachment, deforestation and degradation are minimised to the extend it possible or at least no worse than current situation by 2030;

[1] forest cover> 20%
[2] forest cover <20% but can be naturally regenerated to become abandoned forest

	5. 30% of the PAs deploys carbon credits and other payment of ecosystem service mechanisms by 2025 and 50% by 2030.

3.1.3 Identification of Action and Activities to include in the TAP

3.1.3.1 Summary of EPAM barriers and measures to overcome the barriers

The barrier analysis and enabling framework (BAEF) resulted in identification of seven important barriers that hinder EPAM. To overcome the barriers, several measures were identified (Table 3). However, some measures are still broad, and it may be hard to implement all the measures because of capacity and financial constraints. Hence, the measures to be taken as actions are re-assessed and prioritised (see the section 3.1.3.2 below).

Table 3 Overview of EPAM barriers and measures to overcome the barriers

Categories	EPAM barriers	Measures to overcome barriers
Economic and financial	1. The public budget shortfall for EPAM	1. Improve the public budgeting for EPAM: a. Improve the public budgeting effectiveness and efficiency b. Maintain the public budget for EPAM c. Ensure effective law enforcement (contributions of the development projects and businesses involving with NBCAs to EPAM, polluter pays e.g., forest offset)
	2. Limited revenues from ecosystem services and reinvest in EPAM	2. Increase revenues from ecosystem services and reinvest in EPAM
	3. Insufficient or ineffective or unsustainable EPAM financing mechanism	3. Research and develop an effective or sustainable EPAM financial mechanism
Legal and regulatory framework	4. Defective legal framework and ineffective law enforcement	4. Improve legal framework and law enforcement effectiveness (the measure 3)
Institutional and organisational capacity and human skills	5. Limited organisational capacity and human resources	5. Increase human resources development and management system a. Increase field and extension staff b. Enhance professional education and trainings c. Improve HRD system and enabling environment d. Enhance learning culture and commitment
	6. Insufficient reference project and best practice guidelines on EPAM	6. Develop reference project and best practice guidelines on EPAM 7. Enhance and expand successful EPAM
Information and awareness	7. Insufficient information for EPAM	8. Research and develop information for EPAM

3.1.3.2 Selection of Actions

As mentioned in the Chapter 2, actions to include in the TAP were selected by converting measures into actions. It included breaking down sub-measures or actionable measures, and then prioritising the measures or sub-measures by rapid assessment using multiple criteria assessment in the stakeholder consultation meeting. The conversion of measures to actions and assessment of the action were initially conducted by TNA project team by scoring their effectiveness, efficiency, cost-benefit, impact and necessity of the measures (Annex 2). The stakeholder consultation meeting was held in March 2017 to discuss and select actions for TAP. As a result, the actions to pursue effective protected area management (EPAM) could be summarised in Table 4.

Table 4 Selected measures to include in the EPAM action plan

Categories	Measures to include in the action plan
Economic and financial	1. Maintain or enhance the public budget for EPAM
	2. Increase revenues from ecosystem services and reinvest in EPAM
	3. Enhance resources mobilisation
Legal and regulatory framework	4. Strengthen/Increase law enforcement effectiveness
Institutional and organisational capacity and human skills	5. Increase organisational capacity 6. Increase human resources
Information and awareness	7. Research and develop best practices, reference projects and guidelines and information for EPAM

3.1.3.3 Identification of Activities for the Selected Action

Selection of activities for each action was carried out through a stakeholder consultation process. The activities were initially listed by the TNA project team, then were consulted, elaborated and agreed with the DoF during consultation meeting in November 2017. Practicality, logics, relevance, and impacts and influences of the activities to achieve the actions were considered when the activities were selected. As a result, number of activities were identified for actions as outlined in the Table 5 below.

Table 5 Identification of activities for achieving actions

Action 1	**Maintain and enhance the public budget for EPAM**
Activity 1.1	*Develop strategy on EPAM and action plan of all NBCAs*
Activity 1.2	*Develop comprehensive and financeable project proposal including reliable financial and economic analysis*
Activity 1.3	*Improve effectiveness of public financing projects including M&E of the project impact, budget management system and reporting best practices*
Action 2	**Increase revenue from ecosystem service and reinvest in EPAM**
Activity 2.1	*Enhance sustainable ecotourism*
Activity 2.2	*Enhance sustainable non-timber forest products*
Activity 2.3	*Promote carbon credit mechanism*
Activity 2.4	*R&D of effective or appropriate mechanisms and best practices, and apply them to improve payment for ecosystem services and reinvestment in EPAM*

Activity 2.5	*M&E and apply best practices to promote and enforce regulations on the contribution of development projects and businesses involving with NBCAs*
Action 3	**Enhance resource mobilisation**
Activity 3.1	*Conduct financial needs and resources assessment*
Activity 3.2	*Develop financial resource directory*
Activity 3.3	*Develop and implement resource mobilisation plan*
Activity 3.4	*Increase capacity to develop financeable project proposal(s) including financial and economic analysis*
Activity 3.5	*Increase cooperation and partnership with development partners, international originations, NGOs and NPO to increase financial resources for NBCAs*
Activity 3.6	*Improve financial aids management system including recording, reporting, M&E*
Action 4	**Increase organisational capacity and human resources**
Activity 4.1	*Improve human resource development system including capacity development plan, staff knowledge, building learning culture and commitment*
Activity 4.2	*Build national, local authorities and communities on effective or sustainable PAM through professional training and capacity building activities*
Activity 4.3	*Increase staff and volunteers for EPAM*
Activity 4.4	*Develop and implement strategy and action plans for all NBCAs*
Activity 4.5	*Promote PA conservation network, think-tank and civil organisation and information exchanges*
Activity 4.6	*Improve EPAM education and research in high education*
Action 5	**Research and develop information for EPAM**
Activity 5.1	*Conduct inventory and assessment of social and forest resources, ecosystem services including carbon sequestration and economic valuation*
Activity 5.2	*R&D of best practice guidelines for sustainable or EPAM (all aspects)*
Activity 5.3	*Improve information management systems and dissemination*
Action 6	**Pilot and expand EPAM reference projects (deploying best practices)**
Activity 6.1	*Expand public-private partnership EPAM in Nam Ou, Nam Ha, Nam Ngum, Nam Leek, Nam Kading, Xe Banhieng, Xe Set, Xe Kong river basin*
Activity 6.2	*Expand best practice community-based sustainable forest resources management*
Activity 6.3	*Law enforcement (contributions and forest offset of the development projects and businesses involving with NBCAs to EPAM, enforce rule of law for forest encroachment, illegal logging)*
Activity 6.4	*Application of best technologies for monitoring of environmental changes and patrolling NBCAs*
Activity 6.5	*Forest restoration*

3.1.4 Identify Stakeholders and Determine Timelines

3.1.4.1 Identify Stakeholders for TAP Implementation

Following the actions and activities identification, stakeholders could be identified by listing all of potential stakeholders, especially the existing stakeholders, review and match their mandates what relevant with the actions and activities.

Table 6 Main stakeholders for EPAM

No	Main organisations	Mandates/Tasks
I	**Public sector**	
1	Ministry of Agriculture and Forestry (MAF). In particular, Department of Forest (DOF), Forest Inspection (DFI), Forest Inventory and Planning (DFIP), Agriculture and Forestry Extension (DAFE), Cooperation (DOC), Personal and Organisation (DPO), REDD Office, National Agriculture and Forestry Research Institute (NAFRI) and Forest Protection Fund (FPF)	MAF has the responsibility to oversee forestry affairs. DoF, particularly Conservation Forest Division (DFD) has a specific responsibility on conservation forest or protected area management (PAM) DFI, DFIP, DAFE, DOC, DPO, FPF and NAFRI have the responsibility on overall forest resources including PAM inspection, inventory and planning, extension, cooperation, personal, REDD, research and mobilise resources for PAM
2	National University of Laos, especially Faculty of Forestry (FOF)	Provides protected area management education and research
3	Ministry of Natural Resources and Environment (MoNRE), particularly, Environmental Protection Fund (EPF), Department of Land (DOL), Environmental Promotion (DEF) and Department of Climate Change (DCC)	MoNRE has an overall responsibility about natural resources and environment (NRE) including PAs and biodiversity. EPF has the responsibility to mobilise financial resources for NRE including PAs and biodiversity. DOL has the responsibility for land use planning and development including PAs. DEF promotes NRE including PAM and wetland management. DCC promotes PAM for climate change mitigation and adaptation.
4	Committee for Poverty and Rural Development (CPRD)	Poverty elimination of people including local people living in PAs
5	The National Assembly	Conversion of large area (>500 ha) of protected area
6	The Prime Minister's Office	Oversee overall socioeconomic and environment including protected area management
7	Ministry of Culture, Information and Tourism	Preserve tourism resources and promote eco- and responsible tourism in PAs
8	Ministry of National Defence	Responsible for an PA area assigned to military for military purpose
II	**Private sector**	
9	Hydropower developers	Compensate or contribution to EMAP in the watershed
10	Forestry and environmental consulting firm	Provide consulting service in various aspects of agroforestry development
III	**Development partners and funds**	
11	GIZ, JICA, WB, ADB, SDC, GEF	Provide technical and financial support

IV	International and domestic non-government and non-profit organisations	
12	IUCN, WWF, WCS	Mobilise resources and provides technical and financial support for PAM and local people live in PAs

3.1.4.2 Schedule Actions and Activities

The schedule of the actions and activities was defined by TNA project team in consultation with DOF in November 2017. Logics and sequences, nature and scale of the activities, readiness including time, technical and financial capacity of the DOF and support organisations to perform the activities were considered when scheduling. As a result, the schedule of the actions for EPAM was formulated (see Annex 4) and elaborated in the summary overview of the TAP, Table 7.

The timeframe of the action plan implementation is five years, which is perceived to be appropriate timeframe for technical and financial preparation including demonstration of EPAM before full expansion of EPAM models and practices to provincial and district PAs throughout the country. Overall, the timeframe is divided into two phases. The preparation phase is 3 months, which shall be commenced following approval of the TAP or between March to May 2018.This phase activities are dissemination and consultation with stakeholders to arrange for the implementation. The implementation phase would be started from May or June 2018 until December 2022.

3.1.4 Estimate Resources

3.1.4.1 Capacity Building

The capacity, especially the knowledge and skills needed for effective protected area management (EPAM) were identified in the barrier analysis and enabling framework, which is documented separately. The knowledge and skills needed, include, project management and proposal development and other technical knowledge and skills related to EPAM as outlined in Box 1.

The capacity building, in general, require external support since either the local capacity builders or financial resources are limited.

Box 1: Knowledge and skills needs for EPAM

1) Project management including proposal development
2) Public private partnership for sustainable natural resources and environment management
3) Effective law enforcement
4) Resource mobilisation and access to finance
5) Strategic and protected area site planning
6) Sustainable forest management including model, procedures, best practice guidelines
7) Environmental economics and enterprises including valuation of ecosystem service, design a payment for ecosystem service, tax, financing mechanism and models, cost and benefit analysis including return on investment

8) Harmonisation of people and natural resources conservation
9) Integrated spatial and sustainable landscape planning
10) Biodiversity and ecosystems including soil carbon monitoring and restoration
11) Local economics, rural and community development
12) R&D of best practices
13) HR and organisational development for sustainable natural resources and environment management

3.1.4.2 Estimate Costs for Actions and Activities

The costs for implementation of TAP were estimated by particularly Department of Climate Change (DDC) and Forestry (DOF) through a focus group consultation meeting. Initially, cost items of each activity were listed and estimated by DCC including the TNA project team. The costs were then discussed and agreed with Conservation Forest Division (CFD) in March 2017 prior to bring it to the DCC and DOF joint meeting to review and agree the final costs in November 2017.

The total final cost for implementing this EPAM action plan for all NBCA 2018 to 2022 is about US$ 38.08 million (to top up existing budgets). It consists of the costs for implementation of activities, capacity building, risk and contingency. The preparation cost including the TAP dissemination workshop would be US$ 18,000 (2 day-national workshop). The cost of the implementation of the activities is US$ 34.54 million, which includes allowance, consultant, meeting, equipment, travel and other administrative costs (Annex 4 and Table 7). The costs for risk management and contingency action is about 10% of the activity cost or US$ 3,453,600.

3.1.5 Success Criteria and Indicators for Monitoring of the Implementation

Success criteria and indicators (C&I) for monitoring of the TAP implementation were also formulated by TNA project team in consultation with the key stakeholders in November 2017. The C&I were divided into two levels: actions and activities as well as output-outcome and input level. Those C&I of the actions and activities were summarised in Table 7 below and Table 8, the TAP summary.

Table 7 Success Criteria and Indicators for Monitoring the Implementation of the TAP on Effective PAM

No	Actions	Success criteria	Indicators for M&E
1	Increase the government budget for effective PAM	The government budget allocated for PAM is increased or at least USD 1 per ha of protected areas on average	The government pledge and/or budget for PAM is increased
2	Increase revenue from ecosystem service and reinvest in effective PAM	Revenue from ecosystem service return to PAM is at least sufficient to maintain the could maintain the ecosystem service or at least USD 1 per ha of protected areas on average	- PA's ecosystem service related enterprises improved - Revenue from ecosystem service and reinvest in effective PAM increased

No	Actions	Success criteria	Indicators for M&E
3	Enhance resource mobilisation	- International cooperation and supports are sustained and expanded - At least USD 1 per ha of protected areas could be secured from resource mobilisations and access to international supports	- Cooperation between Lao government, especially MAF, MoNRE and donors improved - Technical and financial support derived from resources mobilisation increased
4	Increase organisational capacity and human resources	The government including MAF and MoNRE at national and local levels and communities have adequate human and financial resources to fully perform their mandates on PAM	Institutional capacity and human resources are improved
5	Research and develop information for effective PAM	Necessary information such as socioeconomic data, land uses, resources, ecosystem service and values including investment feasibility and best practices on PAM are available for effective or sustainable PAM planning and development	Information and awareness are improved
6	Pilot and expand EPAM reference projects (deploying best practices)	Effective PAM reference projects are available for replication or expansion	No. of effective PAM reference projects piloted and scale of financial investment

3.1.6 Summary Overview of the Action Plan for Effective Protected Area Management

The summary overall TAP (Table 8) derived from previous sections. The summary TAP consists of actions and activities, funding sources, responsible organisation, timeframe, budget for the implementation, risks and C&I of the TAP implementation. This TAP will be carried out for five years, by MAF and MoNRE, particularly the Department of Forestry (DoF) and Department of Climate Change (DCC). The total cost of the TAP implementation is about US$ 38.01 million.

Table 8 Effective Protected Area Management Action Plan

Action	Activities	Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ Th.)
Action 1	**Maintain and enhance the public budget for effective PAM**							
Activity 1.1	Develop strategy on PAM and action plan of all NBCAs	**Public:** GOV and development partners - DPs: WB, ADB, JICA, GIZ, KFW **Private:** Hydropower developers-HPD. **INGOs:** WWF, IUCN, WCS	MAF: DOF/ CFD	Jun 2018-Dec 19	Delayed or not practical due to insufficient resources information and best practices	A practical strategy and plans (site management and enterprise plans) including clear development target, resource needs, potential or feasibilities of financial and economic return from ecosystem services or enterprises developed for al NBCAs and available for decision on investment	Strategy and plans developed	*820*
Activity 1.2	Develop and submit comprehensive project proposals for the public and international funding	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, UNDP, UNEP **Private:** HPD **Others:** GEF. **INGOs:** WWF, IUCN, WCS	MAF: DOF/ CFD	Dec 2018 - Dec 2022	Undefinable or variable of funding sources due to information and skills to develop financeable project proposal	Increased number of projects and budget for NBCA	No. of project proposal developed, submitted and funded	*170*

Action	Activities	Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ Th.)
Activity 1.3	Improve the public financing and international aids management system including M&E	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, UNDP	MAF: DOF/CFD, DOC	June 2018-Dec 2022	Ineffective or poor coordination among stakeholders	Financial aids data management system developed, and the public and international aids information are traceable and monitoring- able and reportable.	A financial aids data management system including project profiles, M&E and audit reports developed	*13*
Action 2	**Increase revenue from ecosystem service and reinvest in EPAM**							
Activity 2.1	Enhance sustainable ecotourism development and promotion	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, LUX, UNDP **Private:** HPD **Others:** UNWTO **INGOs:** SNV, WWF, WCS	MAF: DOF/ CFD MICT: DTPM	Jun 2018-Dec 2022	1). Variable tourism markets, and 2) Limited knowledge and best practice information about environmental tax or ecosystem service fee, 3) Ineffective coordination among stakeholders	Increased ecotourism income and intervention to NBCAs	1). No. of ecotourism products, marketing events and materials developed including investment cost, 2) No. of tourist arrivals, 3) change of income and employment to NBCAs	*1,320*
Activity 2.2	Enhance sustainable non-timber forest products	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, AusAID, UNDP **Private:** HPD **Others:** SNV, WWF, WCS, IUCN	MAF: DOF/ CFD, DAFE	May 2018-Dec 2022	1). Insufficient information and knowledge about sustainable harvesting, recovery and regeneration rate or ecosystem carrying capacity. 2) Variable NTPF market.	Increased NTFP income and contribution to NBCAs	1). No. of NTFP and proportion of sustainable enterprises, 2 Mechanism and proportion of NTFP derived income allocated for NBCA.	*2,400*
Activity 2.3	Promote carbon credit mechanism	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP **Others:** GCF, GEF	MAF: DOF/ CFD	May 2018-Dec 2022	Variable market and financial support	Increased income and intervention from carbon	Policy on carbon credit. Number of carbon intervention	*1,050*

Action	Activities	Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ Th.)
		INGOs: SNV, WWF, WCS, IUCN				credit mechanism to NBCAs		
Activity 2.4	R&D and apply an effective mechanisms and best practice guidelines to improve payment for ecosystem services and reinvestment in PAM	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP, UNEP **Private:** HPD **Others:** GEF **INGOs:** WWF, IUCN, WCS	MAF: NAFRI NUOL: FOF, EFS, FOBE	May 2018-Dec 2019	Financial and human resources are not secured for R&D of best practices	Available best practices and guidelines for effective PAM is in place and applied	No. of mechanisms and best practices and guidelines for improve payment for ecosystem services and financing NBCA developed and applied	*610*
Activity 2.5	M&E and apply best practices to promote and enforce regulations on the contribution of businesses to NBCAs	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP, UNEP **Private:** HP **Others:** GEF **INGOs:** WWF, IUCN, WCS	MAF: DOF/ CFD	May 2018-Dec 2018	Financial resources are not secured for development and implementation	Available best practices and guidelines for effective PAM is in place and applied	No. of best practices developed	*390*
Action 3	**Enhance resource mobilisation**							
Activity 3.1	Conduct financial needs and resources assessment	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP, UNEP	MAF: DOF/ CFD, DOC	May 2018-Oct 2018	No access to detailed information about funding sources.	Detail information about funding needs and sources and financing feasibility are available for financial planning and decision	Detailed information about funding needs and sources and eligibility	*815*

Action	Activities	Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ Th.)
Activity 3.2	Develop financial resource directory	**Public:** GOV	MAF: DOF/ CFD	Jun 2018-Dec 2018	Insufficient information about funding sources.	Detail information about donors and funding are updated and made available for planning to cooperate and access to supports	Financial resource directory developed and updated	*13*
Activity 3.3	Develop and implement resource mobilisation plan	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP	MAF: DOF/ CFD	Jul 2018-Mar 2019	Insufficient information about funding sources.	International cooperation, partnership and supports increased and sustained	Resource mobilisation plan developed and implemented	*90*
Activity 3.4	Develop financeable project proposals for NBCA funding	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP, UNEP **Private:** HPD **Others:** GEF. **INGOs:** WWF, IUCN, WCS	MAF: DOF/ CFD	Sep 2018-Dec 2022	Delayed or not fully funded due to unavailable and variable funding sources, information and skills to develop financeable proposals	Increased number of projects and funds for NBCA	No. of project proposal developed, submitted and funded	*150*
Activity 3.5	Increase cooperation and partnership with development partners, international originations	**Public:** GOV and DPs: WB, ADB, JICA, SDC, UNDP	MAF: DOF/ CFD	May 2018-Dec 2022	Ineffective coordination and reporting among stakeholders	Increased cooperation agreements and partners, network and supports.	No. of agreement, partners and engagement with relevant organisations to joint or assist to access to financial support	*55*

Action	Activities	Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ Th.)
Activity 3.6	Improve financial aids management system including recording, reporting, M&E	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP	MAF: DOF/ CFD	Jul 2018-Dec 2022	Ineffective coordination and reporting among stakeholders	Functional financial data management system, which financial flow is traceable, monitorable and reportable	Financial data management system developed and updated	*15*
Action 4	**Increase organisational capacity and human resources**							
Activity 4.1	Improve human resource development system	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP	MAF: DOF/ CFD, DPO	May 2018-Dec 2022	Insufficient knowledge and skills, leadership and commitment on organisational development	Adequate or at least increased human resources and capacity for EPAM	Improved capacity building, effective recruitment, increased staff commitment and learning culture	*75*
Activity 4.2	Provide professional trainings on EPAM and related specialisations	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP, UNEP **Private:** HPD **Others:** GEF **INGOs:** WWF, IUCN, WCS	MAF: DOF/ CFD, DPO	Oct 2018-Dec 2022	Inadequate financial and human resources for capacity building Trainings are not delivered to the right people or needs	Relevant organisations including staff receive more trainings and are skilful to perform EPAM.	No. of trainings and participants attended	*220*
Activity 4.3	Increase staff and volunteers for EPAM	**Public:** GOV	MAF: DOF/ CFD, DPO	May 2019-May 2021	Inadequate financial support for increase no. of staff and volunteers	Adequate or at least increased staff and volunteers to support PAM	No. of staff and volunteers to support PAM	*340*

Action	Activities	Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ Th.)
Activity 4.4	Develop and promote application of the EPAM or sustainable NBCAs guidelines	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP **INGOs:** WWF, IUCN, WCS	MAF: DOF/ CFD	Jun 2018-Dec 2019	Insufficient resources to develop and train to use EPAM or sustainable NBCAs guidelines.	Practical guidelines on EPAM or sustainable NBCAs are available and applied to PAM	EPAM or sustainable NBCAs guidelines developed	*60*
Activity 4.5	Promote EPAM advocacy network, think-tank and civil organisation	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP	MAF: DOF/ CFD	Sep 2018-Dec 2022	Delayed or inactive due to delayed or insufficient resources, motivation, and promotion	Available network and exchange platform and increased knowledge and capacity because of networking and exchange	No. and function of working group, network, think-tank established	*100*
Activity 4.6	Improve EPAM education and research in high education	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC	NUOL: FOF	Jul 2018-Jul 2019	Delayed or not practical due to insufficient resources and best practices	Comprehensive and practical EPAM curriculum.	EPAM curriculum improved	*75*
Action 5	**Research and develop information for EPAM**							
Activity 5.1	Conduct inventory of social and forest resources, ecosystem services and valuation	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP, UNEP **Private:** HPD **Others:** GEF. **INGOs:** WWF, IUCN, WCS	MAF: DFIP, DOF/ CFD, NAFRI NUOL; FOF	Sep 2018-Sep 2020	Insufficient financial and human resources to conduct the inventory and valuation	Detail information for design a sustainable resources management including financing	Inventory conducted and information available	*1,500*

Action	Activities	Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ Th.)
Activity 5.2	R&D of best practices on sustainable or EPAM (to support other actions)	**Public:** GOV **Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP, UNEP **Private:** HPD **Others:** GEF. **INGOs:** WWF, IUCN, WCS	MAF: NAFRI	May 2018-May 2021	Financial resources are not secured for development and implementation	Application and effectiveness of best practices	No. of best practices developed	*180*
Activity 5.3	Research and improve information, information systems and dissemination	**Public:** GOV and development partners e.g., WB, ADB, JICA, GIZ, KFW, SDC, UNDP	MAF: NAFRI	May 2018-May 2022	Insufficient resources for R&D.	Stakeholders have necessary information, awareness and contribute effective PAM	No. of research and information update and available	*20*
Action 6	**Pilot and expand EPAM reference projects (deploying best practices)**							
Activity 6.1	Expand public-private partnership EPAM for restoration of forest carbon in all NBCAs in main river basins	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP, **Private:** Hydropower developers-HPD	MAF: DOF/ CFD MEM: DEB, DEPP, RERI HPD	Jan 2019-Dec 2022	Insufficient resources or unagreeable PPP EPAM.	At least, 6 PPP models are implemented in 6 NBCAs	No. of meeting, studies and agreements on PPP EPAM	*5,000*
Activity 6.2	Expand best practice community-based sustainable forest resources management (CBRM)	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP **Private:** HPD **Others:** GEF **INGOs:** WWF, IUCN, WCS	MAF: DOF/ CFD CRPR	Jan 2019-Dec 2022	Local community may not have sufficient resources to continue after project complete.	At least, 6 CBRM models are implemented in 6 NBCAs	No. of meeting, studies and agreements on CBRM	*5,750*

Action	Activities	Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ Th.)
Activity 6.3	Law enforcement (illegal logging, forest offset, contributions of the development projects and businesses to PAM)	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP, UNEP, EU **Others:** GEF	MAF: DOF/CFD EDL Hydro-power developers	Oct 2018-Oct 2022	No transparency and ineffective governance. Insufficient best practices on law enforcement	Increased resources tax and revenue to NBCAs. Decreased forest encroachment	No. of law violence, environmental case and measures enforced, and meetings to solve the problems.	*1,450*
Activity 6.4	Application of best or modern technologies for monitoring of environmental changes and NBCAs patrolling	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP, UNEP. **Private:** HPD **Others:** GEF. **INGOs:** WWF, IUCN, WCS	MAF: DOF/ CFD	Jan 2019-Dec 2022	Insufficient resources to develop and implement the best or modern technologies for monitoring and patrolling	Decreased forest encroachment	Project planning and implementation	*2,350*
Activity 6.5	Restoration of forest for voluntary carbon market	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP **Private:** HPD **Others:** GEF. **INGOs:** WWF, IUCN, WCS	MAF: DOF /FRD	Jan 2019-Dec 2022	Insufficient resources to develop and implement the project	Increased restored forest including biodiversity and carbon	Project planning and implementation	*8,800*
Total								**34,536**

3.2 Action Plans for Sustainable Community Forest Management

3.2.1 Description of SCFM

Sustainable community or village forest management (SCFM or SVFM), in overall, is a management mechanism and practice in which village or community play a prominent role in managing forest resource for conservation and securing their livelihood. It has great climate change mitigation potential, especially reducing encroachment, conversion while enhancing restoration and prevention of forest degradation. Reducing deforestation, and enhancing forest protection and restoration by smallholders, for example, could possibly reduce emissions from 15,000 to 120,000 tCO_2 annually (MAF, 2010),

Community forest management (CFM) have been implemented in Laos for decades. The outstanding interventions were between 1994 and 2010, when Laos received strong technical and financial support from development partners (Braeutigam, 2003; Manivong and Sophathilath, 2007). Those initiatives have provided foundations and lessons for the SCFM in Laos, although not all of the programmes successfully achieved the programmes' targets (MAF, 2005).

These village forests are; however, underdeveloped and its socioeconomic and environmental benefits have not been either fully exploited or maximized. Most of them have not been completely surveyed, assessed its economic and environmental protection potentials and values. Land allocation had been accomplished in 6,830 villages and each village, on average, has village forest area of about 1,200 ha (MAF, 2005). Site management plans are not in place. Critically, some of the village forests are currently overexploited, and majority are degraded and at risk of conversion for other development purposes.

3.2.2 Development goals and targets

To deploy a sustainable community forest management model and practice including sustainable NTFP management in 50% of village forest areas or community by 2030, so that contributes to achieve the following overarching goals (Box 2).

Box: 2 The overarching goals of village forest management

1. Most of the village forest areas including resources, ecological functions, services and values are well-maintained and/or enhanced by 2025 and onward;
2. Most of the protection and conservation zones (app. 50% of village forests) including its services and values are effectively managed and preserved by 2020 and become forests with carbon stock close to (about 70% of carbon stock) of origin forest by 2030;
3. Deforestation and forest degradation are minimal for the rest of the forest areas by 2030.
4. Enhanced culture heritage, disaster resilience, livelihood and local economy.

3.2.2 Selection of Measures to include in the TAP

3.1.4.3 Summary of Barriers and Measures to Overcome SCFM Barriers

Based on the barrier analysis and enabling framework (DCC, 2017), the main barriers that impede SCFM and measures to overcome the barriers could be summarised in the Table 8. Those barriers and

measures are mainly in the three main categories: financial and economic, institutional capacity and human skills, and legal framework.

Table 9 SCFM Barriers and measures to overcome barriers

Categories	Barriers	Measures to overcome barriers
Economic and financial barrier	1. Inadequate financial resources and investment in SCFM	Increase financial resources and investment in SCFM: - Maintain and enhance the government budget for SCFM - Optimise financial support from development partners - Expand access to financial support from other international organisations and funds - Mobilise financial contribute from society - Maximise revenue from ecosystem services such as NTFP, ecotourism and carbon credit and other sources
Institutional and organisational capacity and human skills	2. Ineffective human resources and organisational development system	Improve human resources and organisational development system
	3. Understaffed (skilful extension and field staff)	Increase skilful extension and field staff to support communities to apply SCFM approaches
	4. Limited technical and relevant skills on SCFM including legal, organisational, financial, social, economic, mitigation and extension skills	Increase technical and relevant skills on SCFM including legal, organisational, financial, social, economic, mitigation and extension skills
Technical	5. Insufficient successful models and tools especially best practice guidelines for SCFM	- R&D successful models, best practice guidelines for SCFM - Pilot SCFM
Legal framework	6. Impropriate village forest definition and ineffective law enforcement	- Redefine village forest appropriately - Enhance effectiveness of law enforcement
Information and awareness	7. Insufficient information about natural resources and sustainable harvesting rate	R&D and provide adequate information about natural resources and sustainable harvesting rate for sustainable planning and uses
Other	8. Poverty	Eliminate poverty

3.2.2.1 Selection of Measures for Action

The selection of actions to include in to the TAP, as mentioned in Chapter 2, was carried by converting measures into actions, and then prioritise by scoring and select the actions in the upper ranks. In addition, stakeholder consultation meetings were organised in March and November 2017 to discuss and agree on the actions for TAP. The conversion of measures to actions and assessment of the action were initially conducted by TNA project team considering its effectiveness, efficiency, cost-benefit,

impact and necessity of the measures, by scoring. The stakeholder consultation meeting in March 2017 were attended by various organisations (Annex 1), and the one in November was the mutual meeting between DCC of MONRE and Department of Forestry, MAF. As a result, the assessment could be summarised in the Table 4 and actions to pursue effective protected area management (EPAM) were summarised in Table 5.

Table 10 Selected measures for TAP of SCFM

Categories	Measures to overcome barriers	Selected measures for TAP
Economic and financial barrier	Increase financial resources and investment in SCFM:	√
	- Maintain and enhance the government budget for SCFM	√
	- Optimise supports from development partners-improve aid effectiveness and M&E system	√
	- Expand access to financial support from other international organisations and funds	√
	- Mobilise financial contribute from society	X
	- Maximise revenue from ecosystem services such as NTFP, ecotourism and carbon credit and other sources	√
Institutional and organisational capacity and human skills	Improve human resources and organisational development system	√
	Increase skilful extension and field staff to support communities to apply SCFM approaches	√
	Increase technical and relevant skills on SCFM including legal, organisational, financial, social, economic, mitigation and extension skills	√
Technical	- R&D successful models, best practice guidelines for SCFM	√
	- Pilot SCFM	√
Legal framework	- Redefine village forest appropriately	√
	- Enhance effectiveness of law enforcement	√
Information and awareness	R&D and provide adequate information about natural resources and sustainable harvesting rate for sustainable planning and uses	√
Other	Eliminate poverty	√

3.1.4.4 Identicality of Actions and Activities for TAP

The activities in the Table 10 below were identified through a stakeholder consultation process. The activities were initially identified by the TNA project team, and then were discussed and agreed with DoF in November 2017, considering practicality, logics, relevance and impacts and the existing activities or overlaps.

Table 11 Selected actions and activities for SCFM

Action 1	**Maintain and enhance the public budget for SCFM**
Activity 1.1	*Develop strategy on SCFM including financial needs and resources assessment*
Activity 1.2	*Develop financeable project proposal*
Activity 1.3	*Improve public budget management system including recording, reporting, M&E*
Action 2	**Enhance income from all sources for SCFM and local people**
Activity 2.1	*Conduct assessments of ecosystem services including potential revenue from NTFPs, ecotourism, carbon credits and other income and employment activities*
Activity 2.2	*Develop an income and employment plans including sustainable NTFPs, ecotourism, carbon credits, agriculture and employment development plan*
Activity 2.3	*Improve marketing and access to markets of communities made products*
Activity 2.4	*Diversify and improve quality and quantity of communities made products*
Activity 2.5	*Improve NTFP production including domestication*
Activity 2.6	*R&D effective mechanisms on resources fee and tax and reinvesting in SCFM*
Action 3	**Enhance resource mobilisation**
Activity 3.1	*Develop financial resource directory*
Activity 3.2	*Develop and implement resource mobilisation plan*
Activity 3.3	*Develop financeable project proposals*
Activity 3.4	*Increase cooperation and partnership with development partners, international originations, NGOs and NPO*
Activity 3.5	*Improve financial aids management system including recording, reporting, M&E*
Action 4	**Increase organisational capacity and human resources**
Activity 4.1	*Improve human resource development system including capacity development plan, staff knowledge, building learning culture and commitment*
Activity 4.2	*Building national, local authorities and communities on SCFM through professional training and capacity building activities*
Activity 4.3	*Increase extension staff and volunteers to work with communities*
Activity 4.4	*Improve SCFM education and research in high education*
Activity 4.5	*Promote SCFM network, think-tank and civil organisation and information exchanges*
Action 5	**Research and develop information for SCFM**
Activity 5.1	*Conduct inventory of social and forest resources, ecosystem services including carbon sequestration and valuation*
Activity 5.2	*R&D of best practices and guidelines on SCFM including sustainable resources harvesting, financing, organisational management, law enforcement etc.*
Activity 5.3	*Improve information management systems and information dissemination*
Action 6	***Eliminate poverty-improvement infrastructure***
Activity 6.1	*Survey and assess land use and sustainability of community settlement*
Activity 6.2	*Develop sustainable or resilient rural or town and land use plans*
Activity 6.3	*Develop infrastructures and facilities for improve services in communities*

Action 7	**Improve SCFM legal framework**
Activity 7.1	*Review and update the decree on village forest*
Activity 7.2	*Review and update the policies and regulation on village forests offset*
Action 8	**Pilot SCFM**
Activity 8.1	*Review and update the decree on village forest*
Activity 8.2	*Enforce rules of law such as conversion or encroachment and offset of village forests*

3.2.3 Identify Stakeholders and Determine Timelines

3.2.3.1 Identify Stakeholders for TAP Implementation

The stakeholders to SCFM were identified by matching the identified activities for TAP and mandates and interest of the relevant organisations. Some organisations have been identified and engaged in TNA-BAEF (Annex 1). Other important stakeholders are definable through review of their mandate, country partnership agreement and previous CFM project engagement. In addition, list of stakeholders was elaborated and validated during stakeholder consultation meeting in November 2017. So, the general or main stakeholder could be summarised in Table 11, and specific one for each activity in Table 12.

Table 12 General stakeholders for SCFM

No	Key organisations	Mandate
I	**Public sector and development partners**	
1	Ministry of Agriculture and Forestry (MAF): Department of Forest (DOF), particularly the village forest division (VFD)	MAF has responsibility to oversee forestry affairs. DoF, particularly VFD has a specific responsibility on village or community forest management (V/CFM)
2	National University of Laos, especially Faculty of Forestry (FOF)	Mobilises resources for SCFM education and research
3	Ministry of Natural Resources and Environment (MoNRE), particularly, Environmental Protection Fund (EPF), Department of Land (DOL), Environmental Promotion (DEF) and Department of Climate Change (DCC)	MoNRE has an overall responsibility about natural resources and environment (NRE) including community forest - EPF has the responsibility to mobilise financial resources for NRE including SCFM - DOL has the responsibility of land use planning including community forest land - DEF promotes NRE including biodiversity and wetland management - DCC promotes SCFM for climate change mitigation and adaptation
4	Committee for Poverty and Rural Development (CPRD)	Poverty elimination of people including local people living in and manage community forests
5	The National Assembly	Conversion of large area (>500 ha) of village forest
6	Ministry of Culture, Information and Tourism (MCIT)	Promote eco- and nature tourism in community forest

No	Key organisations	Mandate
7	Development partners and funds: GIZ, WB, ADB, SDC	Provide technical and financial support for SCFM including reduction of poverty of the poor
II	**Private sector**	
8	Development projects: mining, hydropower etc.	Compensate and forest offset including improvement of livelihood of affected people
9	Forestry and environmental consulting firm	Provide consulting service in various aspects of SCFM
III	**NGOs, NPOs**	
10	NGOs, NPOs on forestry, land, water and environment: IUCN, WCS, WWF, Oxfam, Helvetas	Studies and seek for financial support for SCFM including local people

3.2.3.2 Schedule Actions and Activities

The schedule of the actions and activities was defined by TNA project team and agreed at the key stakeholder consultation meeting in November 2017. Logics and sequences, nature and scale of the activities, readiness including time, technical and financial capacity of the responsible organisations to perform the activities were considered when scheduling.

The timeframe of the action plan implementation is five years, which is perceived to be suitable and sufficient time for technical and financial preparation including demonstration of SCFM before full expansion thought out the country. Overall, the timeframe is divided into two phases. The preparation phase is 3 months, between March to May 2018. It means TAP shall be started following approval and during dissemination to stakeholders. The implementation phase would start from May 2018 until December 2022.

3.2.4 Estimate Resources

3.2.4.1 Capacity Building

The capacity, especially the knowledge and skills need for SCFM were initially identified in the barrier analysis and enabling framework, which documented separately. The knowledge and skills need include project management and proposal development and other technical knowledge and skills related to SCFM as outlined in Box 2.

The capacity building, in general, require external support since either the local capacity builders or financial resources are limited.

Box 2: knowledge and skills need for SCFM

1) Assessment of financial and investment needs for SCFM,
2) Forest resources inventory and assessment of ecosystem service values,
3) Analysis of financial and economic return on investment or cost and benefits of individual or combined village forest sites, including its ecosystem services and products,
4) Development of business plans to maximise revenues from village forest ecosystem service,

5) Development of village forest financing and subsidizing models and mechanism including environmental and forest taxation,
6) Identification and analysis of financial sources,
7) Development of resource mobilization plans, and
8) Preparation of financeable project proposals to attract public, private investment, international supports, and access to other financial sources for village forest ecosystem services entrepreneurship.

3.2.4.2 Estimate Costs for Actions and Activities

The costs of the actions and activities were estimated based on activities and risks. The costs were divided into 1) the cost for preparation including dissemination and revisit the TAP before implementation, 2) the cost of each action and activity, and 3) the cost for handling with risks. The cost for the preparation could be US$ 18,000[3]. The total cost of all activities implementation, considering allowance, a consultant fee, travel, meeting and other administrative costs are about US$ 15.97 million (Annex 4 and Table 12). The cost for contingency to address delay and variations, is estimated to be 10% of the total cost or US$ 1,596,500. So, the total cost of the action plan implementation would be US$ 17.58 million.

3.2.5 Success Criteria and Indicators for Monitoring of the Implementation

Success criteria and indicators for monitoring of the TAP implementation were classified into two levels: actions and activities as well as output-outcome and input level, and summarised in Table 13 and 14, respectively.

Table 13 Success Criteria and Indicators for Monitoring the Implementation of the TAP on SCFM

No	Actions	Success criteria	Indicators for M&E
1	Maintain and enhance the public budget for SCFM	The government budget allocated for SCFM is increased or at least USD 1 per ha of the community/village forest per year	The government pledge and/or budget for SCFM is increased
2	Enhance income from all sources for SCFM and local people	- Revenue from ecosystem service return to CFM is at least sufficient to maintain the could maintain the ecosystem service or at least USD 1 per ha - Community forest's ecosystem service related enterprises and revenue increased	- Community forest's ecosystem service related enterprises and revenue increased - An effective ecosystem service tax or fee collection mechanism is in place and enforced, and revenue

[3] Based on the 3 meetings and 2 days for each meeting, current government daily allowance, a consultant fee, and a meeting including administrative costs

No	Actions	Success criteria	Indicators for M&E
		- An effective ecosystem service tax or fee collection mechanism is in place and enforced	and reinvest in SCFM increased
3	Increase human resource	At least USD 1 per ha of protected areas could be secured from resource mobilisations and access to international supports	- Cooperation between Lao government, especially MAF and donors improved - Technical and financial support derived from resources mobilisation increased
4	Increase organisational capacity and human resources	The government, especially MAF and AF authorities at local levels and communities have adequate human and financial resources to fully perform their mandates on SCFM	Institutional capacity and human resources of MAF and AF authorities at local levels and communities are improved
5	Research and develop information for SCFM	Necessary information such as socioeconomic data, land uses, resources, ecosystem service and values including investment feasibility and best practices on SCFM are available for effective or SCFM planning and development	Information and awareness are improved
6	Eliminate poverty-improvement infrastructure	- Infrastructure and basic service, and income generation activities and employment are available, accessible and affordable by local people - Poverty reduced, and commitment and contribution of locals to SCFM increase	Local people's incomes increased, and poverty rate reduced
7	Improve SCFM legal framework	Practical polices on SCFM is in place and effectively enforced	Legal framework on SCFM improved or updated
8	Pilot SCFM	SCFM piloted and be reference projects for replication or expansion	No. of effective SCFM reference projects piloted and scale of financial resources invested

3.2.6 Summary Overview of the Action Plans for SCFM

To effective deploy SCFM practices and overcome the barriers to effectively develop and sustain village forests, relevant organisations need to increase their more efforts including leadership and commitments to fulfil their roles and take collective actions outlined in the Table 14 below. It is summary TAP based on the previous sections. This summary TAP summed up actions and activities, funding sources, responsible organisation, timeframe, budget for the implementation, risks and C&I of the TAP implementation. It will be implemented five years, by MAF and MoNRE, particularly the Department of Forestry (DoF) and Climate Change (DCC), with the total investment of about US$ 17.58 million.

Table 14 Action Plan for Sustainable Community Forestry Management

Action/Activity		Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$. Th.)
Action 1	**Maintain and enhance the public budget for SCFM**							
Activity 1.1	Develop strategy on SCFM including financial needs and resources assessment	**Public:** GOV	MAF: DOF/ VFD	May 2018-May 2019	Delayed due to insufficient resources and information	An inclusive, relevant and practical strategy and plans (site management, enterprise plan)	Strategy and plans including its relevant meetings and initiatives	20
Activity 1.2	Develop financeable project proposals	**Public:** GOV, WB	MAF: DOF/ VFD	Aug 2018-Aug 2019	Delayed due to insufficient resources, information and financial analysis	Increased number of quality project proposals and funding	No. of project proposals submitted and funded	48
Activity 1.3	Improve public budget management system including recording, reporting, M&E	**Public:** GOV	MAF: DOF/ VFD	Sep 2018-Dec 2022	Ineffective coordination and reporting among stakeholders	Effective and accountable financial management system	Improved financial management system	10
Action 2	**Enhance reinvestment from sustainable non-timber forest products management**							
Activity 2.1	Conduct assessments of ecosystem services including potential revenue from NTFPs, ecotourism, carbon credits and other income and employment	**Public:** GOV and development partners-DP e.g., WB, ADB, JICA, GIZ, KFW, SDC, UNDP, EU **INGOs:** SNV, OXFAM, WWF, IUCN	MAF: DOF/ VFD	May 2018-Dec 2020	Delayed or not inclusive due to insufficient financial and human resources	Comprehensive and informative reports	Value chain study reports including relevant meetings and data collection	90
Activity 2.2	Develop an income and employment plans including sustainable NTFPs, ecotourism, carbon credits,	**Public:** GOV and DP: e.g., WB, ADB, JICA, GIZ, KFW, SDC, UNDP, EU	MAF: DOF/ VFD	Jun 2019-Dec 2020	Delayed due to insufficient resources information and best practices	Sustainable management plans for each commercial-able NTFP or value chain	Study reports and sustainable management plans	50

Action/Activity		Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$. Th.)
	agriculture and job creation plan	**INGOs:** SNV, OXFAM, WWF, IUCN						
Activity 2.3	Improve marketing and access to market of communities made products	**Public:** GOV and DP: e.g., WB, ADB, JICA, GIZ, KFW, SDC, UNDP, EU **INGOs:** SNV, OXFAM, Helvetas	MAF: DOF/ VFD	Aug 2018-Aug 2022	Variable or ineligible to markets. Insufficient resources to develop quality and certified products.	Increased the extent of new and existing markets access, especially sustainable markets	Quantity and quality of NTFPs, values and markets	80
Activity 2.4	Diversify and improve quality and quantity of communities made products including processing	**Public:** GOV and DP: e.g., WB, ADB, JICA, GIZ, KFW, SDC, UNDP, EU **INGOs:** WWF, IUCN, SNV, OXFAM	MAF: DOF/ VFD	Oct 2018-Oct 2022	Variable markets. Insufficient resources or financial unviable to develop new products.	No. of diversified and processed NTFP product and markets access	No. of NTFP product diversified including processed ones	180
Activity 2.5	Improve NTFP production including domestication	**Public:** GOV and DP: e.g., WB, ADB, JICA, GIZ, KFW, SDC, UNDP, EU **INGOs:** WWF, IUCN, SNV, OXFAM	MAF: DOF/ VFD	Oct 2018-Oct 2022	Variable markets. Insufficient resources, information or financial unviable to domesticate NTFPs for commercialisation	No. of NTFP domesticated and marketable products	NTFP domestication feasibility and no. of NTFO domesticated.	480
Activity 2.6	R&D of effective or appropriate mechanisms on resources fee and tax for reinvesting in SCFM	**Public:** GOV and DP: e.g., WB, ADB, JICA, GIZ, KFW, SDC, UNDP, EU	MAF: NAFRI NUOL: FOF, EFS, FOBE	May 2018-Dec 2019	Financial and human resources are not secured for R&D of best practices	Effective tax and fee collection schemes and implementation with best practices	C&I and No. of best practices and guidelines for resources taxation and fee collection, and reinvestment	90
Action 3	**Enhance resource mobilisation**							

Action/Activity		Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$. Th.)
Activity 3.1	Develop financial resource directory	**Public:** GOV	MAF: DOF/ VFD	Jun 2018-Jun 2019	Insufficient information about funding sources.	Directory including detail information about funding sources and eligibility	Meetings, data collection and analysis reports and directory	3
Activity 3.2	Develop and implement resource mobilisation plan	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, SDC, UNDP, EU **INGOs:** WWF, IUCN, SNV, OXFAM	MAF: DOF/ VFD	Sep 2018-Sep 2019	Insufficient information about funding sources.	Resource mobilisation implemented according to the plan	Resource mobilisation plan	12
Activity 3.3	Develop financeable project proposal including comprehensive financial and economic analysis	**Public:** GOV and DP: e.g., WB, ADB, JICA, GIZ, KFW, SDC, UNDP, EU **Others:** GEF	MAF: DOF/ VFD	Oct 2018-Dec 2022	Delayed or not inclusive due to delayed or insufficient resources, information and skills	Increased number of projects and funds	No. of project proposal developed, submitted and funded	48
Activity 3.4	Increase cooperation and partnership with development partners, international originations, NGOs and NPO	**Public:** GOV and DP: e.g., WB, ADB, JICA, GIZ, KFW, SDC, UNDP, UNEP, EU **INGOs:** WWF, IUCN, WCS	MAF: DOF/ VFD	May 2018-Dec 2022	Insufficient information, e.g., project feasibility, barriers or analysis. Poor follow up.	Increased no. of network, agreement to move forward project financing or cooperation to access to finance.	No. of dialogue and meetings and no. of organisations participated	20
Activity 3.5	Improve financial aids management system including recording, reporting, M&E	**Public:** GOV and DP: e.g., WB, ADB, JICA, GIZ, KFW, SDC, UNDP	MAF: DOF/ VFD	Sep 2018-Sep 2021	Ineffective or poor coordination and information exchange about aids	Effective, accountable and transparent aids management system, and trustworthiness	A financial management system including M&E and reports	5
Action 4	**Increase organisational capacity and human resources**							
Activity 4.1	Improve human resource development system including capacity development plan, staff	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP, AusAID, EU	MAF: DOF/ VFD	May 2018-May 2019	Insufficient knowledge and skills, leadership and commitment on	Adequate or at least increased human resources including skills and commitment	Improved capacity, recruitment, increased staff	50

Action/Activity		Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$. Th.)
	knowledge, learning culture and commitment	**INGOs:** WWF, IUCN **Others:** GEF			organisational development		commitment and learning culture	
Activity 4.2	Building capacity of national, local authorities and communities on SCFM through professional trainings	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP, AusAID, EU **INGOs:** WWF, IUCN **Others:** GEF	MAF: DOF/ VFD	Oct 2018-Oct 2022	Staff turn-over or shift and inadequate financial support for continuous human resources and capacity building	Relevant organisations and staff are capable of performing EPAM. Effective training.	No. of training, No. of participants attended and training effectiveness	120
Activity 4.3	Increase extension staff and volunteers to work with communities	**Public:** GOV and DPs:WB, ADB, JICA, GIZ, KFW, SDC, UNDP, UNEP, EU	MAF: DOF/ VFD	Aug 2018-Aug 2021	Delayed or ineffective due to insufficient financial and human resources	Sufficient human resources to develop SCFM	Extension staff and volunteers ToR, no. of quota, staff recruited	90
Activity 4.4	Improve SCFM education and research in high education	**Public:** GOV and DP: e.g., WB, ADB, JICA, GIZ, KFW, SDC, UNDP, AusAID, EU **Others:** GEF **INGOs:** WWF, IUCN	MAF: FOF, FOA FOSS	Jun 2018-Dec 2020	Insufficient financial and human resources to develop Comprehensive and practical SCFM curriculum.	Comprehensive and practical SCFM curriculum. Increased practical knowledge and skills on SCFM	SCFM curriculum	80
Activity 4.5	Promote SCFM network, think-tank and civil organisation and information exchanges	**Public:** GOV and DP: e.g., WB, ADB, JICA, GIZ, KFW, SDC, UNDP, UNEP, EU **Others:** GEF **INGOs:** WWF, IUCN	MAF: NAFRI	Aug 2018-Dec 2022	Low motivation to join working group, network, think-tank and commitment to exchange	Increased knowledge and capacity as a result of exchange	No. and function of working group, network, think-tank established	15
Action 5	**Research and develop information for SCFM**							
Activity 5.1	Conduct inventory of social and forest resources, ecosystem services and valuation	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP, EU	MAF: DFIP	Oct 2018-Oct 2020	Insufficient financial and human resources to conduct the	Detail and sufficient information for design a sustainable resources	The inventory and information	500

Action/Activity		Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$. Th.)
		INGOs: WWF, IUCN, WCS			inventory and valuation	management including financing		
Activity 5.2	R&D best practices and guidelines on SCFM including sustainable resources harvesting, financing, organisation and law enforcement	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP, EU **Others:** GEF. **INGOs:** WWF, IUCN, WCS	MAF: NAFRI	Jul 2018-Jul 2020	Financial resources are not secured for development and implementation	Application and effectiveness of best practices	No. of best practices developed	75
Activity 5.3	Improve information management systems and information dissemination	**Public:** GOV and DP: WB, ADB, JICA, GIZ, KFW, SDC, EU **Others:** GEF	MAF: NAFRI	May 2018-May 2021	Financial resources are not secured for development and implementation	Application and effectiveness of best practices	No. of information and best practices disseminated	9
Action 6	**Eliminate poverty**							
Activity 6.1	Survey and assess land use and sustainability of community settlement	**Public:** GOV and DP: e.g., WB, ADB, **Private:** Mining, HPD	MAF: DOF/ VFD Project owners	Oct 2018-Oct 2020	Delayed due to delayed or insufficient budget	Inclusive and sufficient information for sustainable community development planning	Survey team, meetings, data collection and analyses report including maps	220
Activity 6.2	Develop sustainable rural town and land use plans	**Public:** GOV and DP: WB, ADB, JICA, GIZ, KFW, UNDP, EU **Private:** Mining, hydropower DPs	MAF: DOF/ VFD	Oct 2018-Oct 2021	Delayed or not inclusive due to limited budget and information	Inclusive and practical sustainable or resilient rural or town and land use plans	Survey team, meetings, data collection and analyses report, and plans	850
Activity 6.3	Develop infrastructures and facilities for improve services in communities	**Public:** GOV, DP: WB, ADB, JICA, GIZ, KFW, SDC, UNDP, EU **Private:** Mining, HPD	MAF: DOF/ VFD	Oct 2018-Oct 2021	As 6.1 and 6.2 above	Sufficient infrastructure for community's development	No. of infrastructure developed	5,350
Action 7	**Improve SCFM legal framework**							

Action/Activity		Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$. Th.)
Activity 7.1	Review and update the decree on village forest	**Public:** GOV and DP: e.g., WB, ADB, JICA, GIZ, KFW, SDC, UNDP, AusAID, EU	MAF: DOF/ VFD	Jun 2018-Jun 2019	Delayed or ineffective due to insufficient resources, best practices	Inclusive, appropriate and practical decree or policies on village forest	Policy team, meetings, policy feedback and analysis, and updated decree	25
Activity 7.2	Enforce rules of law such as illegal conversion or encroachment and offset of village forests	**Public:** GOV and DP: e.g., WB, ADB, JICA, GIZ, KFW, SDC, UNDP, AusAID, EU	MAF: DOF/ VFD	Jul 2018-Jul 2022	As 7.1 above	Updated, inclusive and practical decree on village forest	Policy review report and updated decree on village forest	525
Action 8	**Develop SCFM reference projects**							
Activity 8.1	Expand public-private partnership SCFM: Sustainable offset forests management	**Public:** GOV and DPs: WB, ADB, **Private:** Mining, HPD	MAF: DOF/ VFD Project owners	Mar 2019-Dec 2022	Delayed due to insufficient resources and conflict of interest to pursue PPP	At least 3 PPP projects are agreed and implemented in next 5 years	No. of agreement and PPP project	2,220
Activity 8.2	Livelihood-based SCFM: Sustainable NTFP restoration, domestication and commercialisation	**Public:** GOV and DPs: WB, ADB, JICA, GIZ, KFW, SDC, UNDP, EU **Private:** Mining, HPD	MAF: DOF/ VFD	May 2019-Dec 2022	Delayed due to insufficient resources	No. of NTFP domesticated and makeable products	NTFP domestication feasibility and no. of NTFO domesticated.	3,350
Activity 8.3	Effective law enforcement for coping with illegal forest conversion and encroachment	**Public:** GOV, DP: WB, ADB, JICA, GIZ, KFW, SDC, UNDP, UNEP, EU **Others:** GEF	MAF: DOF/ VFD	May 2019-Dec 2022	As 8.2 above.	Minimal law violent, forest conversion and encroachment	No. inspection, case and solved.	1,350
Total								**15,965**

3.3 Action plans for optimal plantation forest

3.3.1 Description of optimal plantation

The plantation forest, in principle, is promoted to establish on the degraded forest and barren forestland, for wood supply, forest conservation and restoration. The forest plantation for wood and non-wood supply must be taken place in the production forest land while the forest plantation for conservation shall be established in the conservation and protection forests to enhance protection functions, ecosystems and values of the forest (GoL, 2007).

Plantation forest area increased sharply in last decades. The area was less than 5,000 ha in 1975 but went up to 200,000 in 2007 (Phimmavong et al., 2009), and then 400,000 ha (MPI, 2015). Despite great potential carbon sequestration, it largely depends on actual implementation since some development of plantation may cause carbon leak or conversion of natural forest (Vandergeest, 2003; Baird and Shoemaker, 2007; Barney, 2008) instead of sequestration.

3.3.2 Development goals and targets

The targets for the plantation forests are to:

1) Deploy 30% of the existing plantations to be operated under sustainable or optimal plantation as well as FSC, FLEGT and carbon credit schemes by 2020 and 65% by 2030;
2) Ensure at least 50% of the newly plantations deploy sustainable or optimal plantation practices including compliance with FSC, FLEGT and carbon credit schemes by 2020 onwards.

3.3.3 Selection of actions to include in the TAP

Selection of actions to be included in the TAP was conducted based on the Barriers Analysis and Enabling Framework (BAEF), especially the barriers and measures to overcome barriers (section 3.3.3.1, Table 13). Importantly, the measures to convert into action were assessed and prioritised as described in Annex 2 and the section 3.3.3.2.

3.3.3.1 Summary barriers and measures to overcome the barriers

Eight barriers were identified critical barriers for development and management of SPF. Three of them are financial and economic and five are non-financial and economic barriers. To overcome the barriers, eight main measures were also identified accordingly (Table 13).

Table 15 Barriers to sustainable plantation and measures to overcome barriers

Categories	Barriers	Measures to overcome barriers
Economic and financial	1. High investment cost on sustainable plantation practices	1. Reduce investment cost on sustainable plantation practices: - Reduce technology and input imported tax and implement tax holiday, cost on UXO, certification, ESIA, logistics and transportation
	2. Limited access to finance	2. Expand access to finance

	3. Inadequate public financial support for extension	3. Increase the public financial support for extension
Market failures and imperfection	4. Limited and variable markets for planted wood and non-wood product	4. Expand access to wood and non-wood product markets
	5. Variable supply of products to market	5. Increase production and products supply
Policy, legal and regulatory	6. Insufficient and inappropriate legal and regulatory framework on sustainable plantation 7. Ineffective law enforcement	6. Develop appropriate legal and regulatory framework on sustainable plantation 7. Enhance law enforcement effectiveness
Institutional and organisational capacity and human skills	8. Limited technical knowledge and skills on optimal and sustainable plantation	8. Increase technical knowledge and skills on optimal and sustainable plantation
Information and awareness	9. Inadequate information and plan about plantation development including land and species suitability	9. Develop information and plan on plantation development including land and species suitability

3.3.3.2 Selection of Measures for Action

The actions were chosen the identified measures. Firstly, broad measures were breakdown into sub-measures and then assess all the measures and sub-measures by scoring regarding to effectiveness, efficiency, cost-benefit, impact and necessity of the measures (Annex 2). This step was completed by TNA project team. Secondly, the identified actions including the assessment were discussed and agreed with stakeholders at the consultation meeting in November 2017. As a result, the selected measures for actions could be summarised in the Table 14 below.

Table 16 Selected measures as actions for sustainable plantation

Categories	Measures to overcome barriers	Selected measures for TAP
Economic and financial	1. Reduce investment cost on sustainable plantation practices by reduce technology and input imported tax and implement tax holiday, cost on UXO, certification, ESIA, logistics and transportation	X
	2. Expand access to finance	√
	3. Increase the public financial support for extension	√
Market failures and imperfection	4. Expand access to wood and non-wood product Markets	√
	5. Increase production and products supply	√
Policy, legal and regulatory	6. Develop appropriate legal and regulatory framework on sustainable plantation 7. Enhance law enforcement effectiveness	√
Institutional and organisational	8. Increase technical knowledge and skills on optimal and sustainable plantation	√

capacity and human skills		
Information and awareness	9. Develop information and plan on plantation development including land and species suitability	√

3.3.3.3 Selection of Activities for TAP

Selected activities for TAP in Table 15 derived from the TNA and stakeholder consultation meeting. The activities were initially listed by the TNA project team, then were consulted, elaborated and agreed with the DoF during consultation meeting in November 2017. Practicality, logics, relevance and impacts and influences of the activities to achieve the actions were considered when the activities were selected.

Table 17 Sustainable plantation actions and activities

Action 1	**Expand access to finance**
Activity 3.1	*Strengthening cooperation between domestic and regional banks and financial institutes (to expand domestic financial markets)*
Activity 3.2	*Increase financial capacity and readiness and of entrepreneurs*
Activity 3.3	*Organise financial access dialogue on SPF financing*
Action 2	**Expand access to market**
Activity 2.1	*Improve plantation registration*
Activity 2.2	*Develop market strategy (based on market research, see action 4)*
Activity 2.3	*Organise business trips and dialogues*
Activity 2.4	*Continue organising and participating trade fairs on plantation and plantation products*
Activity 2.5	*Enhance trading under Forest Law Enforcement, Governance and Trade (FLEGT) with EU and similar scheme with other countries*
Action 3	**Increase organisational capacity and human resources**
Activity 3.1	*Conduct capacity needs assessment*
Activity 3.2	*Provide SFP technical and financial trainings including skills develop financeable project proposal*
Activity 3.3	*Increase cooperation and partnership with development partners, international originations and INGOs on capacity building*
Activity 3.4	*Improve organisation development system including human development plan, staff knowledge management, recruitment etc.*
Activity 3.5	*Develop SPF strategy and action plans*
Activity 3.6	*Promote establishment of SPF network, think-tank and civil organisation and information exchanges*
Activity 3.7	*Improve SFP education and research in high education*
Action 4	**Develop information and plan for SPF**
Activity 4.1	*R&D land suitability map including tree species matching for plantations*
Activity 4.2	*R&D definition and guidelines on optimal plantation systems that possibly generate socioeconomic and environmental benefit including mitigation for a plantation land*
Activity 4.3	*R&D Silviculture techniques to increase plantation productivity including maintaining soil nutrients and carbon*
Activity 4.4	*R&D best practices on community participatory plantation development including contract farming*

Activity 4.5	*Carry out feasibility of financial and economic incentive (tax reduction, subsidies etc.) for promoting sustainable plantation*
Activity 4.6	*Research and identify feasibility and best practices to adopt an international SPF practices e.g., FSC to support policy development*
Activity 4.7	*Develop strategy and plan for SPF*
Action 5	***Develop policy or regulation on SPF***
Activity 5.1	*Formulate a policy or regulation on SPF*

3.3.3 Identify Stakeholders and Determines Timelines

3.3.3.1 Identify Stakeholders for TAP Implementation

The stakeholders to SPF could be identified based on activities in the TAP, mandates and interest of relevant organisations. Some organisations were identified and participated in TNA and BAEF. In addition, number of stakeholders was also listed and validated during stakeholder consultation meeting in November 2017.

The Table 16 below provides a list of key or overall stakeholders for SPF. Some stakeholders were also identified for each activity as in Table 18.

Table 18 General stakeholders for sustainable plantation

No	Key organisations	Mandates
I	**The governmental organisations**	
1	Ministry of Agriculture and Forestry (MAF): Department of Forest (DOF), Plantation Forest Division (PFD)	MAF has the responsibility to oversee a forestry affair. DOF, particularly PFD is charge of plantation development and management
2	National University of Laos, especially Faculty of Forestry (FOF) and Agriculture (FOA)	Mobilises resources for plantation forest education and research.
3	Ministry of Planning and Investment (MPI), particular Department of Foreign Aid Management (DFAM) and Investment Promotion (DIP)	Work with development partners and others on financial aids for sustainable plantation, investment and land concession for plantation forest
4	Ministry of Commerce and Industry (MCI), particular Department of Small and Medium Enterprise Promotion (DSMEP)	Promote access to finance and financial support for development of business including plantation enterprises
5	Ministry of Natural Resources and Environment (MoNRE), particularly, Department of Land (DOL), Environmental and Social Impact Assessment (DESIA), Environmental Protection Fund (EPF) and Department of Climate Change (DCC)	MoNRE has an overall responsibility to promote the environmentally friendly technologies and practices including sustainable plantation. - DOL has the responsibility for land use planning including plantation land - EPF has the responsibility to mobilise financial resources for NRE including sustainable plantation

		- DESIA ensures minimal environmental and social impact from the plantation developments - DCC promotes sustainable plantation for climate change mitigation and adaptation
6	Committee for Poverty and Rural Development (CPRD)	Poverty elimination through sustainable plantation
7	The National Assembly	Conversion of large area (>500 ha) for plantation
8	National/Provincial Chamber of Commerce and Industry (N/PCCI), particularly, agriculture business association (ASA) and agriculture production group (APA)	Mobilise resources to support plantation and wood business and capacity building
II	**Development partners**	
9	ADB, JICA, WB, GIZ etc.	Provide technical and financial support
III	**Private sector**	
10	Agriculture, forestry, environment, business and economics consulting firm	Provide consulting service in various aspects of plantation development
IV	**NGOs and NPOs**	
11	NGOs, NPOs on sustainable plantation	Studies and seek for financial support community to deploy sustainable plantation

3.3.3.2 Schedule Actions and Activities

The schedule of the actions and activities (Annex 4 and Table 18) was defined by TNA project team in consultation with the key stakeholders in November 2017. Logics and sequences, nature and scale of the activities, readiness including time, technical and financial capacity of the responsible organisations to perform the activities were considered when scheduling.

The SPF action plan will be implemented in five years, which is for enhancing technical and financial preparedness including demonstration of SPF before full expansion of SPF practices throughout the country. Overall, the timeframe is divided into two phases. The preparation phase is 3 months, March to May 2018, which shall be commenced following approval and during dissemination of TAP to stakeholders. The implementation phase would start from May or June 2018 until December 2022.

3.3.4 Estimate Resources

3.3.4.1 Capacity Building

Capacity building needs as well as knowledge and skills gaps were mainly identified during BAEF. To implement the TAP effectively, capacity of especially the key stakeholders is needed to be enhanced. Specific knowledge and skills, for example, to be addressed are project management and technical knowledge and skills and shown in the Table 7 below.

Table 19 Knowledge and skills needs for sustainable plantation development

Main skills categories	Knowledge and skills needs
Financial and Economic	• Financial and economic analysis such as cost and benefits including return on investment of different types of plantations including trade-off analysis, • Access to finance including business planning and development of bankable or financeable proposal
Market	Analysis and identification of potential wood and non-wood products markets, networks and feasibility of access
Policy	• Development and application of best practices on the enforcement of penal measures regarding law violations.
	• Development of comprehensive policy and incentives for promotion of good performance on sustainable plantation development
Technical	• Sustainable plantation development, certification and marketing under FSC and FLEGT mechanism, • Criteria, indicators and best practices on sustainable plantation development in Lao context, • Assessment and mapping of land and tree species suitability, • Sustainable extraction of use of harvest residues including maximum rate of extraction, • Best practice for soil carbon and nutrients enhancement including retention of harvest residues, optimal and precise fertilisation for sustainable productivity and reduction of environmental impacts, • Agroforestry, especially incorporation of cash crops in plantations to maximise land use and soil nutrients, • Best practices on resource valuation and compensation trade-off analysis between plantations and other land uses, • Techniques and equipment for resource efficient processing, • Phytosanitary, • Carbon credits mechanisms.

3.3.4.2 Estimate Costs for Actions and Activities

The costs for the TAP implementation were estimated by particularly Department of Climate Change (DDC) and Forestry (DOF) through a focus group consultation meeting and judgement. Initially, costs were listed and estimated by the TNA project team, and then reached the agreement DOF during mutual meeting in November 2018. The estimated cost is the cost for promoting and facilitating SPF, and not include investment cost on the establishment of plantations.

The total final cost for implementing this action plan for 2018 to 2022 is US$ 9.68 million. The cost consists of the costs for dissemination and consultation meetings; based on the 3 meetings and 2 days for each meeting, current government daily allowance, a consultant fee, and a meeting including administrative costs, is expected to be US$ 18,000. Secondly, it is the costs for implementation of activities, US$ 8.78 million (Annex 4 and Table 21), which includes allowance, consultant, meeting, equipment, travel and other administrative costs. Thirdly, it is the costs for risk management and contingency action which accounts for 10% of the activities cost or US$ 878,400.

3.3.5 Success Criteria and Indicators for Monitoring of the Implementation

Success criteria and indicator for monitoring of the TAP implementation identified were divided into two levels: actions and activities as well as output-outcome and input level. Those C&I of the actions and activities were summarised in the following tables.

Table 20 Success Criteria and Indicators for Monitoring the Implementation of the TAP on Sustainable Plantation

No	Actions	Success criteria	Indicators for M&E
1	Expand access to finance	Favourable financial markets and ease of access	No. of entrepreneurs/ business that are accessible to finance and financial resources increased
2	Expand access to market	Various wood and non-wood product markets and ease of access	No. of markets and wood and non-wood products sale increased
3	Increase organisational capacity and human resources	- The government, especially MAF and forestry authorities at local levels have adequate human and financial resources to fully perform their mandates on SPF - Private sector including entrepreneurs and famers can run SPF business in sustainable manner	Institutional capacity and human resources of MAF and forestry authorities at local levels and private sector are strengthened
4	Develop information for SPF	Necessary information for SPF planning and development such as land and species suitability, map and areas for plantations, silviculture, wood processing and phyto-hygiene technologies and markets	Information on SPF developed/improved
5	Develop policy or regulation on SPF	Practical polices on SPF is in place and effectively enforced	Legal framework on SPF improved or updated

3.3.6 Summary Overview of the Action plans for sustainable plantation forest

Based on the previous sections, the following summary of the TAP could be formulated. The summary TAP (Table 21) below provided in brief information about actions and activities, funding sources, responsible organisation, timeframe, budget for the implementation, risks and C&I of the TAP implementation. This TAP will be carried out for five years and MAF and MoNRE, particularly the Department of Forestry (DoF) and Climate Change (DCC) will be executive agencies. Financial resources for the TAP is at least USD 9.68 million. However, sustaining plantation development and management requires commitment and leadership of the executive agencies and other stakeholders to implement the TAP and related actions.

Table 21 Action Plan for Optimal or Sustainable Plantation Forest Development

Action	Activity	Sources of funding	Responsible body and focal point	Time frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ th.)
Action 1	**Expand access to finance**							
Activity 1.1	Facilitate cooperation with domestics and regional banks (to expand financial markets and access)	**Public:** GOV **Private:** Banks	MOF: BOL MPI: DIP MOIC: SMEPD	Oct 2018-Oct 2022	Delayed and unfulfilled due to low return on investment of some - plantations	Increased and available favourable loans for SPF	Number of business trips, meetings and cooperation agreements	90
Activity 1.2	Increase financial capacity and readiness and of entrepreneurs	**Public:** GOV, development partners-DPs: WB-IFC, ADB, GIZ, EU **Private:** LNCCI	LNCCI	May 2018-Dec 2019	Delayed due to insufficient resources	Increased financial access, capital for expansion of plantation business.	No. of training, project proposal developed, submitted and financed	1,200
Activity 1.3	Organise financial access dialogue on SPF financing	**Public:** GOV, DPs: WB-IFC, ADB, GIZ, EU **Private:** LNCCI	LNCCI	Dec 2018-Dec 2022	Ineffective or less impact due to limited research and information, and participation of influential organisations	Functional platform for exchange and advocacy of SPF	No. of forum organised, and organisations attended	70
Action 2	**Expand access to markets**							
Activity 2.1	Improve plantation registration	**Public:** GOV **Private:** LNCCI	MAF: DOF/ PFD	May 2018-Dec 2022	Delayed due to limited resources or low awareness on plantation registration for SPF	Functional plantation registry is in place to support SPF planning, M&E	Plantation registration system developed	50
Activity 2.2	Develop market strategy (based on market research, see action 4)	**Public:** GOV, DPs: WB-IFC, ADB, GIZ, EU **Private:** LNCCI	MAF: DOF/ PFD	Jul 2018-Jul 2019	Financial resources are not secured for R&D on time or sufficient	Practical strategy and plans is in place and implemented	Strategy and plans developed	20

Action	Activity	Sources of funding	Responsible body and focal point	Time frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ th.)
Activity 2.3	Organise business trips and dialogues	**Public:** GOV, DPs: WB-IFC, ADB, EU **Private:** LNCCI, Banks	LNCCI	Oct 2018-Dec 2022	Insufficient information, e.g., project feasibility, barriers or analysis. Poor follow up.	Increased no. of network, agreement, project financing or cooperation to access to finance.	No. of dialogue and meetings and no. of organisations and investors attended	80
Activity 2.4	Continue organising and participating trade fairs on plantation and plantation products	**Public:** GOV, DPs: WB-IFC, ADB, GIZ, EU **Private:** LNCCI	MAF: DOF/ PFD	Oct 2018-Dec 2022	Not fully attended or organised due to limited resources	Expanded markets and networks	No. of events and meetings, networks, products accessible to markets	100
Activity 2.5	Enhance trading under Forest Law Enforcement, Governance and Trade (FLEGT) with EU and similar scheme with other countries	**Public:** GOV, DPs: WB-IFC, ADB, GIZ, EU **Private:** LNCCI	May 18	May 2018-Dec 2022	Delayed or insufficient resources and information to facilitate the process and variable product quality and quantity	Expanded markets and networks	No. of events and meetings, networks, products accessible to markets	1,365
Action 3	**Increase organisational capacity and human resources**							
Activity 3.1	Conduct capacity needs re-assessment	**Public:** GOV, DPs: WB-IFC, ADB, EU	MAF: DOF/ PFD	May 2018-Dec 2018	Delayed or not inclusive due to insufficient resources and information about capacity building	Detail information about capacity needs are available for HRD planning	Capacity needs re-assessment conducted and reports	12
Activity 3.2	Conduct financial and technical support assessment	**Private:** LNCCI	DOF/ PFD	May 2018-Apr 2019	Delayed or not inclusive due to insufficient resources and information about funding sources	Inclusive capacity assessments	Assessment team, no. of interview and meetings, data collection and obtained, and reports	25
Activity 3.3	Develop a plan to access to financial and technical support	**Public:** GOV, DPs: WB-IFC, ADB, EU	DOF/ PFD	Mar 2019-Dec 2019	As 3.2 above	Inclusive and practical plan	Planning team, no. of interview and meetings, data	15

Action	Activity	Sources of funding	Responsible body and focal point	Time frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ th.)
							collection and analysis, and plan	
Activity 3.4	Provide SFP technical and financial trainings including skills develop financeable project proposal	**Public:** GOV **Private:** LNCCI	DOF/ PFD	Oct 2018- Dec 2022	Delayed or not inclusive and less practical due to insufficient financial and human resources for the trainings	The responsible bodies gain sufficient knowledge and skills, and are capable to develop financeable project proposals	Training needs assessment, no. of trainings and participants and reports	60
Activity 3.5	Increase cooperation and partnership with development partners, international originations and INGOs on capacity building	**Public:** GOV, DPs: WB-IFC, ADB, EU	DOF/ PFD	May 2018- Dec 2022	Insufficient information, e.g., project feasibility, barriers or analysis. Poor follow up.	Increased no. of network, agreement to move forward project financing or cooperation to access to finance.	No. of dialogue and meetings and no. of organisations participated	20
Activity 3.6	Improve financial aids management system including recording, reporting, M&E	**Private:** GOV (MPI, MOF) **Private:** LNCCI	DOF/ PFD	Oct 2018- Oct 2019	Delayed due to limited or delay financing	Inclusive, accountable and transparent system, and increased trustworthiness for financing	Donor directory, information management systems and M&E reports	6
Activity 3.7	Develop SPF strategy and action plans	**Public:** GOV, DPs: WB-IFC, ADB, EU	DOF/ PFD	Jul 2018- Jul 2019	As 3.6 above	Inclusive and practical SPF strategy and action plans	SFP research, meetings and developed strategy	15
Activity 3.8	Promote establishment of SPF network, think-tank and civil organisation and information exchanges	**Private:** LNCCI	DOF/ PFD	Oct 2018- Dec 2022	Low motivation to join working group, network, think-tank and commitment to exchange	Increased knowledge and capacity as a result of exchange	No. and function of working group, network, think-tank established	30

Action	Activity	Sources of funding	Responsible body and focal point	Time frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ th.)
Activity 3.9	Improve SFP education and research in high education	**Public:** GOV, development partners e.g., WB-IFC, ADB, EU	FOF	Jul 2018-Jul 2019	Delayed due to insufficient financial and human resources and best practices for development of the curriculum	Comprehensive and practical SFP curriculum, teaching and research provide by FOF	SFP research, meetings and developed curriculum	80
Action 4	**Enhance research and piloting SFP practices**							
Activity 4.1	R&D land suitability map including tree species matching for plantations	**Public:** GOV, DPs: WB, ADB, JICA	MAF: NAFRI	Jul 2018-Dec 19	Delayed or not inclusive due to delayed financing, or insufficient resources for R&D.	Land suitability map including tree species matching for plantations information is available for SPF planning and promotion	No. of and resources for R&D.	2,600
Activity 4.2	R&D optimal plantation systems that possibly generate socioeconomic and environmental benefit including mitigation for a plantation land	**Public:** GOV, DPs: WB-IFC, ADB, EU **Private:** LNCCI	MAF: NAFRI	Jul 2018-Dec 2021	As 4.1 above	Application and effectiveness of best practices	No. of and resources for R&D of the optimal systems or best practices	165
Activity 4.3	R&D Silviculture techniques to increase plantation productivity including maintaining soil nutrients and carbon	**Public:** GOV, DPs: WB-IFC, ADB, EU	MAF: NAFRI	Jul 2018-Dec 2021	As 4.1 above	Detailed information about silviculture techniques to increase plantation productivity including maintaining soil nutrients and carbon are available	No. of R&D conducted and information about techniques to increase plantation productivity is available	170

Action	Activity	Sources of funding	Responsible body and focal point	Time frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ th.)
						for SPF planning and development		
Activity 4.4	R&D best practices on community participatory SPF	**Private:** LNCCI	MAF: NAFRI	Jul 2018-Dec 2022	As 4.1 above	R&D best practices on community participatory SPF	No. of and resources for R&D of the best practices	75
Activity 4.5	Carry out feasibility of financial and economic incentives (tax reduction, subsidies etc.) for promoting SPF	**Public:** GOV, DPs: WB-IFC, ADB, EU	MPI: ERI NAFRI FOBE	Jun 2018-Dec 2019	As 4.1 above	Application and effectiveness of best practices	No. of and resources for R&D of the feasibility	55
Activity 4.6	Conduct value chain analysis of SPF products and market	**Public:** GOV, DPs: WB-IFC, ADB, EU **Private:** LNCCI	MPI: ERI NAFRI FOBE	Jul 2018-Dec 2019	As 4.1 above	Lists of products and markets matched, and value added and marketing access feasibility	Research team, meetings, data collection, assessment reports	150
Activity 4.7	Study feasibility to adopt an international SPF practices e.g., FSC and best practices to support policy development	**Public:** GOV, DPs: WB-IFC, ADB, EU	MPI: ERI NAFRI	Jul 2018-Dec 2021	As 4.1 above	Lists of SPF best practices applicable to formulate the policies in Laos	Research team, meetings, data collection, assessment reports	30
Action 5	**Develop policy or regulation on SFP**							
Activity 5.1	Formulate a policy or regulation on SFP	**Public:** GOV, DPs: WB-IFC, ADB, EU	MAF: DOF/ PFD	Jul 2018-Jul 2019	Delayed or not inclusive and practical due to delayed financing, or insufficient resources for the policies development	Inclusive and practical policies for SPF	Formulated policy team, meetings, data collection and analysis reports, and developed policies	15
	Total							**8,784**

3.4 Action plans for optimal agroforestry

3.4.1 Description of optimal agroforestry

The agroforestry is a forest management technique that could provide multi-benefits, both socioeconomic and environmental including climate change mitigation and adaptation. Normally there are four main systems of agroforestry: Agri-siviculture (crops and trees), Sivolpastoral (pasture/animal and trees), Agro-silvopastoral (crops, pasture/animal and trees) and others (multipurpose) (Nair, 1985 and 1993). Carbon sequestration or storage can be enhanced by converting low carbon land use systems (e.g., grassland and agriculture landscape) to tree carbon-richer system (Bouman, 2001), promoting agroforestry on degraded forest grassland, and unproductive crops areas (Nair et al. 2009), optimization of crops yield (Akinnifesi et al., 2008), conservation of existing carbon pools and substitute fossil fuels by wood products (Schlamadinger et al., 2007) and increase or maintain soil carbon storage and vegetables in agroforestry systems (Unruh et al., 1993; Albrecht and Kandji, 2003 and Makuba et al., 2006).

Agroforestry for mitigation has been initiated in Laos since last 5 years. Those initiatives include a rubber-based agroforestry system for sustainable development and poverty reduction project in the southern of Laos and this intervention could possibly reduce 1.17 million tCO2 in 30 years. A small-holder agroforestry carbon offset programmes in Vientiane province, if properly developed would reduce 27, 000 tCO_2 in 15 years. However, these carbon credits have not been achieved yet.

Importantly, since agroforestry is in early stage of development or loosely developed, substantial technical and financial supports from government and development partners on the demonstration, provision of information and good practices, and creation of enabling environment are prerequisite for upscaling and sustaining.

3.4.2 Development goals and targets

- Adopt agroforestry appropriately on 50% of former shifting cultivated areas by 2020 and 80% by 2030
- Deploy a sustainable or an optimal agroforestry to 50% of the existing by 2025.

3.4.2 Selection of Measures to Include in the Action Plan

Selection of measures for actions as well as TAP were identified based on results of the Barriers Analysis and Enabling Framework (BAEF), especially the identified barriers and measures to overcome barriers as summarised in the section 3.4.2.1 below. Importantly, the measures were assessed and prioritised before the selection as described in section 3.4.2.2.

3.4.2.1 Summary of Barriers and Measures to Overcome Barriers

The BAEF highlighted that there are 8 critical barriers including 3 financial and economic barriers and 5 non-financial and economic barriers that hinder sustainable or effective agroforestry development. Overcoming the barriers could be realised by implementing measures which were identified in

accordance with the barriers (Table 19). However, to be effective and efficient, these measures were assessed and prioritised prior to include in the TAP of sustainable or optimal agroforestry (section 3.4.2.2).

Table 22 Barriers and measures to overcome barriers to agroforestry

Broad categories	Barriers	Measures to overcome barrier
Economic and financial	1. Inadequate the public financial support including incentives and subsidy	Increase the public financial support: - from the government budget - from development partners and other organisations
	2. Limited capital and access to finance	Expand access to finance: - Lower interest rate, simply procedures and improve risk management mechanism - Increase access to regional financial markets - Enhance financial market development - Increase financial capacity and readiness and of entrepreneurs
Market failures and imperfection	3. Small and variable agroforestry's products and service markets	Increase access to markets: - Domestic and regional markets - Promote and sustain the niche product and market - Enhance and sustain quantity and quality of products - Manage the import agroforestry products that undermine, or the domestic products cannot compete e.g., subsidised and cheap products - Carbon Markets
Institutional and organisational capacity and human skills	4. Insufficient technical skills on agroforestry	Increase technical skills on agroforestry
Information and awareness	5. Insufficient information and awareness on optimal agroforestry system and best practices	Increase information and awareness on optimal agroforestry including land-tree-crop species suitability, systems and best practices
Technical	6. Difficult or time and resources consuming to define and develop optimal agroforestry systems that generate maximum profit and benefits	Increase collaborative R&D and information sharing to identify, develop and apply an optimal agroforestry system

3.4.2.2 Selection of Measures for Action

The actions were basically derived from converting measures to actions. In addition, the actions were prioritised by rapid assessment using multiple criteria assessment and judged in the stakeholder consultation meeting in March 2017. The conversion of measures to actions and assessment of the action were initially conducted by TNA project team considering its effectiveness, efficiency, cost-benefit, impact and necessity of the measures by scoring. However, the assessment was discussed, adjusted, and agreed in the stakeholder consultation meeting in March 2017. As a result, the assessment could be summarised in the Table 4 and actions to pursue sustainable or optimal agroforestry were summarised in Table 20.

Table 23 Selected measures to include in the TAP of sustainable or optimal agroforestry

Broad categories	Measures to overcome barrier	Selected measures for TAP
Economic and financial	Increase the public financial support: - from the government budget - from development partners and other organisations	√
	Expand access to finance: - Lower interest rate, simply procedures and improve risk management mechanism - Increase access to regional financial markets - Enhance financial market development - Increase financial capacity and readiness and of entrepreneurs	√
Market failures and imperfection	Increase access to markets: - Domestic and regional markets - Promote and sustain the niche product and Markets - Enhance and sustain quantity and quality of products - Manage the import agroforestry products that undermine, or domestic products cannot compete e.g., subsidised and cheap products - Carbon market	√
Institutional and organisational capacity and human skills	Increase technical skills on agroforestry	√
Information and awareness	Increase information and awareness on optimal agroforestry including land-tree-crop species suitability, systems and best practices	√
Technical	Increase collaborative R&D and information sharing to identify, develop and apply an optimal agroforestry system	√

3.4.2.3 Action and Activities for TAP

Activities for fulfilling the actions were identified by TNA team and throughout key stakeholder consultations. Activities were firstly listed and elaborated by the TNA project team, and then presented and consulted with DoLF in November 2017 for finalisation. Relevance, effectiveness, efficiency, impacts on the actions and duplication with existing activities were considered during activities selection. As a result, activities of each action were formulated as in the Table 21 below.

Table 24 Actions and activities for TAP of agroforestry

Action 1	**Improve the public budgeting effectiveness and efficiency**
Activity 1.1	*Develop strategy on SCFM including financial needs and resources assessment*
Activity 1.2	*Develop financeable project proposal including reliable financial and economic analysis*
Activity 1.3	*Improve coordination with committee for rural development and poverty reduction to negotiate and convince the public funding*
Activity 1.4	*Improve public budget management system including recording, reporting, M&E*
Action 2	**Enhance resource mobilisation for agroforestry extension**
Activity 2.1	*Conduct financial needs and resources assessment*
Activity 2.2	*Develop financial resource directory*
Activity 2.3	*Develop and implement resource mobilisation plan*
Activity 2.4	*Increase capacity to develop financeable project proposals*
Activity 2.5	*Increase cooperation and partnership with development partners, international originations, NGOs and NPOs*
Activity 2.6	*Improve financial aids management system including recording, reporting, M&E*
Action 3	**Expand access to finance**
Activity 3.1	*Strengthening cooperation between domestic and regional banks and financial institutes (to expand domestic financial markets including lowering interest rate and simply procedures for borrowing)*
Activity 3.2	*Develop a fund for agriculture development*
Activity 3.3	*Increase financial capacity and readiness and of entrepreneurs*
Activity 3.4	*Organise agroforestry forum including financial access forum*
Action 4	**Increase organisational capacity and human resources**
Activity 4.1	*Improve human resource development system including capacity development plan, staff knowledge, building learning culture and commitment (e.g., MAF)*
Activity 4.2	*Building national, local authorities and communities on agroforestry*
Activity 4.3	*Increase extension staff-mobile team*
Activity 4.4	*Develop and implement strategy and action plans on agroforestry*
Activity 4.5	*Promote agroforestry network, think-tank and civil organisation and information exchanges*
Activity 4.6	*Improve agroforestry education and research in high education*
Action 5	**Research and develop information and best practice guidelines**
Activity 5.1	*Conduct studies and disseminate information on agroforestry systems, its performance and optimal agroforestry systems*
Activity 5.2	*Develop and disseminate information about land suitability map including trees and crops matching, optimal production systems including financial analysis of each system*
Activity 5.3	*Develop and disseminate information about agroforestry product markets, finance, production and processing technologies, inputs and networks*
Activity 5.4	*R&D of best practices and guidelines on sustainable or optimal agroforestry systems including one for access to carbon market*
Action 6	**Develop sustainable or optimal agroforestry reference projects**
Activity 6.1	*Pilot optimal agroforestry in former shifting cultivation areas*
Activity 6.2	*Improve existing agroforestry systems to realise optimal productivity and benefits*
Activity 6.3	*Pilot a sustainable or optimal agroforestry in plantation and agriculture systems*

3.4.4 Identify Stakeholders and Determine Timelines

3.4.4.1 Identify Stakeholders for TAP Implementation

The stakeholders to implement the actions including activities were definable based on a stakeholder's mandates and roles relevant to the activities. Some organisations were identified and participated in TNA and BAEF. In addition, number of stakeholders was also listed and validated during stakeholder consultation meeting in November 2017. As a result, the key stakeholders could be outlined in Table 22, and Table 23.

Table 25 General stakeholders for agroforestry

No	Key organisations	Mandate
I	**Public sector**	
1	Ministry of Agriculture and Forestry (MAF). In particular, Department of Agriculture and Forestry Extension (DAFE), Forest (DOF), Agriculture (DOA)	MAF has the responsibility to oversee agriculture and forestry affairs. The departments have the responsibility to secure financial resources for implementing their mandates including agroforestry extension.
2	National University of Laos: Faculty of Forestry (FOF) and Agriculture (FOA)	Mobilises resources for agroforestry education and research.
3	Ministry of Planning and Investment (MPI), particular Department of Foreign Aid Management (DFAM) and Investment Promotion (DIP)	Work with development partners and others on financial aids and investment, including agroforestry investment
4	Ministry of Commerce and Industry (MCI), particular Department of Small and Medium Enterprise Promotion (DSMEP)	Promote access to finance and financial support for development of business including agroforestry enterprises
5	National/Provincial Chamber of Commerce and Industry (N/PCCI), particularly, agriculture business association (ASA) and agriculture production group (APA)	Mobilise resources to support their business and capacity building
II	**Development partners**	
6	ADB, JICA, WB, GIZ etc.	Provide technical and financial support
III	**Private sector**	
7	Agriculture, forestry, environment, business and economics consulting firm	Provide consulting service in various aspects of agroforestry development
IV	**NGOs and NPOs**	
8	NGOs, NPOs on sustainable plantation	Mobilise and provide technical and financial support for agroforestry

3.4.4.2 Schedule Actions and Activities

The schedule of the actions and activities was defined by TNA project team in consultation with the key stakeholders in November 2017. Logics and sequences, nature and scale of the activities, readiness including time, technical and financial capacity of the responsible organisations to perform the activities

were considered when scheduling. As a result, the schedule of the action for optimal agroforestry was formulated (see Annex 4).

The timeframe of the action plan implementation is five years, which is perceived to be suitable and sufficient time for technical and financial preparation including demonstration of optimal agroforestry before expansion of the optimal agroforestry throughout the country. The timeframe is divided into two phases. The preparation phase is 3 months, which shall be commenced following approval and during dissemination of TAP to stakeholders. This means this phase would be between March to May 2018. The implementation phase would start from May or June 2018 until December 2022.

3.4.5 Estimate Resources

3.4.5.1 Capacity Building

Capacity building needs as well as knowledge and skills gaps were mainly identified during BAEF (Box 3). Furthermore, to implement the TAP effectively, the responsible organisations is required to enhance their project management.

Box 3: capacity building needs for agroforestry

3	Agroforestry land and combination suitability assessment and mapping
4	Agroforestry product marketing and access
5	Access to finance
6	Production and processing technologies
7	Agroforestry science and related areas such as eco-physiology of trees and crops including their components and interaction, ecology, soil nutrients and carbon
8	Geographical information system (GIS)
9	Land use planning and landscape management
10	Project management including proposal and financial analysis
11	R&D of best practices (technical, organisational, policy, human resources, market and finance

3.4.5.2 Estimate Costs for Actions and Activities

The costs of the TAP implementation include 1) the cost for dissemination and consultation before actual implementation of TAP, 2) the cost of each action and activity implementation and 3) the cost for contingency were estimated by DCC including TNA team in consultation and agreement with DOF. The cost for dissemination and consultation meetings for preparation of the TAP implementation is expected to be US$ 18,000. The cost of each activity implementation, considering allowance, a consultant fee, travel, meeting and other administrative costs is approximately US$ 17.012 million (Table 27 and Annex 4). The cost for contingency to address delay and variations, is estimated to be 10% of the total cost or US$ 1,701,200. So, the total cost for the action plan for promoting and facilitating sustainable or optimal agroforestry between 2018 to 2025 is about US$ 18.73 million.

3.4.6 Success Criteria and indicators for Monitoring of the Implementation

Success criteria and indicator for monitoring implementation of the TAP were divided into two levels: actions and activities as well as output-outcome and input level, as outlined in Table 26 and 27.

Table 26 Success Criteria and indicators for Monitoring the Implementation of the TAP on Optimal Agroforestry

No	Actions	Success criteria	Indicators for M&E
1	Improve the public budgeting effectiveness and efficiency	The government budget allocated for AF extension increased at least by 30% per year or sufficient for MAF and MOIC to perform full mandates on agroforestry production and business	The government budget allocated for agroforestry production and business increased
2	Enhance resource mobilisation for agroforestry extension	International cooperation and supports for agroforestry production and business are sustained and expanded	International cooperation and supports for agroforestry production and business improved
3	Expand access to finance	Favourable financial markets and ease of access	No. of entrepreneurs/ business that are accessible to finance and financial resources increased
4	Expand access to market	Various markets and ease of access	- Production increased and diversified - No. of markets and products sale increased
5	Increase organisational capacity and human resources	- The government, especially MAF and forestry authorities at local levels have adequate human and financial resources to fully perform their mandates on SPF - Private sector including entrepreneurs and famers can run SPF business in sustainable manner	Institutional capacity and human resources of MAF and forestry authorities at local levels and private sector are strengthened
6	Research and develop information and best practice guidelines	Necessary information (competition among species and production systems, feasibility, markets) and best practice guidelines are available for planning and development including division making on investment are available and accessible	- Information and best practice guidelines developed and updated - Ease of access and proportion of stakeholders that access to relevant information
7	Develop sustainable or optimal agroforestry reference projects	At least 3 sustainable or optimal agroforestry reference projects are successfully piloted and being reference projects for expansion	No. of sustainable or optimal agroforestry reference projects piloted and resources invested

3.4.7 Summary Overview of the Action plans on optimal agroforestry

Based on previous sections, the TAP could be summarised in the Table 27 below. Achieve optimal agroforestry; the summary TAP should be implemented effectively.

Table 27 Action plans for promotion of agroforestry

Actions	Activities	Funding sources	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ th.)
Action 1	**Maintain pubic financial support and enhance resource mobilisation for agroforestry extension**							
Activity 1.1	Conduct financial assessment-identification of funding sources and feasibility		MOF: DOF, DOA	May 2018-Dec 2018	Delayed or not inclusive due to insufficient resources and information	Definable list of possible funding sources/ donors and information about funding and access or cooperation	Assessment team, meeting, planning, data collection and analysis reports, List of and information about funding sources	45.00
Activity 1.2	Develop and implement resource mobilisation or access plan		MOF: DOF, DOA	Oct 2018-May 2019	Delayed or not inclusive and practical due to insufficient resources and information	Inclusive and practical resource mobilisation and access plan	Planning team, meeting, data collection and analysis reports, and resource mobilisation and access plan developed	5.00
Activity 1.3	Increase capacity, develop and submit financeable project proposal including financial and economic analysis		MOF: DOF, DOA	Sep 2018-Sep 2022	As 1.2 above	At least 2 projects financed and increased financial access, capital for expansion of agroforestry business.	Proposal development team, no. of trainings and meeting, proposal developed, submitted and financed	25.00
Activity 1.4	Engage and reach cooperation and partnership agreement with development partners, international originations, NGOs, NPOs and private sector to access to financial support		MOF: DOF, DOA	May 2018-Dec 2022	Delayed or insufficient resources	Increased networks, partners and access to finance and supports.	No. of meetings, partner agreements	40.00
Activity 1.5	Improve financial aids management system including financial sources		MOF: DOF, DOA	Oct 2018-	Not inclusive due to ineffective coordination and information sharing	Complete, effective and transparent financial aids management system	Improved financial aids management system	25.00

	or donor directory, M&E, reporting, and roundtable for feedback			Dec 2022				
Action 2	**Expand access to finance**							
Activity 2.1	Facilitate cooperation between domestic and regional banks and financial institute to expand domestic financial markets including lowering interest rate and simply procedures for borrowing		MOF: DOF, DOA	Oct 2018-Oct 2021	Delayed and unfulfilled due to low return on investment some agroforestry businesses	Increased and available favourable loans for agroforestry business	Number of business trips, meetings and cooperation agreements	80.00
Activity 2.2	Develop a fund for agriculture development		MOF: DOF, DOA	Jul 2018-Dec 2019	Delayed due to insufficient resources	Inclusive and practical agriculture development fund agreement or decree, management team, fund instalment.	No. of studies, meetings, agreement or decree on agriculture development fund	2,000.00
Activity 2.3	Increase financial capacity and readiness and of entrepreneurs		MOF: DOF, DOA	May 2018-May 2019	Delayed due to insufficient resources	Agroforestry entrepreneurs have good financial management system, high trustworthiness and are capable to access to finance	No. of training, participants attended and improved financial management system of enterprises	70.00
Activity 2.4	Organise agroforestry forum including financial access		MOF: DOF, DOA	Dec 2018-Dec 2022	Insufficient information, e.g., project feasibility, barriers or analysis. Poor follow up.	Increased no. of network, agreement to move forward project financing or cooperation to access to finance.	No. of dialogue and meetings and no. of participated biomass investors/ developers	50.00
Action 3	**Increase organisational capacity and human resources**							
Activity 3.1	Improve human resource development system		MOF: DOF, DOA	May 2018-	Insufficient knowledge and skills, leadership and	Adequate or at least increased human resources	Improved capacity building, more effective	65.00

	including capacity development plan, staff knowledge, building learning culture and commitment (e.g., MAF)			Dec 2022	commitment on organisational development	including skills and commitment	recruitment, increased staff commitment and learning culture	
Activity 3.2	Building national, local authorities and communities on agroforestry		MOF: DOF, DOA	Oct 2018-Dec 2022	Staff turn-over or shift and inadequate financial support for continuous human resources and capacity building	Relevant organisations and staff are capable of performing sustainable or optimal agroforestry Effective training.	No. of training, No. of participants attended and training effectiveness	110.00
Activity 3.3	Increase extension staff-mobile team		MOF: DOF, DOA	Jan 2019-Dec 2022	Delayed or ineffective due to insufficient budget, incentives or promotion	Sufficient skilful staff for field extension	No. of meetings, agreement or policies, staff recruited	290.00
Activity 3.4	Develop and implement strategy and action plans on agroforestry		MOF: DOF, DOA	May 2018-May 2019	Financial resources are not secured for R&D	Effectiveness of the strategy and plans implementation	Strategy and plans including its practicality and inclusiveness	35.00
Activity 3.5	Promote agroforestry network, think-tank and civil organisation and information exchanges		MOF: DOF, DOA	Oct 2018-Dec 2022	Low motivation to join working group, network, think-tank and commitment to exchange	Increased knowledge and capacity as a result of exchange	No. and function of working group, network, think-tank established	45.00
Activity 3.6	Improve agroforestry education and research in high education		MOF: DOF, DOA	Jul 2018-Jul 2019	Insufficient financial and human resources to develop Comprehensive and practical agroforestry curriculum.	Comprehensive and practical agroforestry curriculum. Increased practical knowledge and skills on agroforestry	Sustainable agroforestry curriculum	80.00
Action 4	**Research and develop information and best practice guidelines**							

Activity 4.1	Conduct studies and disseminate information on agroforestry systems, its performance and optimal agroforestry systems		MOF: DOF, DOA	Jun 2018-Dec 2021	Delayed due insufficient resources	Increased awareness and application of the best practice guidelines.	No. of best practices guidelines developed and disseminated including workshops etc.	135
Activity 4.2	Develop and disseminate information about land suitability map including trees and crops matching, optimal production systems including financial analysis of each system		MOF: DOF, DOA	Sep 2018-Dec 2020	As 4.1 above	Sufficient data, information and maps	Research, meetings, data collection and analysis reports, maps and available information	1,120
Activity 4.3	Develop and disseminate information about agroforestry product markets, finance, production and processing technologies, inputs and networks		MOF: DOF, DOA	Oct 2018-Oct 2022	Delayed or not inclusive due to limited resources and information	Sufficient information for planning and development of optimal agroforestry	Survey, meetings, reports, maps and available information	345
Activity 4.4	R&D best practices and guidelines on sustainable or optimal agroforestry systems including one for access to carbon market		MOF: DOF, DOA	Jul 2018-Jul 2021	Financial resources are not secured for development and implementation	Application and effectiveness of best practices	No. of best practices developed	140
Action 5	**Develop reference projects on optimal agroforestry systems**							
Activity 5.1	Pilot (3) optimal agroforestry systems		MOF: DOF, DOA	Mar 2019-Mar 2022	Delayed due to insufficient resources, incentives and best practices	At least 2 optimal agroforestry systems piloted in next 5 years	No. of agroforestry system consulted, designed and piloted	12,300
	Total							**17,012**

Chapter 4 Action Plan for Climate Change Mitigation in Agriculture Sector

4.1 Action plans for animal feed improvement

4.1.1 Description about animal feed improvement

Feed improvement for mitigation includes increase productivity of degraded and low forage/pastoral systems, deployment of optimal feed and concentrates for optimal growth of livestock. Total grassland and potential pasturelands for grazing animals in Laos is about 0.65 million ha and 1.14 million ha, respectively (MAF, 2015). These grasslands are, however, unproductive or produce (dry) grasses of less than 6 tonnes of dry grasses or 3 tonnes of fresh grasses per ha per year, on average. Currently, quite large area of pasture degraded, and it is believed that the production decreased. Consequently, it has undermined livestock development including lengthen the feeding and emissions.

Feed improvement, especially forage, started 20 years ago mainly under the support of development partners but the expansion of the feed production has been limited. Currently, the improved grasslands e.g., using improved grass varieties such as Ruzi, Mulato, Sorghum are less than 50,000 ha. This TAP is expected to be fulfilled to promote and develop an effective livestock feed for livestock production and mitigation.

4.1.2 Development goal and target

- To protect feed resources and increase improved pasture of at least 10% of the total pasture area (1.7 million ha) including 1% of optimal agro-silvopastoral system piloting area by 2025,
- To increase animal feeds of 1.4 million tons by 2025, including 1% of feed and concentrates that possibly maximise productivity and reduce emissions.

4.1.3 Selection of Actions to include in the TAP

4.1.3.1 Summary of Barrier and Measures to Overcome Barriers

Throughout barrier analysis and enabling framework (BAEF, nine important barriers that hinder animal feed improvement. To overcome the barriers, several measures were also identified accordingly (Table 24). However, some measures are still broad, and it may be hard to implement all the measures because of capacity and financial constraints. Hence, the measures to be taken as action are re-assessed and prioritised (see the section 4.1.3.2 below).

Table 28 Barriers and measures to overcome barriers to feed development

Categories	Barriers	Measures to overcome barriers
Economic and financial	1. Low profit of livestock and feed development business	1. Increase profit of livestock and feed development business (see measure 2, 3, 4)
	2. High cost on feed development	2. Reduce cost on feed development

Categories	Barriers	Measures to overcome barriers
	3. Inadequate the public financial support e.g., incentives, subsidy	3. Increase the public financial support e.g., incentives, subsidy for extension and facilitate access to the state financial institutes and banks as well as soft loans
	4. Limited capital and access to favourable financial resources	4. Expand access to financial resources (commercial loans)
market failures and imperfection	5. Small and variable market (livestock industry)	5. Increase extension and sustain livestock industry (promotion of an optimal agro-silvopastoral production systems and feed concentrates, and business model)
Institutional capacity and human skills	6. Limited technical knowledge and skills on feed development	6. Increase technical knowledge and skills on feed development
	7. Inadequate accurate information on feed/forage resources, suitable forage varieties and system, suitable formula of feed and feasibility	7. Increase R&D of information on feed/forage resources, suitable forage varieties and system, suitable formula of feed and feasibility
Others	8. Fragmented pastureland	8. Improve farmer organisation including pastureland. 9. Develop and enhance law enforcement on feed resources including land conservation, management and development
	9. Degraded and unfertile pastureland	10. Improve pastureland and soil fertility (by implement measures 3,6,7)

4.1.3.2 Selection of Measures to include in the TAP

Table 29 Selected measures for include in the livestock feed development action plan

Categories of barriers	Selected measures for action
Economic and financial	1. Maintain or increase public financial support and resources mobilisation for extension of livestock feed development
	2. Study incentives, subsidy and cost reduction or sharing mechanism
	3. Expand access to financial resources
Market failures and imperfection	4. Enhance promotion of an optimal agrosilvopastoral production systems and feed concentrates
Institutional capacity/ Human skills	5. Increase knowledge and technical skills on feed development
Information	6. Increase R&D of information on feed/forage resources, suitable forage varieties, optimal production system and feasibility
Others/Legal framework	7. Enhance law enforcement on livestock land management and development including management of livestock land conversion and grabbing

4.1.3.3 Actions and activities

Table 30 Selected activities for actions for animal feed improvement

Action 1	**Improve the public budget and resource mobilisation**
Activity 1.1	*Conduct financial assessment*
Activity 1.2	*Develop and implement resource mobilisation plan*
Activity 1.3	*Increase capacity to develop financeable project proposal including financial and economic analysis*
Activity 1.4	*Increase cooperation and partnership with development partners, international originations, NGOs and NPOs*
Activity 1.5	*Develop financial resource directory and improve financial aids management system including recording, reporting, M&E*
Action 2	**Expand access to finance**
Activity 2.1	*Facilitate cooperation between domestic and regional banks and financial institutes (to expand domestic financial markets including lowering interest rate and simply procedures for borrowing)*
Activity 2.2	*Increase financial capacity and readiness and of entrepreneurs*
Action 3	**Expand access to market**
Activity 3.1	*Increase promotion of an optimal agrosilvopastoral production systems and feed concentrates*
Action 4	**Increase organisational capacity and human resources**
Activity 4.1	*Improve human resource development system including capacity development plan, staff knowledge, building learning culture and commitment (e.g., MAF and LNCCI)*
Activity 4.2	*Increase professional trainings on livestock feed including fodder resources, production techniques and technologies, legal system*
Activity 4.3	*Increase extension staff-mobile team*
Activity 4.4	*Enhance the livestock including feed development network*
Activity 4.5	*Improve the livestock feed education and research in high education*
Activity 4.6	*Develop feed development strategy and action plans for extension and development*
Action 5	**Research and develop information and pilot an optimal agrosilvopastoral system and feed including concentrates**
Activity 5.1	*R&D best practices and pilot an optimal agrosilvopastoral and crop diversification system that may possibly generate maximum benefits on a land use*
Activity 5.2	*R&D best practices and pilot an optimal feed including concentrates*
Action 6	**Develop legal framework on feed management and enhance law enforcement**
Activity 6.1	*Research and develop policies on feed management including livestock land, feed/fodder resources conservation and development*

4.1.4 Identify Stakeholders and Determine Timelines

4.1.4.1 Identify Stakeholders for TAP Implementation

Majority of the stakeholders, especially the governmental organisations which were identified during TNA and BAEF. Addition stakeholders were identified by reviewing mandates and interest of

organisations related with the identified activities. Importantly, there was a consultation meeting on TAP including elaboration validation of stakeholders list in November 2017.

The Table 27 below provides list of the primary or overall stakeholders. Some stakeholders were identified for each activity as in Table 28.

Table 31 General stakeholder to livestock feed development

No	Key organisations	Mandate
1	Ministry of Agriculture and Forestry (MAF). In particular, Department of Livestock and Fishery (DLF), Agriculture (DOA), Agriculture and Forestry Extension (DAFE), Cooperation (DOC), Personnel and Organisation (DPO) and National Agriculture and Forestry Research Institute (NAFRI)	MAF has the responsibility to oversee agriculture and livestock affairs. - DLF is specifically responsible for feed resources conservation and development. - DOA is in charge of agriculture including feed techniques, standards and business - DAFE, DOC, DPO and NAFRI have the responsibility to secure financial resources for implementing their mandates related with feed extension, cooperation, personnel and research, respectively
2	National University of Laos, especially Faculty of Agriculture (FOA)	Mobilises resources for feed education and research.
3	Ministry of Planning and Investment (MPI), particular Department of Foreign Aid Management (DFAM) and Investment Promotion (DIP)	Work with development partners and others on financial aids, investment and land concession for livestock including feed development
4	Ministry of Natural Resources and Environment, particularly Department of Land (DOL) and Environmental Promotion (DEP)	DOL oversees overall land management, especially land concession DEF promotes conservation of biodiversity including fodder
5	Ministry of Commerce and Industry (MCI), particular Department of Small and Medium Enterprise Promotion (DSMEP)	Promote access to finance and financial support for development of business including livestock and feed enterprises
6	National/Provincial Chamber of Commerce and Industry (N/PCCI), particularly, agriculture business association (ASA) and agriculture production group (APA)	Mobilise resources to support livestock entrepreneur's business and capacity building
7	Agriculture, business and economics consulting firm	Provide consulting service in various aspects of livestock and feed development
8	NGOs, NPOs on livestock including fodder improvement	Studies and seeks financial support for livestock including fodder improvement and farmers

4.1.4.2 Schedule Actions and Activities

The schedule of the actions and activities was defined by TNA project team in consultation with the key stakeholders in November 2017. Logics and sequences, nature and scale of the activities, readiness

including time, technical and financial capacity of the responsible organisations to perform the activities were considered when scheduling. As a result, the schedule of action for the feed improvement was formulated (Annex 5).

The timeframe of the action plan implementation is five years, which is perceived to be suitable and sufficient time for technical and financial preparation including demonstration of feed development before expansion of the feed improvement throughout the country. The timeframe is divided into two phases. The preparation phase is 3 months, which shall be commenced following approval and during dissemination of TAP to stakeholders. This means this phase would be between March to May 2018. The implementation phase would start from May or June 2018 until December 2022.

4.1.4 Estimate Resources

4.1.4.1 Capacity Building

Capacity building or technical knowledge and skills to be strengthened were highlighted during BAEF. These include technical skills in various aspects of animal feed development (Box 5). In addition, to implementing the TAP effectively, it is necessary to enhance the responsible organisation's capacity on project management.

Box 5: capacity needs for development of livestock feed for mitigation

1) Optimal feed, especially seeds, forage species and concentrates that maximise yield and nutrients while reducing emissions
2) Feed business including production, processing and technologies
3) Feed or fodder resources assessment, improvement and conservation
4) R&D of best practices (technical, financial, organisational, legal framework etc.) for enabling feed development and management of feed resources
5) Soil carbon and nutrient management and restoration
6) Project management including proposal development, financial and economic analysis

4.1.4.2 Estimate Costs for Actions and Activities

The costs of the actions and activities such as 1) the cost for dissemination and consultation including adjustment of the TAP before actual implementation, 2) the cost of each action and activity, and 3) the cost for contingency were estimated and agreed among the TNA team and DoA and DOLF in November 2017. The cost for dissemination and 2 national consultation meetings is estimated to be US$ 18,000. The cost of the activities implementation including allowance, a consultant fee, travel, meeting and other administrative costs is approximately US$ 7.22 million (Table 33 and Annex 5). The cost for contingency action is estimated to be 10% of the total activity cost or US$ 722,900. So, the total cost of the action plan implementation would be US$ 7.97 million.

4.1.5 Success Criteria and indicators for Monitoring of the Implementation

Based on the identified actions and activities, success criteria and indicator for monitoring of the TAP implementation could also be identified. The C&I of the actions were descried in the Table 32 and C&I for each activity are in Table 36.

Table 32 Success Criteria and indicators for Monitoring the Implementation of the TAP on Animal Feed Improvement

No	Actions	Success criteria	Indicators for M&E
1	Improve the public budget and resource mobilisation	- The government budget allocated for extension increased at least by 30% per year or sufficient for MAF, NOUL and MOIC to perform full mandates on animal feed promotion and development - International cooperation and supports for livestock including animal feed production and business are sustained and expanded	The government and international aids on livestock including animal feed production and business increased
2	Expand access to finance	Favourable financial markets and ease of access to livestock including animal feed production and business	No. of entrepreneurs/ business that are accessible to finance and financial resources increased
3	Expand access to market	Various markets and ease of access to livestock including animal feed production and business	- Production increased and diversified - No. of markets and products sale increased
4	Increase organisational capacity and human resources	- The government, especially agriculture and commerce authorities at national and local levels have adequate human and financial resources to fully perform their mandates on animal feed production and business - Private sector including CCI, entrepreneurs and famers (at least the targeted groups involved in the TAP) are able to operate animal feed production and business sustainably including access to finance, markets, information and technologies	Institutional capacity and human resources of agriculture and commerce authorities and private sector at national and local levels are strengthened
5	Develop and pilot an optimal agrosilvopastoral system and feed	- At least 2 reference projects or business plans are successfully implemented and being reference projects/business models for	No. of animal feed production and business reference projects piloted, and resources invested

No	Actions	Success criteria	Indicators for M&E
	including concentrates	expansion of animal feed production and business	
6	Develop legal framework on feed management and enhance law enforcement	Necessary information (competition among species and production systems, feasibility, markets) and best practice guidelines are available for planning and development including division making on investment are available and accessible	- Information and best practice guidelines developed and updated - Ease of access and proportion of stakeholders that access to relevant information

4.1.6 Summary overview of the action plans on feeds improvement

Through the identification of actions and activities, timeframe, resources need and stakeholders; TAP for animal feed improvement for mitigation could be summarised in the Table 33 as follow. The summary TAP outlined the actions and activities, funding sources, responsible organisation, timeframe, budget for the implementation, risks and C&I of the TAP implementation as well as animal feed development. This TAP will be carried out for five years with total cost of approximately US$ 7.97 million. MAF, particularly the Department of Livestock and Fishery shall take the leading roles in the implementation in coordination with MoNRE, especially Department of Climate Change (DCC).

Table 33 Action plans for feeds improvement

Actions	Activities	Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (UD$ th.)
Action 1	**Improve the public budget and resource mobilisation**							
Activity 1.1	Conduct financial assessment including financial needs, resources and feasibility	**Public:** Gov. and development partners - DPs: SDC, EU, JICA, UNDP, ADB, FAO	MAF: DOFL	May 2018-May 2019	Financial resources are not secured for R&D	Practical and comprehensive strategy and plans is in place to guide implementation and support decision on financing	Financial assessment including financial needs, resources and feasibility carried out and reported	35
Activity 1.2	Develop and implement resource mobilisation plan	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO	MAF: OFL	Sep 2018-Sep 2019	Financial resources are not secured for R&D	Practical and comprehensive resource mobilisation plan is in place, and international support increased as a result of the implementation	Resource mobilisation plan developed and implemented	12
Activity 1.3	Increase capacity to develop financeable project proposal including financial and economic analysis	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO **Private:** Financial institutes	MAF: DOFL	Dec 2018-Dec 2022	Unfunded due to variable funding, insufficient resources and information to develop financeable proposal	Increased financial access, capital for expansion of organic farming business.	No. of training, project proposal developed, submitted and financed	60
Activity 1.4	Increase cooperation and partnership with development partners,	**Public:** Gov. and development partners	MAF: DOFL	May 2018-	Delayed or insufficient resources	Increased networks, partners and access	No. of meetings, partner agreements	15

	international originations, NGOs and NPOs	e.g., SDC, EU, JICA, UNDP, ADB, FAO **Private:** LNCCI **NGOs, NPOs:** Helvetas, WFP		Dec 2022		to finance and supports.		
Activity 1.5	Develop and update financial resource directory and improve financial aids management system including recording, reporting, M&E	**Public:** Gov. and development partners e.g., SDC, EU, JICA, UNDP, ADB, FAO **Private:** LNCCI	MAF: DOFL	May 2019-Dec 2022	Not inclusive due to ineffective coordination and information sharing	Complete, effective and transparent financial aids management system	Improved financial aids management system	10
Action 2	**Expand access to finance**							
Activity 2.1	Facilitate cooperation between domestic and regional banks and financial institutes (to expand domestic financial markets)	**Public:** Gov. **Private**: Banks and financial institutes e.g., LADB, NB, LDB	MOF: BOL, LADB, NB, LDB	Jul 2018-Dec 2022	Delayed and limited access to finance due to low return on investment some animal feed businesses	Increased and available favourable loans for animal feed business	Number of business trips, meetings and cooperation agreements	80
Activity 2.2	Increase trainings on business and financial management for entrepreneurs	**Public:** Gov. and development partners e.g., SDC, EU, JICA, UNDP, ADB, WB-IFC	SMEPD LNCCI	Oct 2018-Dec 2022	Delayed due to insufficient resources	Entrepreneurs have good financial management system, high trustworthiness and are capable to access to finance	No. of training, participants attended and improved financial management system of enterprises	60
Action 3	**Expand access to market**							
Activity 3.1	Increase promotion of an optimal agrosilvopastoral production systems and feed concentrates	**Public:** Gov. and development partners e.g., SDC, EU, JICA, UNDP, ADB, FAO **Private:** LNCCI	LNCCI SMEPD	May 2018-Dec 2022	Insufficient information, e.g., project feasibility, barriers or analysis.	Increased no. of network, agreement to move forward project financing or	No. of dialogue and meetings and no. of participated biomass investors/ developers	750

		NGOs, NPOs: WFP			Insufficient of following up.	cooperation to access to finance.		
Action 4	**Increase organisational capacity and human resources**							
Activity 4.1	Improve human resource development system including capacity development plan, staff knowledge, building learning culture and commitment	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB **Private:** LNCCI	SMEPD LNCCI	May 2018-May 2022	Insufficient knowledge and skills, leadership and commitment on organisational development	Adequate or at least increased human resources including skills and commitment	Improved capacity building, more effective recruitment, increased staff commitment and learning culture	25
Activity 4.2	Increase professional trainings on livestock feed including fodder resources, production techniques and technologies, legal system	**Public:** Gov. and DPs: ADB **Private:** LNCCI	SMEPD LNCCI	Dec 2018-Dec 2022	Staff turn-over or shift and inadequate financial support for continuous human resources and capacity building	Relevant organisations and staff are capable of operate livestock feed production and enterprise	No. of training, No. of participants attended and training effectiveness	100
Activity 4.3	Increase extension staff-mobile team	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO **Private:** LNCCI	SMEPD LNCCI	Jan 2019-Dec 2022	Delayed or ineffective due to insufficient budget, incentives or promotion	Sufficient skilful staff for field extension	No. of meetings, agreement or policies, staff recruited	75
Activity 4.4	Enhance the livestock including feed development network	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO	SMEPD LNCCI	Oct 2018-Dec 2022	Low motivation to join working group, network, think-tank and commitment to exchange	Increased knowledge and capacity as a result of exchange	No. and function of working group, network, think-tank established	45
Activity 4.5	Improve the livestock feed education and research in high education	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO	FoA	Sep 2018-Sep 2019	Insufficient financial and human resources to develop the curriculum.	Comprehensive and practical curriculum.	Animal feed study and research curriculum	60

Activity 4.6	Develop feed development strategy and action plans for extension and development	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO **Private:** LNCCI **NGOs, NPOs:** WFP	DPO	May 2018-May 2019	Insufficient knowledge and skills, leadership and commitment on organisational development	Adequate or at least increased human resources including skills and commitment	Improved capacity building, more effective recruitment, increased staff commitment and learning culture	30
Action 5	**Develop and pilot an optimal agrosilvopastoral system and feed including concentrates**							
Activity 5.1	Research, define and pilot an optimal agrosilvopastoral and crop diversification system that may possibly generate maximum benefits on a land use	**Public:** Gov. and development partners e.g., SDC, EU, JICA, UNDP, ADB, FAO **Private:** LNCCI	MAF: DOFL LNCCI	Aug 2018-Aug 2022	Staff turn-over or shift and Insufficient financial support for continuous human resources and capacity building	Increased or adequate extension staff for extension works	Policy and plan to establish and recruit staff as mobile extension team	5,065
Activity 5.2	Research, define and pilot an optimal feed including concentrates	**Public:** Gov. and development partners e.g., SDC, EU, JICA, UNDP, ADB, FAO **NGOs, NPOs:** Helvetas, WFP	NAFRI	Aug 2018-Aug 2022	Low motivation to join working group, network, think-tank and commitment to exchange	Increased knowledge and capacity as a result of exchange	No. and function of working group, network, think-tank established	850
Action 6	**Develop legal framework on feed management and enhance law enforcement**							
Activity 6.1	Research and develop policies on feed management including livestock land, feed/fodder resources conservation and development	**Public:** Gov. and development partners e.g., SDC, EU, JICA, UNDP, ADB, FAO **NGOs, NPOs:** Helvetas, WFP	FOA	Aug 2018-Aug 2019	Insufficient financial and human resources to develop Comprehensive and practical of the curriculum.	Comprehensive and practical organic farming curriculum. Increased practical knowledge and skills on EPAM	Organic farming curriculum	20
	Total							**7,229**

4.2 Action plans for organic farming

4.2.1 Description about organic farming

Organic farming or agriculture is commonly known as farming systems and products that are free from synthetic chemicals, Genetically Modified Organism (GMO), and not organic chemistry (MAF, 2005). There are two types of organic production, organic by default and certified one. The organic agriculture by default accounted for about 80% of the total agriculture land (of app. 4 million ha) (Bounyasouk, 2014). Certified organic agriculture which meet and certified under Lao organic agriculture standards (MAF, 2005) are relatively small. It reached a peak in 2013, when organic production areas and farmers reached 6,441 ha and 26 products with a total production of 18,340 tons (Bounyasouk, 2014), which increased from 5,989 ha and 1,342 farmers in 2011 (Panyakul, 2012). Currently, there are 17 companies, 88 farmer groups that consisted of 1,598 households who farms 3,002 ha and produce about 3,375 tonnes in 122 villages and 47 districts through the country (MAF, 2016).

Organic farming is an important environment friendly technology. It has substantial, apart from income and employment, climate change mitigation potentials. The prominent mitigation potentials are increase productivity, while enhancing restoration of soil carbon and nitrogen storage, particularly on low and degraded production systems.

As described above, organic farming in Laos is a relatively small industry that is not firmly and fully developed with few entrepreneurs, production areas and products. At its early stage of development, the number of entrepreneurs, areas of production, products and markets are variable. In effect, the sustainability of organic farming depends on the public and external support for R&D, capacity building, access to production and processing technologies, markets and finance.

4.2.2 Development goals and targets

To increase certified organic farming area and farmers of 35,000 ha and 70,000, respectively by 2025.

4.2.3 Selection of measures to include in the TAP

The selection of actions to include in to the TAP, as mentioned in Chapter 2, was carried by converting measures into actions. The barriers and measures to overcome barriers identified during BAEF were revisited, assessed and then prioritise by scoring. In addition, stakeholder consultation meetings to discuss and agree on the actions for TAP. The barriers and measures resulted from BAEF is outlined in section 4.2.3.1. The action selection process was described in section 4.2.3.2.

4.2.3.1 Summary of Barriers and Measures to Overcome Barriers

The BAEF resulted in identification of 6 critical barriers including 3 financial and economic barriers and 3 non-financial and economic barriers to sustainable or effective organic farming development. Overcoming the barriers could be realised by implementing measures which were identified in accordance with the barriers (Table 29).

Table 34 Barriers and measures to overcome barriers to organic farming

Categories	Barriers	Measures to overcome barriers
Economic and financial	1. High investment cost per unit (compare with conventional farming)	1. Reduce investment cost (including implementing measure 2,3)
	2. Limited capital and access to financial resources	2. Expand access to financial resources (e.g., low interest loan)
	3. Inadequate the public financial support for extension such as incentives and subsidy	3. Increase the public financial support for extension such as incentives and subsidy
Market failures and imperfection	4. Small market	4. Expand market
	5. Variable product quantity and low trustworthiness on quality	5. Improve product quantity and quality
Institutional capacity and human skills	6. Limited technical skills and related skills including access to markets and finance, production and processing techniques, soil nutrients and carbon management, standards and certification	6. Increase technical skills and related skills including access to markets and finance, production and processing techniques, soil nutrients and carbon management, standards and certification

4.2.3.2 Selection of Measures for Action

Overall, the actions were derived from converting measures to actions as mentioned in Chapter 2. The conversion of measures to actions and assessment of the action were initially conducted by TNA project team considering its effectiveness, efficiency, cost-benefit, impact and necessity of the measures by scoring. In addition, there were discussion, adjustment and agreement with the key stakeholders, particularly DOA at the consultation meeting in November 2017. The assessment could be summarised in the Annex 3, and measures or actions to pursue sustainable or effective organic farming were summarised in Table 30.

Table 35 Selected measures as actions for organic farming development and deployment

Categories	Measures to include in the action plan	Selected measures
Economic and financial	Expand access to financial resources: - Enhance development of financial markets-increase cooperation with regional banks and financial institutes - Enhance capacity of entrepreneurs to access to finance - Develop policies to facilitate and warrant access to finance	√
	Increase the public financial support for extension such as incentives and subsidy	√
Market	Expand market - Increase marketing and engagement - Improve product quantity and quality	√
Institutional and organisational capacity	Increase technical skills and related skills including access to markets and finance, production and processing techniques, soil nutrients and carbon management, standards and certification	√

Categories	Measures to include in the action plan	Selected measures
and human skills		

4.2.3.3 Actions and Activities

Activities for TAP of organic farming were identified by TNA team and throughout key stakeholder consultations. Activities were firstly identified by the TNA project team prior to consult and agree with DoLF in November 2017 considering relevance, effectiveness, efficiency, impacts on the actions and duplication with existing activities. As a result, activities of each action were formulated as in the Table 31 below.

Table 36 Selected activities for actions on organic farming

Action 1	**Improve the public budget and resource mobilisation**
Activity 1.1	*Conduct financial assessment*
Activity 1.2	*Develop and implement resource mobilisation plan*
Activity 1.3	*Increase capacity to develop financeable project proposal including financial and economic analysis*
Activity 1.4	*Increase cooperation and partnership with development partners, international originations, NGOs and NPOs*
Activity 1.5	*Develop financial resource directory and improve financial aids management system including recording, reporting, M&E*
Action 2	**Expand access to finance**
Activity 2.1	*Strengthening cooperation between domestic and regional banks and financial institutes (to expand domestic financial markets including lowering interest rate and simply procedures for borrowing)*
Activity 2.2	*Increase financial capacity and readiness and of entrepreneurs*
Activity 2.3	*Organise the organic farming business forum including financial access forum*
Action 3	**Expand access to market**
Activity 3.1	*Market assessment (domestic and regional markets)*
Activity 3.2	*Develop marketing and promotional strategy*
Activity 3.3	*Organise business trips and dialogues in the regions*
Activity 3.4	*Continue organising and participating trade fairs*
Activity 3.5	*Cooperate with actors to expand market places*
Action 4	**Increase organisational capacity and human resources**
Activity 4.1	*Improve human resource development system including capacity development plan, staff knowledge, building learning culture and commitment (e.g., MAF and LNCCI)*
Activity 4.2	*Increase professional trainings on the organic farming*
Activity 4.3	*Increase extension staff-mobile team*
Activity 4.4	*Enhance the organic farming network, think-tank and civil organisation*
Activity 4.5	*Improve the organic farming education and research in high education*
Action 5	**Develop and pilot an optimal organic farming system**
Activity 5.1	*Research and define an optimal organic farming system that may possibly generate maximum benefits on a land use*

Activity 5.2	*Pilot a sustainable or optimal organic farming systems including integrated farming, home garden, agroforestry, crop diversification etc.*

4.2.4 Identify Stakeholders and Determine Timelines

4.2.4.1 Identification of Stakeholders

The organic farming stakeholders were identified based on identified activities for TAP and mandates and interest of the relevant organisations. Some organisations have been identified and engaged in TNA-BAEF (Annex 1). Other important stakeholders are defined following the consultation meeting of November 2017. So, the general or main stakeholder could be summarised in Table 32, and specific one for each activity in Table 33.

Table 37 General stakeholders to organic farming

No	Key organisations	Mandate
1	Ministry of Agriculture and Forestry (MAF). In particular, Department of Agriculture (DOA), Agriculture and Forestry Extension (DAFE), Cooperation (DOC), Personnel and Organisation (DPO) and National Agriculture and Forestry Research Institute (NAFRI)	MAF has the responsibility to oversee agriculture and forestry affairs. DOA, especially Agricultural Technical Division (ATD) and Clean Production Centre (CPC) have specific tasks on the management or organic farming. DAFE, DOC, DPO and NAFRI have the responsibility of extension, cooperation, personnel and research on organic farm development and management
2	National University of Laos, especially Faculty of Agriculture (FOA), Forestry (FoF) and Environment Science (FoES) and Business and Economic (FOBE)	Mobilises resources for organic farming education and research.
3	Ministry of Planning and Investment (MPI), particular Department of Foreign Aid Management (DFAM) and Investment Promotion (DIP)	Work with development partners and others on financial aids, investment related with land concession including organic farm investment
4	Ministry of Commerce and Industry (MCI), particular Department of Small and Medium Enterprise Promotion (DSMEP)	Promote access to finance and financial support for development of organic farming and product business
5	National/Provincial Chamber of Commerce and Industry (N/PCCI), particularly, organic farm association (OFA)	Mobilise resources to support their business and capacity building
6	Agriculture, forestry, environment, business and economics consulting firm	Provide consulting service in various aspects of organic development
7	NGOs, NPOs on agroforest	Seek for technical and financial support to organic farming business and farmers

4.2.4.2 Schedule Actions and Activities

The schedule of the actions and activities in Annex 5 and Table 33 was defined by TNA project team in consultation with the key stakeholders in November 2017. Logics and sequences, nature and scale of the activities, readiness including time, technical and financial capacity of the responsible organisations to perform the activities were considered when scheduling.

The timeframe of the action plan implementation is five years, which is perceived to be suitable and sufficient time for technical and financial preparation including demonstration before full expansion of the organic farming throughout the country. The timeframe is divided into two phases. The preparation phase is 3 months, which shall be commenced following approval and during dissemination of TAP to stakeholders. This means this phase would be between March to May 2018. The implementation phase would start from May or June 2018 until December 2022.

4.2.5 Estimate Resources

4.2.5.1 Capacity building

Capacity building needs for the responsible organisations includes technical and project management skills. The technical knowledge and skills needs were already defined during BAEF (Box 4). The project management skills to be enhanced include project activity and financial planning, team organisation, monitoring and evaluation of implementation.

Box 4: capacity needs for effective and sustainable organic farming development

1) Best practice and guidelines on sustainable or conservation farming including soil carbon and nutrient management techniques,
2) Organic farming inspection and certification including equipment and facilities for inspection,
3) Development of financial project and business proposal including financial and economic analysis,
4) Resource mobilisation including development resource mobilisation plan,
5) Sustainable farmer organisations,
6) Marketing and access to market,
7) Organic product diversification and product processing technologies,
8) Research and establishment of development fund or subsidy for organic farming,
9) Organic farm land inventory, classification and management,
10) Research and monitoring of organic farm soil carbon and nitrogen,
11) Integrated and strategic planning and development,
12) Human resource development system including human resource or capacity development plan, staff knowledge management, monitoring and evaluation HRD including financing mechanism.

4.2.5.2 Estimate Costs for Actions and Activities

The costs of the TAP include 1) the cost for dissemination and consultation for TAP implementation arrangement, 2) the cost of the actions and activities, and 3) the cost for contingency action. The cost for dissemination and consultation workshops could be US$ 18,000. The cost of the activities implementation, considering allowance, a consultant fee, travel, meeting and other administrative costs is approximately US$ 7.23 million (Table 39 and Annex 5). The cost for contingency to address delay

and variations, is estimated to be 10% of the total activity cost or US$ 722,900. So, the total cost for the implementation the TAP is US$ 7.97 million.

4.2.6 Success Criteria and indicators for Monitoring of the Implementation

The following Table 38 and 39 provided success criteria and indicator for monitoring of the TAP implementation, which identified by TNA project team and key stakeholders in the stakeholder consultation meeting and focus group meeting in November 2017. The criteria and indicators (C&I) included C&I of the actions (Table 38) and activities (Table 39).

Table 38 Success Criteria and indicators for Monitoring the Implementation of the TAP on Organic Farming

No	Actions	Success criteria	Indicators for M&E
	Improve the public budget and resource mobilisation	- The government budget allocated for extension of organic farming and business increased at least by 50% per year or sufficient for MAF and MOIC to perform full mandates - International cooperation and supports for organic farming and business are sustained and expanded	The government and international aids for promotion of organic farming and business increased
	Expand access to finance	Favourable financial markets and ease of access to the organic farmers and businesses	No. of entrepreneurs/ business that are accessible to finance and financial resources increased
	Expand access to market	Various markets and ease of access	- Production increased and diversified - No. of markets and products sale increased
	Increase organisational capacity and human resources	- The government, especially agriculture and commerce authorities at national and local levels have adequate human and financial resources to fully perform their mandates on organic farming and business promotion and management - Private sector including entrepreneurs and famers can develop and manage their business in sustainable manner	Institutional capacity and human resources of MAF and forestry authorities at local levels and private sector are strengthened
	Research and develop information and best practice guidelines	Necessary information (competition among species and production systems, feasibility, markets) and best practice guidelines are available for planning and	- Information and best practice guidelines developed and updated

No	Actions	Success criteria	Indicators for M&E
		development including division making on investment are available and accessible	- Ease of access and proportion of stakeholders that access to relevant information
7	Expand optimal organic farming system	- At least 3 sustainable or organic farming reference projects or business plans are implement within 5 years and being reference projects and business models for further expansion - Increased income and employment from organic farming and businesses	No. of sustainable organic farming reference projects implemented, and resources invested

4.2.7 Summary overview of the action plans for promotion of organic farming

Through the identification of actions and activities, timeframe, resources need and stakeholders; TAP for mitigation oriented organic farming could be summarised in the Table 39. Based on the previous sections, the summary of the TAP could be formulated. This summary TAP included actions and activities, funding sources, responsible organisation, timeframe, budget for the implementation, risks and C&I of the TAP implementation. This TAP will be implemented five years, by MAF and MoNRE, particularly the Department of Agriculture (DoA) and Climate Change (DCC), with total cost about US$ 8.71 million.

Table 39 Action plans for promotion of organic farming

Action	Activity	Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ Th.)
Action 1	**Improve the public budget and resource mobilisation**							
Activity 1.1	Conduct financial assessment	**Public:** Gov. and development partners-DPs: SDC, EU, JICA, UNDP, ADB, FAO	MAF: DOA	May 2018-Dec 2018	Insufficient and inaccurate information	Detail information about financial needs, funding sources and feasibility are available for financial planning and decision	Financial assessment conducted	50.00
Activity 1.2	Develop and implement resource mobilisation plan	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO	MAF: DOA	Sep 2018-Sep 2019	Financial resources are not secured for R&D	Practical and comprehensive resource mobilisation plan is in place to guide cooperation and access to support	Resource mobilisation plan developed and implemented	20.00
Activity 1.3	Increase capacity, develop and submit financeable project proposal including financial and economic analysis	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO **Private:** LNCCI	MAF: DOA	Oct 2018-Dec 2022	Delayed due to insufficient resources	Increased financial access, capital for expansion of organic farming business.	No. of training, project proposal developed, submitted and financed	75.00
Activity 1.4	Increase cooperation and partnership with development partners, international originations, NGOs and NPOs	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO **Private:** LNCCI	MAF: DOA	May 2018-Dec 2022	Delayed or insufficient resources	Increased networks, partners and access to finance and supports.	No. of meetings, partner agreements developed	5.00
Activity 1.5	Develop and update financial resource directory and	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO	MAF: DOA	Oct 2018-	Not inclusive due to ineffective	Complete, effective and transparent financial aids management system	Financial aids management system	6.00

	financial aids management system including M&E	**Private:** LNCCI		Dec 2022	coordination and information sharing	which traceable financial flow	developed and updated	
Action 2	**Expand access to finance**							
Activity 2.1	Strengthening cooperation between domestic and regional banks and financial institutes (to expand financial markets)	**Public:** Gov. **Private**: Banks and financial institutes e.g., LADB, NB, LDB	MOF: BOL, LADB, NB, LDB	May 2018-Dec 2022	Delayed and limited access to finance due to low return on investment some animal feed businesses	Increased and available favourable loans for animal feed business	Number of business trips, meetings and cooperation agreements developed	60.00
Activity 2.2	Increase financial capacity and readiness and of entrepreneurs	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, WB-IFC	SMEPD LNCCI	May 2018-Dec 2022	Delayed due to insufficient resources	Entrepreneurs have good financial management capacity and increased access to finance	No. of training, participants attended and improved financial management capacity of enterprises	70.00
Activity 2.3	Organise the organic farming business forum including financial access forum	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO **Private:** LNCCI	LNCCI SMEPD	Dec 2018-Dec 2022	Insufficient information, e.g., project feasibility, barriers or analysis.	Increased no. of network, agreement to move forward project financing or cooperation to access to finance.	No. of dialogue and meetings and no. of biomass investors/ developers participated	45.00
Action 3	**Expand access to market**							
Activity 3.1	Market assessment (domestic and regional markets)	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO **Private:** LNCCI	SMEPD LNCCI	May 2018-May 2019	Delayed or not inclusive due to insufficient resources and information	Inclusive assessment reports including identification of markets, feasibility and how to access to markets	Market assessment conducted	70.00
Activity 3.2	Develop marketing and promotional strategy	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB **Private:** LNCCI	SMEPD LNCCI	May 2018-May 2019	As 3.2 above	Inclusive and practical marketing strategy is in place to guide access to markets and decision for financing	Marketing and promotional strategy developed and implemented	10.00

Activity 3.3	Organise business trips and dialogues in the regions	**Public:** Gov. and DPs: ADB **Private:** LNCCI	SMEPD LNCCI	Dec 2018-Dec 2021	As 3.2 above	Expanded cooperation and networks, lead to increase access to markets	No. of business trips, meetings, cooperation agreements achieved	90.00
Activity 3.4	Continue organising and participating trade fairs	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO **Private:** LNCCI **NGOs, NPOs:** Helvetas, WFP	SMEPD LNCCI	Dec 2018-Dec 2220	As 3.2 above	As 3.3, and most of the potential products are accessible to markets	No. of trade faire attended or organised, participants, cooperation agreements and networks achieved	85.00
Activity 3.5	Cooperate with actors to expand market places	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO **Private:** LNCCI	SMEPD LNCCI	May 2018-Dec 2022	As 3.2 above	Expanded marketing cooperation and networks, leading to increased markets access	As 3.3 above	15.00
Action 4	**Increase organisational capacity and human resources**							
Activity 4.1	Improve human resource development system including capacity development plan, staff knowledge, learning culture, commitment	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO **Private:** LNCCI	DPO	May 2018-Dec 2022	Insufficient knowledge and skills, leadership and commitment on organisational development	Adequate or increased human resources including skills and commitment	Human resource development system including capacity development plan, staff knowledge, learning culture, commitment improved	40.00
Activity 4.2	Increase professional trainings on the organic farming	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO **Private:** LNCCI	DOA SMEPD LNCCI	Dec 2018-Dec 2022	Staff turn-over or shift and inadequate financial support for continuous human resources and capacity building	Relevant organisations and staff received more trainings and competent to promote and manage organic farming and business.	No. of training, No. of participants attended	105.00

Activity 4.3	Increase extension staff-mobile team	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO **Private:** LNCCI	DOA LNCCI	May 2019-May 2022	Staff turn-over or shift and inadequate financial support for continuous human resources and capacity building	Increased or adequate extension staff for extension works	No. of extension staff and mobile team organised and support the extension works	150.00
Activity 4.4	Enhance the organic farming network, think-tank and civil organisation	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO **NGOs, NPOs:** Helvetas, WFP	NAFRI	Oct 2018-Oct 2022	Low motivation to join working group, network, think-tank and commitment to exchange	Increased knowledge and capacity as a result of exchange	No. and function of working group, network, think-tank established	22.00
Activity 4.5	Improve the organic farming education and research in high education	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO	FOA	Jul 2018-Jul 2019	Delayed or not practical due to insufficient financial and human resources	Comprehensive and practical organic farming curriculum.	Organic farming curriculum improved or updated	70.00
Action 5	**Develop and pilot an optimal organic farming system**							
Activity 5.1	Research and define an optimal or a best organic farming system that generate maximum benefits on a land use	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO **Private:** LNCCI **NGOs, NPOs:** Helvetas, WFP	DOA	Jun 2018-Jun 2020	Delayed or not inclusive due to insufficient resources	Best practices are available and applied to improve the organic production and business	No. of best practices developed	110
Activity 5.2	Expand a sustainable or optimal organic farming systems including integrated farming, home garden, agroforestry, crop diversification	**Public:** Gov. and DPs: SDC, EU, JICA, UNDP, ADB, FAO **Private:** LNCCI **NGOs, NPOs:** Helvetas, WFP	DOA	Mar 2019-Mar 2021	As 5.1 above	At least 3 to 4 sustainable or optimal organic farming projects or business systems replicated or expanded	No. of sustainable or optimal organic farming systems expanded	6,800
Total								**7,898**

4.3 Action plans for manure-based biogas

4.3.1 Description about manure-based biogas

The manure-based biogas is a GHG mitigation technology, particularly reduction of methane emissions from manure management system, fuelwood utilisation and import of LPG. Biogas could save 4.8kg/day of wood, 8.17kg/day of LPG, US$ 23/month from electricity and replacement of kerosene (SNV, 2006). In addition, it can reduce pollution such as water pollution, nuisance order and health related hygiene which may result from improper manure management.

Laos had annual biogas production potential of about 302.4m^3, which could be used to generate 51 MW of electricity (MEM, 2011). Currently there are approximately 5,000 manure-based biogas systems through the country. 3,000 biodigesters were established under biogas pilot programme during 2006-2012, of which more than 80% is 4m^3 biodigester and some are 6m^3 and 10m^3 (SNV, 2013). Based on a survey, 76% of the biogas owners are highly satisfied with their biodigesters while 67% affirmed that their plants have been functioning very well without any major problem (SNV, 2013). Despite strong support from the government, potentials and high satisfaction; expansions of the biogas are still on slow pace or only 10% of the target was met.

Biogas is market or consumer goods. There is a specific market and expansion of market depends on consumer awareness, promotion and commercial marketing cleaner energy, and change of energy consumption pattern. Since biogas is in early stage of development, public support and creation of enabling environment for diffusion is remained crucial.

4.3.2 Development goals and targets

To promote and facilitate development of biogas to produce energy equivalent to 19 MW of electricity by 2020 and 51 MW by 2025.

4.3.3 Selection of measures to include in the TAP

Selection of measures for action were identified based on the BAEF, especially identified barriers and measures to overcome barriers (4.3.3.1 and Table 34). Detail process and method for selection of action and activities are explained in section 4.3.3.2 and 4.3.3.3, respectively.

4.3.3.1 Summary of Barriers and Measures to Overcome Barriers

As a result of BAEF, five barriers are considered as important obstacle for biogas development and sustainability. Three of them are financial and economic barriers, two are market related barriers (Table 34).

Table 40 Barriers and measures to overcome barriers to biogas development and deployment

Categories	Barriers	Measures
Economic and financial	1. High investment cost including high equipment cost, construction, operation and maintenance (O&M)	1. Reduce investment cost including high equipment cost, construction, operation and maintenance (O&M)
	2. Limited the public budget and financial and economic incentives and subsidy for extension	2. Increase the public budget and financial and economic incentives and subsidy for extension
	3. Investors, especially farmers have limited financial resources	3. Increase access to finance
Market failures and imperfection	4. Small and variable supply of raw materials (manure)	4. Increase and sustain supply of raw materials (manure): - Promoting larger, standard and organisation of farming systems
	5. Limited accurate information about market/demand and capacity	5. Increase information about market/demand and capacity

4.3.3.2 Selection of Measures for Action

Measures for actions were derived by converting measures to actions. The conversion of measures to actions and assessment of the action were initially conducted by TNA project team considering its effectiveness, efficiency, cost-benefit, impact and necessity of the measures by scoring. Moreover, the assessment was discussed, adjusted, and agreed in the stakeholder consultation meeting with relevant departments of MEM in March 2017. Consequently, the selected measures for TAP were summarised in Table 35 as follows.

Table 41 Selected measures as actions for biogas development action plan

Categories	**Measures**	**Selected measures for actions**
Economic and financial	1. Reduce investment cost including high equipment cost, construction, operation and maintenance (O&M)	√
	2. Increase the public budget and financial and economic incentives and subsidy for extension	√
	3. Increase access to finance	√
Market failures and imperfection	4. Increase and sustain supply of raw materials (manure): 5. Promoting larger, standard and organisation of farming systems	√
	6. Increase information about market/demand and capacity	√

4.3.3.3 Actions and Activities

Activities for biogas action plan were identified by TNA team and throughout key stakeholder consultations. Activities were firstly listed and elaborated by the TNA project team, and then presented and consulted with DoLF, DEPP and RERI in November 2017. Relevance, effectiveness, efficiency, impacts on the actions and duplication with existing activities were considered during activities selection. As a result, activities of each action were formulated as in the Table 36 below.

Table 42 Selected activities for actions on biogas development

Action 1	**Expand access to finance**
Activity 1.1	*Strengthening cooperation between domestic and regional banks and financial institutes (to expand domestic financial markets including lowering interest rate and simply procedures for borrowing)*
Activity 1.2	*Increase financial capacity and readiness and of entrepreneurs*
Activity 1.3	*Organise financial access dialogue on biogas development including financing*
Action 2	**Increase the public supports including subsidise to promote larger and standard farm and technologies**
Activity 2.1	*Conduct feasibility, impact, trade-off of the public subsidies on biogas and define sustainable financial mechanism for biogas development*
Activity 2.2	*Piloting and M&E a sustainable financial mechanism for biogas development*
Action 3	**Increase organisational capacity and human resources**
Activity 3.1	*Provide professional training and exchanges on biomass energy development including technologies, access to finance, policy and climate change mitigation*
Activity 3.2	*Improve human resources development system of the public organisations responsible for biomass energy*
Activity 3.3	*Improve biogas energy education and research in high education*
Activity 3.4	*Promote establishment of renewable energy including biogas network, expert group and information exchanges*
Action 4	**Improve raw material and feedstock**
Activity 4.1	*Promote larger and standard animal farms*
Activity 4.2	*Conduct assessment of biogas including present and future availability of feedstock*
Activity 4.3	*R&D and diversify or define alternative raw materials for biogas*
Action 5	**Improve and enforce policy or regulation on renewable, biogas and environment including environmentally friendly technologies**
Activity 5.1	*Formulate and enforce policies or regulations on environmentally friendly technologies*
Activity 5.2	*Improve and enforce policies on biogas development and management*

4.3.4 Identify Stakeholders and Determine Timelines

4.3.4.1 Identify Stakeholders for TAP Implementation

The biogas stakeholders were identified by matching the identified activities for TAP and mandates and interest of the relevant organisations. Some organisations have been identified and engaged in TNA-BAEF (Annex 1). Other important stakeholders are listed during stakeholder consultation meeting in November 2017. So, the main stakeholder could be summarised in Table 37, and specific one for each activity in Table 38.

Table 43 General stakeholders to biogas

No	Key organisations	Mandate
Public sector		
1	Ministry of Agriculture and Forestry (MAF). In particular, Department of Livestock and Fishery (DLF), Agriculture and Forestry Extension (DAFE), Cooperation (DOC), Personnel and Organisation (DPO) and National Agriculture and Forestry Research Institute (NAFRI)	MAF has the responsibility to oversee the agriculture and livestock affairs. DLF is specifically responsible for feed resources conservation and development. DAFE, DOC, DPO and NAFRI have the responsibility to secure financial resources for implementing their mandates related with feed extension, cooperation, personnel and research, respectively
2	Ministry of Energy and Mines (MEM), particularly Renewable Energy Research Institute (RERI), Department of Energy Business (DEB)	Promotes renewable energy including biogas research and business
3	Ministry of Science and Technology (MST), particularly Renewable Energy and Innovation Research Centre (REIRIC)	Promotes research and deployment of renewable energy including biogas
4	National University of Laos, especially Faculty of Agriculture (FOA), Engineering (FOE), Environmental Science (FES)	Mobilises resources for biogas education and research.
5	Ministry of Planning and Investment (MPI), particular Department of Foreign Aid Management (DFAM) and Investment Promotion (DIP)	Work with development partners and others on biogas financial aids and investment
6	Ministry of Natural Resources and Environment, particularly Department of Environmental Promotion (DEP) and Department of Climate Change (DCC)	DEF promotes environmentally friendly technologies and practices DCC promotes deployment of biogas for climate change mitigation
7	Ministry of Commerce and Industry (MCI), particular Department of Small and Medium Enterprise Promotion (DSMEP)	Promote access to finance and financial support for development of biogas enterprises
8	Public and state enterprise banks and financial institutes	Have a role to provide a loan for a business and investment. However, financing biomass energy has been unprecedented.
Private sector		
9	National/Provincial Chamber of Commerce and Industry (N/PCCI), particularly, energy business association (EBA)	Mobilise resources to support energy entrepreneur's business and capacity building
10	Agriculture, environment, business and economics consulting, construction and engineering firm	Provide consulting service and construct biogas plant
11	Private banks and financial institutes	Have a role to provide a loan for a business and investment. However, financing biomass energy has been unprecedented.
Development partners and other organisations		

12	Development partners (UN organisations, bilateral and multilateral foreign governmental organisations, multi-banks e.g., JICA, ADB, WB)	Provide technical and financial support. However, the support has been limited.
13	NGOs, NPOs on biogas e.g., SNV	Mobilise and provide technical and financial support biogas development

4.3.4.2 Schedule Actions and Activities

The schedule of the actions and activities was defined by TNA project team in consultation with the key stakeholders in November 2017. Nature and scale of the activities, readiness including time, technical and financial capacity of the responsible organisations to perform the activities were considered when scheduling. Consequently, the action for biogas could be scheduled (Annex 5).

The timeframe of the action plan implementation is five years, which is perceived to be suitable and sufficient time for technical and financial preparation including demonstration before full expansion of the biogas throughout the country. The timeframe is divided into two phases. The preparation phase is 3 months, which shall be commenced following approval and during dissemination of TAP to stakeholders. This means this phase would be between May and July 2018. The implementation phase would start from May or June 2018 until December 2022.

4.3.5 Estimate Resources

4.3.5.1 Capacity Building

Capacity building is prerequisite for effective TAP implementation. The technical knowledge and skills gaps of the key stakeholders were identified in the BAEF (Box 5). Furthermore, project management skills of the responsible organisations are also needed to be strengthen.

Box 5: capacity needs for biogas development

1) Feasibility study including financial and economic analysis such as cost and benefits including return on investment,
2) Design, construction and maintenance of biogas plant,
3) Estimate of emission reduction for carbon credits mechanism such as CDM/JCM,
4) Development of bankable proposal for access to finance,
5) Capital market development and management,
6) Research and development of biogas equipment.

4.3.5.2 Estimate Costs for Actions and Activities

The total costs of the actions and activities include 1) the cost for dissemination and consultation including adjustment of the TAP before actual implementation, 2) the cost of each action and activity, and 3) the cost for contingency is US$ 18.47 million. The cost for dissemination and consultation meetings is about US$ 18,000[4]. The cost of the activities implementation including allowance, a consultant fee, travel, meeting and other administrative costs is US$ 16.775 million (Table 45 and

[4] Based on the 3 meetings and 2 days for each meeting, current government daily allowance, a consultant fee, and a meeting including administrative costs

Annex 5). The cost for contingency action is estimated to be 10% of the total activity cost or US$ 1,677,500.

4.3.5 Success Criteria and indicators for Monitoring of the Implementation

Success criteria and indicator for M&E of the TAP implementation identified by TNA project team in consultation and stakeholders consisted of (C&I) of actions (Table 44) and C&I for activities (Table 45).

Table 44 Success Criteria and indicators for Monitoring the Implementation of the TAP on Biogas

No	Actions	Success criteria	Indicators for M&E
1	Expand access to finance	Favourable financial markets and ease of access to biogas developers and users	No. of entrepreneurs/ business that are accessible to finance and financial resources increased
2	Increase the public supports including subsidise to promote larger and standard farm and technologies	The government budget allocated for AF extension increased at least by 50% per year or sufficient for MAF, MEM, MST and MoNRE and line agencies at local levels to perform full mandates on biogas promotion and management	The government budget allocated for biogas promotion and management increased
3	Increase organisational capacity and human resources	- The government, especially MAF, MEM, MST and MoNRE and line agencies at local levels have adequate human and financial resources to fully perform their mandates on biogas development - Private sector including entrepreneurs and famers can run biogas sustainably	Institutional capacity and human resources of MAF, MEM, MST and MoNRE and line agencies at local levels and private sector are strengthened
4	Improve and enforce policy or regulation on renewable, biogas and environment including environmentally friendly technologies	Practical policies renewable, biogas and environment including environmentally friendly technologies are in place and enforced	No. of policies developed
5	Improve raw material and feedstock	At least 3 projects piloted, and optimal biogas feedstock formula or materials defined fur future development	No. of projects piloted, and suitable biogas feedstock formula or alternative materials defined

4.3.6 Summary overview of the action plan for promoting the manure-based biogas

The summary TAP is overall biogas action plan, which derived from integrating all previous sections or works. It includes actions and activities, timeframe, resources and stakeholders to achieve a

sustainable development of the biogas. To ensure effective deployment and diffusion of the biogas; relevant organisations including public, private sector and development partners needs to increase financial investment capacity, technical knowledge and skills, market and prices, quality and quantity of raw materials for feedstock (Table 45).

Table 45 Action plan for more effective and sustainable deployment of the biogas

Action	Activity	Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ Th.)
Action 1	Expand access to finance							
Activity 1.1	Strengthening cooperation between domestic and regional banks and financial institutes (to expand domestic financial markets including lowering interest rate and simply procedures for borrowing)	**Public:** Gov. **Private:** Banks and financial institutes	MOF: BOL MPI: DIP MOIC: SMEPD	Sep 2018-Sep 2022	Undefinable or variable of financial sources. Ineligible or incapable to access to financial Markets.	Expanded financial Markets, and increased no. of projects access to loans.	No. of cooperation, agreements with regional banks and financial institutes increased.	85
Activity 1.2	Increase financial capacity and readiness and of entrepreneurs	**Public:** Gov. **Private:** biomass developers	BOL DIP SMEPD	May 2018-May 2019	Delayed due to insufficient resources	Increased financial access, capital for expansion of biogas	No. of training, project proposal developed, submitted and financed	80
Activity 1.3	Organise financial access dialogue on biogas development including financing	**Public:** Gov. **Private:** biomass developers, Banks and financial institutes	BOL DIP SMEPD	Dec 2018-Dec 2021	Insufficient information, e.g., project feasibility, barriers or analysis. Poor follow up.	Increased no. of network, agreement to move forward project financing or cooperation to access to finance.	No. of dialogue and meetings and no. of biomass investors/ developers participated	75
Action 2	**Increase the public supports including subsidise to promote larger and standard farm and technologies**							
Activity 2.1	Conduct feasibility, impact, trade-off of the public subsidies on biogas and define	**Public:** Gov. and development partners-DPs: WB, ADB, JICA	BOL DIP SMEPD	Sep 2018-Mar 2019	Delayed due to insufficient resources and information about	Inclusive and sufficient information about feasibility for decision making and	Feasibility study conducted	30

Action	Activity	Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ Th.)
	sustainable financial mechanism for biogas development				best practices on feed-in-tariff mechanism	design appropriate feed-in-tariff		
Activity 2.2	M&E and expand a sustainable financial mechanism for biogas development	**Public:** Gov. and DPs: WB, ADB, JICA **Private:** developers, Banks	BOL	May 2019-May 2022	Delayed due to insufficient resources or take time to agree on the feed-in-tariff policies	At least 1 or 2 small biomasses subsidized, or feed-in-tariff implemented	No. of sustainable financial mechanism for biogas developed and applied	16,000
Action 3	**Increase organisational capacity and human resources**							
Activity 3.1	Provide professional training and exchanges on biomass energy development including technologies, access to finance and mitigation	**Public:** Gov. and DPs: WB, ADB, JICA, AusAID, USAID	DEB, DEPP	Dec 2018-Dec 2022	Staff turn-over or shift and inadequate financial support for continuous human resources and capacity building	Relevant organisations and staff received more trainings and capable of development, O&M of biogas.	No. of training, No. of participants attended	80
Activity 3.2	Improve HRD system of the public organisations responsible for biomass energy	**Public:** Gov. and DPs: WB, ADB, JICA, AusAID	DEPP DEB	May 2018-Dec 2022	Insufficient knowledge and skills, leadership and commitment on organisational development	Adequate or at least increased human resources including skills and commitment	HRD system including staff capacity, commitment improved/increased	50
Activity 3.3	Improve biogas energy education and research in high education	**Public:** Gov. and DPs: WB, ADB, JICA, AusAID	NUOL: FOE	Sep 2018-Jun 2019	Insufficient financial and human resources to develop Comprehensive and practical of the curriculum.	Comprehensive and practical curriculum. Increased practical knowledge and skills on biogas	Biogas energy curriculum improved or updated	75
Activity 3.4	Promote establishment of renewable energy including biogas	**Public:** Gov. and DPs: WB, ADB,	BOL DIP SMEPD	Sep 2018-	Low motivation to join working group, network,	Increased knowledge and capacity as a result of exchange	No. and function of working group,	40

Action	Activity	Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ Th.)
	network, expert group and exchanges	JICA, AusAID, USAID		Sep 2021	think-tank and commitment to exchange		network, think-tank established	
Action 4	**Improve raw material and feedstock**							
Activity 4.1	Promote larger and standard animal farms	**Public:** Gov. **Private:** BED	MAF: DoA BED	Oct 2018-Jun 2019	Delayed due to insufficient resources or higher cost due to geographical constraints	Map and feasibility for expansion of farms including agricultural residues	Feasibility team, meetings, data collection and analysis reports	120
Activity 4.2	Conduct assessment of biogas including present and future availability of feedstock	**Public:** Gov. and DPs: WB, ADB, JICA, AusAID, USAID	BOL DIP SMEPD	Jul 2018-Jul 2019	Delayed due to insufficient resources and information about alternative feedstock and technologies	Sufficient information about existing feedstock for design and decide about biomass energy	As 4.1 above	35
Activity 4.3	R&D and diversify or define alternative raw materials for biogas	**Public:** Gov. and DPs: WB, ADB, JICA, AusAID **Private:** BED	MEM, MOST BED	Oct 2018-Oct 2019	As 4.2 above	Detail information about alternative feedstock and feasibility are available for decision making	As 4.1 above	45
Action 5	**Improve and enforce policy or regulation on renewable, biogas and environment including environmentally friendly technologies**							
Activity 5.1	Formulate and enforce policies or regulations on environmentally friendly technologies	**Public:** Gov. and DPs: WB, ADB, JICA, AusAID, USAID	MEM: DEPP MPI: DIP MOF:	Dec 2018-Dec 2019	Insufficient financial resources and knowledge about the feed-in-tariff and impacts	Effectiveness of the policy implementation	Polices including its practicality and inclusiveness	30
Activity 5.2	Improve and enforce policies on biogas development and management	**Public:** Gov. and DPs: WB, ADB, JICA, AusAID, USAID	MAF: DoA, DoF	Dec 2018-Dec 2019	Delayed due to insufficient resources and information	Effectiveness of the policy implementation	Polices including its practicality and inclusiveness	30
	Total							**16,775**

4.4. Action plan for agricultural residues-based electricity

4.4.1 Description about agricultural residue-based electricity

Agricultural residues-based electricity is a second-generation biofuel which crops, and plants dry matter will be used as the main feedstock for electricity production. The production process of electricity includes feedstock preparation and storage, loading and burning feedstock in the boiler systems to produce steam that runs the turbine to produce electricity.

Saw dust, rice husk and corn cobs only are about 580,000 tonnes, which can generate energy of about 8.5 million GJ or 200 KTOE[5] per year (MEM, 2011). The government expected that by 2020 and 2025, the biomass power plant would have electricity production capacity of 60 MW and 80 MW, respectively.

Currently, there are few investors/developers and biomass plants with total capacity of less than 50 MW. Those biomass plants are 40 Kw corn cobs-based electricity scheme in Xayaboury province, 160 Kw rice husk energy plant in Champasack province, and two biomass plants, 30 MW and 9.7 MW[6]using sugarcane's bagasse feedstock in Attapue and Savanakhet province, respectively.

This indicated that, despite the potential and the government promotes, biomass energy has not been fully exploited. This TAP is believed to be a guide or push for developing and sustaining biomass energy in Laos.

4.4.2 Development goal and target

The goal of this TAP is to enhance development and sustainability the biomass energy, so that increase production capacity to 58 MW by 2025.

4.4.3 Selection of measures to include in the TAP

Selection of measures to be included in the TAP were identified based on the BAEF, especially identified barriers and measures to overcome barriers. The identified barriers and measures are summarised in the section 4.4.3.1 and Table 39. Detail process and method for selection of action and activities are explained in section 4.4.3.2 and 4.4.3.3, respectively.

4.4.3.1 Summary of Barriers and Measures to Overcome Barriers

BAEF discovered that there are 9 critical barriers that impede development and sustainability of the biomass energy. Five of them are financial and economic barriers, two are market related barriers and the rest are policies and capacities (Table 39).

Table 46 Barriers and measures to overcome barriers to biomass energy development

[5] https://www.asiabiomass.jp/english/topics/1502_01.html
[6] http://www.oeaw.ac.at/forebiom/WS2lectures/02-02-NLAEMSAK.pdf

Categories	Barriers	Measures to overcome barriers
Economic and financial	1. Low profit and/or not economic and financial feasible	1. Increase profit and/or not economic and financial feasible (see also measure 2, 6 and 8)
	2. High investment cost, especially installation/start-up, O&M cost	2. Reduce investment cost, especially installation/start-up, O&M cost
	3. Unclear financial and economic feasibility to establish plantation to supply raw materials, co-firing system	3. R&D of financial and economic feasibility to establish plantation to supply raw materials, co-firing system
	4. Undeveloped capital market and limited access to financial resources	4. Expand access to financial resources
	5. Inadequate public financial support including financial and economic incentives for extension	5. Increase the public financial support including financial and economic incentives and subsidy for extension
Market failures and imperfection	6. Low renewable energy price	6. Increase renewable energy price
	7. Small and variable agricultural and forestry production and supply of raw materials	7. Sustain agricultural and forestry production and supply of raw materials
Policy, legal and regulatory	8. Insufficient policies on biomass energy promotion, especially feed-in tariff or adder	8. Develop and enforce policies on biomass promotion, especially feed-in tariff or adder
Institutional and organisational capacity and human skills	9. Limited technical knowledge and skills on biomass energy extension and development	9. Increase technical knowledge and skills on biomass energy extension and development

4.4.3.2 Selection of Measures for Action

Selection of measures for TAP were conducted by converting the identified measures into actions. The conversion of measures to actions were performed by TNA project team by breaking down measures into sub-measures or actionable action, and then assessing them by scoring according to effectiveness, efficiency, cost-benefit, impact and necessity of the measures. Furthermore, the preliminary results of the assessment and selection were validated, and actions were agreed in the stakeholder consultation meeting in March 2017. The actions for TAP are as in Table 40 below.

Table 47 Selected measures as actions for biomass energy development

Categories	Measures to overcome barriers	Selected measures for action
Economic and financial	1. Increase profit and/or not economic and financial feasible (see also measure 2, 6 and 8)	√
	2. Reduce investment cost, especially installation/start-up, O&M cost	X
	3. R&D of financial and economic feasibility to establish plantation to supply raw materials, co-firing system	√
	4. Expand access to financial resources	√

Categories	Measures to overcome barriers	Selected measures for action
	5. Increase the public financial support including financial and economic incentives and subsidy for extension	√
Market failures and imperfection	6. Increase renewable energy price	√
	7. Sustain agricultural and forestry production and supply of raw materials	√
Policy, legal and regulatory	8. Develop and enforce policies on biomass promotion, especially feed-in tariff or adder	√
Institutional and organisational capacity and human skills	9. Increase technical knowledge and skills on biomass energy extension and development	√

4.3.5.3 Selection of Activities for TAP

The activities for the actions were selected through a stakeholder consultation process. Firstly, the activities were listed by the TNA project team considering practicality, logics, relevance and impacts and influences of the activities to achieve the actions. The listed activities were then consulted, elaborated and agreed with the stakeholders, particularly Department of Energy Policy and Planning (DEPP) and Renewable Energy Research Institute (REEI) of MEM in November 2017. Consequently, series of activities for each action finalised as in Table 41.

Table 48 Selected activities for actions on biomass energy development

Action 1	**Expand access to finance**
Activity 1.1	*Strengthening cooperation between domestic and regional banks and financial institutes (to expand domestic financial markets including lowering interest rate and simply procedures for borrowing)*
Activity 1.2	*Increase financial capacity and readiness and of entrepreneurs*
Activity 1.3	*Organise financial access dialogue on biomass financing*
Action 2	**Increase and subsidise renewable energy price and apply policies on feed-in tariff or adder**
Activity 2.1	*Conduct feasibility, impact, trade-off and define appropriate feed-in-tariff or adder mechanism*
Activity 2.2	*Piloting and M&E of feed-in-tariff or adder mechanism*
Action 3	**Increase organisational capacity and human resources**
Activity 3.1	*Provide professional training and exchanges on biomass energy development including technologies, access to finance, policy and climate change mitigation*
Activity 3.2	*Improve human resources development system of the public organisations responsible for biomass energy*
Activity 3.3	*Improve biomass energy education and research in high education*
Activity 3.4	*Promote establishment of renewable energy including biomass network, think-tank and information exchanges*
Action 4	**Improve raw material and feedstock**
Activity 4.1	*Enhance agriculture and forestry production e.g., larger farms*

Activity 4.2	*Conduct assessment of biomass feedstock availability and future projection*
Activity 4.3	*Diversify and R&D of substitute or alternative raw materials*
Action 5	**Develop policy or regulation on renewable including biomass promotion**
Activity 5.1	*Formulate a policy or regulation on feed-in-tariff*
Activity 5.2	*Formulate a policy or regulation on the use of agriculture and forestry residues*

4.4.4 Identify Stakeholders and Determines Timelines

4.4.4.1 Identify Stakeholders for TAP Implementation

The stakeholders to implement or support the implementation of the TAP could be identified by reviewing and matching the identified activities and mandates or interest of relevant organisations. Some organisations were already identified during the first and second phase of TNA as well as TNA and BAEF. Furthermore, some more stakeholders were listed during consultation meeting on the TAP in November 2017. The Table 42 below provides a list of key stakeholders, and some more stakeholders are included the summary TAP, Table 43.

Table 49 General stakeholders to biomass energy

No	Key organisations	Mandate and performance
Public sector		
1	Ministry of Energy and Mines (MEM), particularly Department of Energy Policy and Planning (DEPP), Energy Business (DEB) and Renewable Energy Research Institute (RERI),	Promotes renewable energy including biomass energy policy, planning, business and research
2	Ministry of Science and Technology (MST), particularly Renewable Energy and Innovation Research Centre (REIRIC)	Promotes research and deployment of renewable energy including biomass
3	Ministry of Agriculture and Forestry (MAF). In particular, Department of Agriculture (DOA), Forestry (DOF), Agriculture and Forestry Extension (DAFE and National Agriculture and Forestry Research Institute (NAFRI)	MAF oversees agricultural and forestry affairs. DOA, DOF, DAFE and NAFRI have the responsibility to manage agriculture and forestry harvest residues, which are the feedstock of the biomass energy
4	National University of Laos, especially Faculty of Agriculture (FOA), Forestry (FoF), Business and Economics (FOBE), Engineering (FOE), Environmental Science (FES)	Biomass energy education and research
5	Ministry of Planning and Investment (MPI), particular Department of Foreign Aid Management (DFAM) and Investment Promotion (DIP)	Manage financial aid and investment including biomass investment licence (for large project or >15 MW)
6	Ministry of Natural Resources and Environment, particularly Department of Environmental Promotion (DEP) and Department of Climate Change (DCC)	DEF promotes environmentally friendly technologies and practices. DCC promotes deployment of technologies for climate change mitigation

7	Ministry of Commerce and Industry (MCI), particularly Department of Small and Medium Enterprise Promotion (DSMEP) and Business Registration (DBR)	Promote access to finance and financial support for development of biogas enterprises and licensing smaller scale project (≤15 MW), respectively
8	Public and state enterprise banks and financial institutes	Have a role to provide a loan for a business and investment. However, financing biomass energy has been unprecedented.
Private sector		
9	National/Provincial Chamber of Commerce and Industry (N/PCCI), particularly, energy business association (EBA)	Represents and promote biomass energy entrepreneur's business and capacity building
10	Agriculture, environment, business and economics consulting firm	Provide consulting service in various aspects of biomass development. However, a number of firms and services that specifically serve biomass have been limited.
11	Banks and financial institutes	Provide a loan for a business and investment. However, financing biomass energy has been unprecedented.
Development partners and other organisations		
12	Development partners (UN organisations, bilateral and multilateral foreign governmental organisations e.g., JICA, ADB, WB)	Provide technical and financial support. However, the support has been limited.
13	NGOs, NPOs to promote the biomass energy	NGOs or NPOs to promote the biomass energy do not exist

4.4.4.2 Schedule Actions and Activities

The schedule of the actions and activities was defined by TNA project team in consultation with the key stakeholders in November 2017. Logics and sequences, nature and scale of the activities, readiness including time, technical and financial capacity of the responsible organisations to perform the activities were considered when scheduling. As a result, the schedule of the action for biomass was formulated (Annex 5).

The timeframe of the action plan implementation is five years, which is perceived to be suitable and sufficient time for technical and financial preparation including demonstration before full expansion of the biomass energy throughout the country. The timeframe is divided into two phases. The preparation phase is 3 months, which shall be commenced following approval and during dissemination of TAP to stakeholders. This means this phase would be between March to May 2018. The implementation phase would start from May or June 2018 until December 2022.

4.4.5 Estimate Resources

4.4.5.1 Capacity Building

Capacity building, especially technical knowledge and skills needs were identified during BAEF. To implement the TAP effectively, the responsible organisations are also needed to be strengthen their project management skills. So, all capacity to be built could be summarised in the Box 6 below.

Box 6: capacity needs for biomass energy development

1. Feasibility study including financial and economic analysis such as cost and benefits including return on investment,
2. Operation and management of biomass energy and its value change businesses,
3. Design, construction and maintenance of biomass energy plant,
4. Estimate of emission reduction for carbon credits mechanism such as CDM/JCM,
5. Development of bankable proposal for access to finance,
6. Capital market development and management,
7. Research and development of feedstock including alternative feedstock such as energy grasses and plants,
8. Development of comprehensive policy to facilitate biomass energy business development, access finance and technologies, promote renewable energy prices and management of agriculture and forest restudies in sustainable manner,
9. Human resource development system including human resource or capacity development plan, staff knowledge management, monitoring and evaluation HRD including financing mechanism.

4.4.5.2 Estimate Costs for Actions and Activities

Total costs for implementation of the TAP is US$ 29.58 million. It includes the cost for dissemination and consultation of the TAP before actual implementation, US$ 18,000. Secondly, it is the cost of the implementation of the actions and activities, which is US$ 26.875 million (Table 51 and Annex 5). Thirdly, it includes the cost for contingency which was estimated to be 10% of the total cost or US$ 2,687,500.

4.4.6 Success Criteria and indicators for Monitoring of the Implementation

Success criteria and indicators for monitoring of the TAP implementation identified by TNA project team and key stakeholders in November 2017 divided into two levels: actions and activities as well as output-outcome and input level. Those C&I of the actions and activities were summarised in Table 50 and Table 51, respectively.

Table 50 Success Criteria and indicators for Monitoring of the Implementation of the TAP on Biomass

No	Actions	Success criteria	Indicators for M&E
1	Expand access to finance	Favourable financial markets and ease of access to biomass developers and owners	No. and proportion of biomass projects that are accessible to finance increased and No. of

			finance inaccessible projects reduced
2	Increase and subsidise renewable energy price and apply policies on feed-in tariff or adder	The government budget allocated for AF extension increased at least by 50% per year or sufficient for MAF, MEM, MST and MoNRE and line agencies at local levels to perform full mandates on biogas promotion and management	The government budget allocated for biogas promotion and management increased
3	Increase organisational capacity and human resources	- The government, especially MAF, MEM, MST and MoNRE have clear responsibilities on biomass energy promotion and management (also resulted from action 5 implementation) - The government, especially MAF, MEM, MST and MoNRE and line agencies at local levels have adequate human and financial resources to fully perform their mandates on biomass development - Private sector including developers and owners can run biomass business sustainably	Institutional capacity and human resources of MAF, MEM, MST and MoNRE and line agencies at local levels and private sector are strengthened
4	Improve raw material and feedstock	At least 3 projects on biomass feedstock formula and alternative materials piloted and be a good model for promotion and expansion	No. of projects piloted, and suitable biomass feedstock formula or alternative materials defined or developed
5	Develop policy or regulation on renewable including biomass promotion	- Practical policies renewable, biogas and environment including environmentally friendly technologies are in place and enforced - Policies on feed-in tariff or adder studied, developed and applied	No. of policies developed, evaluated and updated

4.4.7 Summary Overview of the action plans for (agricultural residues-based) biomass energy

Through the identification of actions and activities, timeframe, resources need and stakeholders; TAP for biomass energy could be summarised in the Table 51. The summary TAP summed up actions and activities, funding sources, responsible organisation, timeframe, budget for the implementation, risks and C&I for M&E of the TAP implementation. This TAP will be for five years and executed by MAF, MEM and MoNRE with total investment cost of US$ 29.58 million.

Table 51 Biomass development action plan

Action	Activity	Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ Th.)
Action 1	**Expand access to finance**							
Activity 1.1	Strengthening cooperation between domestic and regional banks and financial institutes (to expand financial Markets)	**Public:** Gov. **Private:** Banks and financial institutes	MOF: BOL MPI: DIP MOIC: SMEPD	May 2018-Dec 2022	Undefinable or variable of financial sources. Ineligible or incapable to access to financial Markets.	Expanded financial Markets, especially available and affordable financial resources for biomass business. Increased no. of projects access to loans.	No. of cooperation, agreements with regional banks and financial institutes increase.	85.00
Activity 1.2	Increase financial capacity and readiness of entrepreneurs to access to finance	**Public:** Gov. **Private:** biomass developers	BOL DIP SMEPD	Sep 2018-Sep 2022	Delayed due to Insufficient resources	Increased financial access, capital for expansion of biomass energy.	No. of training, project proposal developed, submitted and financed	80.00
Activity 1.3	Organise financial access dialogue on biomass financing	**Public:** Gov. **Private:** biomass developers, Banks and financial institutes	BOL DIP SMEPD	Jan 2019-Jan 2022	Insufficient information, e.g., project feasibility, barriers or analysis. Poor follow up.	Increased no. of network, agreement to move forward biomass project financing or cooperation to access to finance.	No. of dialogue and meetings and no. of participated biomass investors/ developers	75.00
Action 2	**Increase and subsidise renewable energy price and apply policies on feed-in tariff or adder**							
Activity 2.1	Conduct feasibility, impact, trade-off and define appropriate feed-in-tariff or adder mechanism	**Public:** Gov. and development partners e.g., WB, ADB, JICA	BOL DIP SMEPD	Jul 2018-Jul 2019	Insufficient financial resources and information for R&D	The studies are disseminated and usable for deciding about the mechanism	No. of and resources for studies	30.00
Activity 2.2	Piloting and M&E of feed-in-tariff or adder mechanism	**Public:** Gov. and development	BOL	May 2019-	Insufficient financial resources and	No. of pilot projects and expansion	No. of pilot projects	26,000

Action	Activity	Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ Th.)
		partners e.g., WB, ADB, JICA **Private:** biomass developers, Banks		May 2022	information for implementation			
Action 3	**Increase organisational capacity and human resources**							
Activity 3.1	Provide professional training and exchanges on biomass energy development including technologies, access to finance, policy and mitigation	**Public:** Gov. and development partners e.g., WB, ADB, JICA, AusAID, USAID	DEB, DEPP	Oct 2018-Oct 2022	Staff turn-over or shift and inadequate financial support for continuous human resources and capacity building	Relevant organisations and staff are capable of promoting and facilitating biomass energy Effective training.	No. of training, No. of participants attended and training effectiveness	80.00
Activity 3.2	Improve human resources development system of the biomass energy responsible organisations	**Public:** Gov. and development partners e.g., WB, ADB, JICA, AusAID	DEPP DEB	May 2018-Jun 2022	Insufficient knowledge and skills, leadership and commitment on organisational development	Adequate or at least increased human resources including skills and commitment	Improved capacity building, more effective recruitment, increased staff commitment and learning culture	50.00
Activity 3.3	Improve biomass energy education and research in high education	**Public:** Gov. and development partners e.g., WB, ADB, JICA, AusAID	NUOL: FOE	Jul 2018-Jul 2022	Insufficient financial and human resources to develop Comprehensive and practical curriculum.	Comprehensive and practical biomass curriculum. Increased practical knowledge and skills on biomass energy	Biomass energy curriculum	75.00
Activity 3.4	Promote establishment of renewable energy	**Public:** Gov. and development partners e.g., WB,	BOL DIP SMEPD	Oct 2018-	Low motivation to join working group, network, think-tank	Increased knowledge and capacity as a result of exchange	No. and function of working group,	40.00

Action	Activity	Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ Th.)
	including biomass network, think-tank and information exchanges	ADB, JICA, AusAID, USAID		Oct 2022	and commitment to exchange		network, think-tank established	
Action 4	**Improve raw material and feedstock**							
Activity 4.1	Study feasibility of large farm/merging farm	**Public:** Gov. and development partners e.g., WB, ADB, JICA, AusAID, USAID	BOL DIP SMEPD	Aug 2018-Aug 2019	Delayed due to insufficient resources or higher cost due to geographical constraints	Map and feasibility for expansion of farms including agricultural residues	Feasibility team, meetings, data collection and analysis reports	120.00
Activity 4.2	Conduct assessment of biomass feedstock	**Public:** Gov. and development partners e.g., WB, ADB, JICA, AusAID, USAID	BOL DIP SMEPD	Aug 2018-Aug 2019	Delayed due to insufficient resources and information about alternative feedstock and technologies	Sufficient information about existing feedstock for design and decide about biomass energy schemes	As 4.1 above	85.00
Activity 4.3	R&D of substitute or alternative raw materials	**Public:** Gov. and development partners e.g., WB, ADB, JICA, AusAID, USAID	MEM: RERI MST: RRII MAF: DOA	Dec 2018-Dec 2019	As 4.2 above	Sufficient information about alternative feedstock and feasibility for decide about development	As 4.1 above	95.00
Action 5	**Develop policy or regulation on renewable including biomass promotion**							
Activity 5.1	Formulate a policy or regulation on feed-in-tariff	**Public:** Gov. and development partners e.g., WB, ADB, JICA, AusAID, USAID	MEM: DEPP MPI: ERI, DIP MOF:	Aug 2018-Aug 2019	The government has not enough budget to implement the feed-in-tariff schemes. Dependent on the subsidy	A practical and attractive feed-in-tariff policy, prices and subsidies. At least 1 biomass project is piloted.	Feasibility report and policy on feed-in-tariff	30.00

Action	Activity	Sources of funding	Responsible body and focal point	Time-frame	Risks	Success criteria	Indicators for monitoring of implementation	Cost (US$ Th.)
Activity 5.2	Formulate a policy or regulation on the use of agriculture and forestry residues	**Public:** Gov. and development partners e.g., WB, ADB, JICA, AusAID	MEM: RERI MST: RRII MAF: DOA	Dec 2018-Dec 2019	The extent of agricultural harvest residue removal and retention on site could not be precisely definable. Hence, impact on soils or requires long-term monitoring.	A practical policy on residue management.	Assessment report on the impacts of the residue removals. A policy on residue management.	30.00
	Total							**26,875**

Chapter 5 Management Planning

5.1 Risks and Contingency Planning

5.1.1 Overall risks and contingency actions

It is common that the implementation of an activity may involve and result a risk. So, do the TAPs, which were anticipated to have cost, schedule and performance risk. However, those risks could be mitigated by implementation contingency actions outlined in the Table 52 and 53 as follows.

Table 52 Risks and contingency actions

Risk items	Description	Contingency actions
Cost risk	There may be a cost risk, which may result from unexpected events, and caused budget deficiency or remains. In addition, the estimated cost could be a bit lower and higher than actual needs in the cause of implementation.	1. Conduct regular M&E of the action plan implementation including budget use, and adjust as appropriate 2. Increase awareness about risks and contingency 3. Spare 10% of the action plan budget for addressing contingency 4. Enhance organisational capacity, staff skills, policy and decision procedure to be ready and clear for contingency response 5. Conduct examination and implementation of a social and environmental plan.
Schedule risk	The schedule, can be delayed since financial and human resources may not be secured on time. Furthermore, although the financial and resources are in place, there could be which may result from unexpected events, and caused budget deficiency or remains. In addition, the estimated cost could be a bit lower and higher than actual needs in the cause of implementation.	
Performance risk	Implementation of the action plan may encounter performance risk; especially the goals of the actions are not attained, and benefits are not being delivered, which may result from uncontrolled factor, limited capacity or conflict. Moreover, the implementation of the action plan may cause impact or conflict among stakeholders, who may have conflict of interest etc.	

5.1.2 Specific risks of actions and contingency actions

Table 53 Specific risks of actions and contingency actions

No	Actions	Risks	Contingency actions
1	**Increase budget and resources mobilisation**	**Responsible organisations may not be able to secure financial resources on time or adequately due to:** 1. **Public budget deficit,** 2. **Variable international financial pledge,**	1. **Enhance capacity and commitment of the organisations in charge to mobilise and access to financial support** 2. **Increase engagement and provision of information** about

No	Actions	Risks	Contingency actions
		3. **Small private sector and limited** 4. **Limited capacity-know-how of the responsible organisations**	the technologies **for decision makers** 3. **Improve cooperation and coordination among stakeholder and with development partners, donors and private sector**
2	**Expand access to finance**	**1. Limited access to finance due to high cost and/or financially and economically not viable** **2.** E**ntrepreneurs have limited financial capacity** including collateral, reliable business's financial management system **and human resources to develop financeable projects**	**Implement the contingency measures of the Action 1 and 3**
3	**Increase human resource**	1. **The responsible organisations may not have capacity or sufficient financial resources to implementation of full capacity building programmes as needed** including following up 2. **Trainings are not provided to the right people** 3. Less practical trainings due to limited appropriate methods and training materials	1. **Implement contingency measures for action 1 above** 2. **Research and implement cost-effective including internal or self- capacity building** 3. **Increase commitment to secure financial resources** 4. **Improve coordination and synergy of capacity development activities among stakeholders, and between HR demand and supply side** 5. **Improve HRD and capacity development plan, staff knowledge management**
4	**Increase technologies including equipment,** tools and **facilities**	**As the risk of the action 1**, 2, **3** and 4	**Implement the contingency actions of the action** 1, 2, 3 and 4
5	Research and improve **information and awareness** about the **technologi**es **practices and guidelines**	**As the risk of the action 1 and 3**	**Implement the contingency actions of the action 1 and 3**
6	**Develop legal framework on the technologies**	1. **As the risks of the Action 1** and 3 2. **Unclear mandates of the responsible organisation on the management**	1. **Implement contingency measures of the Action 1** and 3

No	Actions	Risks	Contingency actions
		3. Insufficient platform to oversee alignments and/or overlapping among the relevant laws and policies	2. Establish a platform to oversee alignments and/or overlapping among the relevant laws and policies

Chapter 6 Next Steps

Following approval of the TAPs, the next steps, which is immediate requirement and critical for the TAP implementation, MoNRE shall work with MAF and MEM to carry out following actions:

1. Issuing an instruction to implement the TAPs including assigning focal point to for the implementation of the TAPs,
2. Disseminate the TAPs to stakeholders including potential donors, and
3. Develop project proposals based on the project ideas

Furthermore, MoNRE shall work with MAF and MEM shall immediately implement activities that capacity and available resources allow such as HRD system improvement including HRD planning and internal or self-learning, development of project proposal for the government funding, strategies and plans. However, stronger leadership including initiatives and commitments shall be ensured in order to fulfil the actions.

6.1 Project Ideas for climate change mitigation in the forestry sector

As a next step and based on mutual meeting between DCC and DoF in November 2017, two important project ideas were chosen to be developed for climate change mitigation in the forestry sector.

Table 54 Project Ideas for climate change mitigation in the forestry sector

Project 1	**Piloting Public Private-Partnership (PPP) for Effective Protected Area Management (EPAM)**
Technology	PPP-EPAM for national protect areas in Nam Ou, Nam Ha, Nam Ngum, Nam Leek, Nam Kading, Xe Banhieng, Xe Set, Xe Kong river basin.
Development goals and targets	Develop PPP-EPAM for national protect areas in Nam Ou, Nam Ha, Nam Ngum, Nam Leek, Nam Kading, Xe Banhieng, Xe Set, Xe Kong river basin
Location	8 provinces
Main activity	1. Integrated water resources management planning 2. Forest regeneration and restoration 3. Law enforcement (forest conversion, illegal logging)
Benefits and beneficiary	Key benefits: - Natural resources conservation and GHG reduction (from forest encroachment including illegal logging and forest conversion, and restoration of degraded forests) - Sustain water for energy production - Reduce risks related to landslide and drought Key beneficiary:

	- The government: - Hydropower developers - Local communities:
Responsible body	Department of Forestry (DOF), Ministry of Agriculture and Forestry (MAF)
Timeframe	4 years. 2018-2021
Cost (US$)	6,540,000
Business model	Public-Private Partnership-PPP. The government's in-kind support and ensure policy measures. Private sector, especially hydropower developers in a river basin cover most of the management costs by share the cost among them.
Project 2	**Sustainable Community-Based Forest Management (for mitigation)**
Technology	Sustainable Community-Based Forest Management
Development goals and targets	Regeneration and restoration of 1 million ha of village forests
Location	18 provinces
Main activity	1. Forest regeneration and restoration 2. Law enforcement (forest conversion, illegal logging)
Benefits and beneficiary	Key benefits: - Natural resources conservation and GHG reduction (from forest encroachment including illegal logging and forest conversion, and restoration of degraded forests) - Reduce risks related to landslide and drought - Increase ecosystem services for poverty reduction and local economy Key beneficiary: - The government: - Local communities:
Responsible body	Department of Forestry (DOF), Ministry of Agriculture and Forestry (MAF)
Timeframe	3.5 years. 2018-2020
Cost (US$)	4,400,000
Business model	Community-based resources management

6.2 Project Ideas for mitigation in the agriculture sector

As a next step and based on mutual meeting between DCC and DoA and DoLF in November 2017, two important project ideas were chosen to be developed for climate change mitigation in the agriculture sector.

Table 55 Project Ideas for climate change mitigation in the agriculture sector

Project 1	**Biogas from slaughterhouse waste through the country**
Technology	200 m3 digester biogas plant. The biogas plant would supply energy for heating, boiling and lighting in the slaughterhouses
Development goals and targets	18 biogas plants to be developed for 18 slaughterhouses through the country.
Location	18 provinces
Benefits and beneficiary	Key benefits: - Pollutions reduction (odder, waste water, and GHG) - Increase energy saving and cost - Promotion sanitation and healthy environment Key beneficiary: - Slaughterhouse owners: - Surrounding community:
Responsible body	Department of Livestock and Fishery (DOLF), Ministry of Agriculture and Forestry (MAF)
Timeframe	3.5 years. 2018-2021
Cost (US$)	1,440,000
Business model	Public-Private Partnership-PPP. The government subsidies 30% of the cost, while slaughterhouse owners cover the rest.
Project 2	**Biomass from agriculture and forestry harvest residues**
Technology	Biomass Plant (flexible to use agriculture and forestry pellets) for electricity generation in the agriculture manufacture and local communities.
Development goals and targets	2 and 3 MW Biomass Plant
Location	2 MW and 3 MW biomass plant in the north and southern, respectively
Benefits and beneficiary	Key benefits: - Pollutions and GHG reduction (from open burning of corn cobs) - Increase renewable energy saving and cost Key beneficiary: - Public and private - Communities
Responsible body	Renewable Energy Research Institute (RERI), Ministry of Energy and Mines (MEM)
Timeframe	3.5 years. 2018-2021
Cost (US$)	13,000,000
Business model	Public-Private Partnership-PPP. The government subsidies 50% of the cost, while private sector covers the rest.

Chapter 7: Conclusion

The action plans of the following eight mitigation technologies or practices in the forestry and the agriculture sector were developed through a consultation process.

1. Effective protected area management (PAM)
2. Sustainable community forest management (SCFM)
3. Optimal or sustainable plantation forests
4. Optimal agroforestry
5. Animal feed improvement
6. Organic farming
7. Biogas
8. Biomass (agricultural residue-based energy)

Ministry of Natural Resources and Environment (MoNRE), particularly Department of Climate Change (DCC) including TNA project team facilitated the development and consultation with the climate change technical working group (CC-TWG) and stakeholders. Following a Barrier Analysis and Enabling Framework (BAEF) of the eight mitigation technologies; actions and activities, funding sources, responsible organisations, timeframe, risks, budget, and success criteria and indicators for M&E for the TAP were identified, assessed, selected, and initial draft of Technology Action Plan (TAP) was formulated by DCC including TNA project team. Followed by the stakeholder consultation on the draft of TAP in March and November 2017, review and feedback by stakeholders as well as by AIT, DTU-UNEP, and improvement, the final TAP was approved.

The TAP includes actions and activities, funding sources, responsible organisations, timeframe, risks, success criteria and indicators for M&E, human resources and financial needs for implementation of the TAP. In overall, the most important actions are strengthening capacity building of stakeholders, especially MAF, MEM and MoNRE to full perform their mandates on the promotion and management of the eight areas for climate change mitigation and environmental protection as well as socioeconomic development. Improve cooperation and enhance to international supports and strengthen private sector participation and access to finance resources for development and deployment of the capital market technologies such as biomass, biogas, commercial plantation and agroforestry are equally important. In addition, to ensure sustainability and pace of development, it is necessary to develop and implement policies, information, best practices and reference projects.

The TAPs were scheduled for five years, starting from mid of 2018 to the end of 2022. Total costs for implementation of the TAPs on climate change adaptation in the forestry and agriculture sector are US$ 76.30 and 58.78 million, respectively.

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ReMayk: WG=working group. PT=project team. WS=workshop attendant. INT=interview

Annex 2 Assessment of the measures to include into the TAP for climate change mitigation in the forestry sector

1. Effective protected area management-EPAM

Measures	Criteria and scores considered in the selection of the measures actions to include in the TAP
Improve the public budgeting effectiveness and efficiency	**Overall score: 18** Effectiveness: *3.* Improving the public/the government budgeting is a challenge considering MPI's current capacity and insufficient information about best practices on the national economic model and the public budgeting. In addition, limited capacity and cooperation of the other public organisations on project feasibility study and M&E may prevent the effectiveness of implementation of this measure. Efficiency: *4.* There may not be large investment in implementing this measure, except studies and develop best public budgeting models. In contrast, improve the effectiveness and efficient of the budgeting would increase the public investment projects and save resources. Cost-benefit: *3.5.* Considering effectiveness and efficiency. Impact: *2.5.* Increase public revenue and effectiveness of budget allocation may not significantly increase the budget for EPAM since demand for the public demand and deficit may remain high in future. Secondly, the increase of public revenues has not accompanied with the increased budget for PAM. Necessity: *5.* Although it may not increase the government budget for PAM much, but it is very necessary since a majority of NPAs are limited. Importantly, it would have great and wider impact on the national socioeconomic development.
Maintain the public budget for EPAM	**Overall score: 20** Effectiveness: 3. This measure is attainable as it is a common and annual activity which NPA responsible organisations are capable preparing project proposals for public investment. Efficiency: 5. Only a small amount of fund is needed to develop project proposals, except data collection, meetings and some administrative costs, which possibly less than 15,000 a year. There may be some investments such as studies on funding sources and development of financeable project proposals including good financial and economic analysis to convince an investment and financial support, but cost may not be high compare to funds that possibly be secured. Importantly, it also deems high efficient considering cost and benefit that NBCAs possibly generate. Cost-benefit: 4. The financial return could be double if PAs are fully, effectively and sustainably exploited. However, it is unlikely that PAM would reach that level or fully effective. Impact: 3. The public budget has been deficit, and it is anticipated future, it is unlikely that the public budget for PAM would be significantly increased. So, moderate increase of the budget for PAM means moderate impact. Necessity: 5. Although the government budget for PAM is small, but it is very necessary since the majority of NPAs rely on the government budget and there is limited other funding source. Without the government budget, many PAM activities could be halted.
Increase resources mobilisation	**Overall score: 20** Effectiveness: *4.* Considering current capacity of PAM responsible organisations, there is high possibility to achieve this measure. However, it is challenged to fully access to international financial support as it could be variable.

	Efficiency: *5.* There may be large investments, except studies on funding sources, development of financeable project proposals including good financial and economic analysis to convince an investment and financial support. The benefit would be very high compare to financial support to be obtained. Cost-benefit: 4. The financial return could be double if PAs are fully, effectively and sustainably exploited. However, it is unlikely PAM would reach that level or fully effective. Impact: 3. Necessity: 5. Although the government budget for PAM is small, but it is very necessary since the majority of NPAs rely on the government budget and there is limited other funding source. Without the government budget, many PAM activities could be halted.
Increase revenue from ecosystem services and reinvest in EPAM	Overall score: 19.5 Effectiveness: 4. Based on current and future capacity of the responsible organisations, implementation of income generating activities such as ecotourism, NTFP could be effective. Efficiency: 3.5. Investing in promoting sustainable tourism and NTFP could be highly efficient, considering potential revenue that ecotourism and NTFP may generate to local economy compare to resources to invest in product development and Marketing. However, the direct income to be collected and allocated for NPA may be moderate based on current and future fee or tax to be collected for NPA. Cost-benefit: *3.5.* The financial return could be double if PAs are fully, effectively and sustainably exploited. However, it is unlikely PAM would reach that level or fully effective. Impact: *3.5.* Revenue from ecosystem service could be high although income from carbon credit may be variable. Income from ecotourism and non-timber forest products, for example, could possibly be double if the products are well-promoted and Marketed. Necessity: *5.* It is highly and immediately needed as budget for EPAM is far shortfall. The government budget is not enough for EPAM, and income from other sources are variable or uncertain.

Research and develop an effective and sustainable financial mechanism for EPAM	**Overall score: 17** **Effectiveness: *4.*** Although it could be challenge or there may not be a novel financial mechanism, for example, to realise PAM self-sufficient, but this measure is implementable and attainable. **Efficiency: *3.*** The efficiency of the investing in the implementation of this measure could be moderate to high. It requires certain technical and some financial resources for R&D. However, its impact could be variable, depending on the actual enforcement and available resources to finance according to the mechanism. **Cost-benefit: *3.*** As efficiency is moderate. **Impact: *3.*** It is believed that the budget shortfall and implementation are the most critical barrier to EPAM. Despite the good financial mechanism is useful, it may not have great impact considering budget and capacity constraints or low commitment in the implementation, which are anticipated to occur in future. **Necessity: *3.*** It is highly and immediately needed as budget for EPAM is shortage and unclear what is the best way and how to effectively and sustainably finance NPAs. However, without an effective or best practice, the existing PAM financing mechanism which include the public and private funding is continual. **Feasibility: *4.*** Considering existing and capacity to be gained in future, R&D an effective mechanism doable.
Develop legal framework for EPAM (e.g., on PA conversion and offset, right and participation of local people, business and fee/tax)	**Overall score: 18.5** **Effectiveness: *4.*** Considering existing and capacity to be gained in future, the development of the legal framework is attainable. **Efficiency: *3.5.*** It requires certain technical and some financial resources for R&D. However, investing in the legal framework development is possibly efficient, especially in the long term. **Cost-benefit: *3.5.*** especially in the long term and when budget, skills and commitment readiness is high. **Impact: *3.5.*** Moderate to high, despite the good legal framework exists, considering current low law enforcement effectiveness, budget and capacity constraints, Poor know-how and no commitment, which are anticipated to persist in future. **Necessity: *4.*** It is highly and immediately needed as EPAM issues are unclear what is the best way and how to effectively solve problems. And without the legal framework, it is hard to realise EPAM.

Enhance law enforcement effectiveness	**Overall score: 20.5** **Effectiveness: *3.5.*** Considering current and future law enforcement effectiveness, budget and capacity constraints, poor know-how and no commitment. There are challenges to realise effective law enforcement. **Efficiency: *4.*** Effective law enforcement, especially preventing illegal logging, forest encroachment and effectively implement forest offset measures and contribution of NPA related business would bring more benefit to EPAM as well as socioeconomic development. **Cost-benefit: *4.*** As efficiency and impact are likely high. **Impact: *4.*** As mentioned, effective law enforcement, particularly preventing illegal logging, forest encroachment while ensure effective forest offset and contribution of NPA related business would have great impact on EPAM. **Necessity: *5.*** It is highly and immediately needed. Otherwise, opportunity to realise EPAM is limited.
Increase organisational capacity and human resources	**Overall score: 21** **Effectiveness:** 4. It is attainable considering capacity of stakeholders including development partners and local capacity builders. However, it may not be very high considering current key responsible organisations' leadership, commitment and know-how, which are not strong as it should be. **Efficiency: *4.*** Investing cost in human resources could be high. However, it should be efficient, especially in the long term, and when knowledge and skills are effectively provided to right originations/people to secure financial support and investment in EPAM. **Cost-benefit: *4. a***s well as effectiveness and efficiency. **Impact: *4.*** Especially in the long term and when knowledge and skills are effectively provided to right originations/people. **Necessity: *5.*** It is highly and immediately needed as human resources are very limited. Although current human resources of the responsible organisations are capable of managing some aspects of EPAM, without HR strengthening, it would be hard to guarantee effectiveness and sustainability of NPA.
Develop best practice guidelines for EPAM	**Overall score: 18.5** **Effectiveness: *4.*** Considering current future organisational capacity and skills to be built, defining and developing best practice guideline should be doable although it may need external technical support. **Efficiency: *3.5.*** Some technical and financial resources are needed for R&D. However, with the best practice guidelines in place, it would lead to more effective and relevant performance EPAM, leading to more financial benefit to NPA. **Cost-benefit: *3.5. a***s well as efficiency. **Impact: *3.5.*** With the best practice guidelines in place, effectiveness and relevance of PAM would be much improved, leading great impact on NPA sustainability. **Necessity: *4.*** It is highly and immediately needed as tools and guidelines are insufficient. Importantly, without the guidelines, although PAM could be continued, it could be out of track and undermine effectiveness, efficiency and impact.

Develop EPAM reference project (effective PA offset, fee/tax scheme, CBRM, payment for ecosystem service, PPP)	**Overall score: 20** **Effectiveness: *4.*** Considering current future organisational capacity and skills to be built, defining and developing a reference project although it may need external technical support. **Efficiency: *4.*** With a good design, the reference projects could be efficient. However, expansion of the reference projects would have great financial and economic impact as well as EPAM expansion. **Cost-benefit: *4.*** as well as efficiency. **Impact: *4.*** It is convinced an EPAM would significantly expand following the reference projects, leading to greater impact on NPA sustainability. **Necessity: *4.*** It is highly and immediately needed as reference projects are not either available or definable. The absence of the reference projects, although PAM could be continual, possibly undermine effectiveness, efficiency and impact of PAM or even out of track of EPAM.
Research and develop information for EPAM (forest resources inventory and valuation, best practices etc.)	**Overall score: 18.5** **Effectiveness: *4.*** Considering existing capacity and skills to be acquired in future, R&D of information and best practices to support policy, capacity and reference projects are doable, although external technical support is required. **Efficiency*: 3.5.*** Investing in information may be costly and may not be high efficient considering just production of information. However, once it is used for development, especially for financial and economic purpose, more benefit could overweight the cost. **Cost-benefit: *3.5.*** As efficiency is moderate. **Impact: *Moderate to high.*** Available information may have only impact on knowledge and awareness. However, once it is used for development, more impact could be expected. **Necessity: *High.*** It is highly and immediately needed as information is insufficient for effective planning and development of EPAM.

2. Sustainable community forestry management-SCFM

Measures	**Criteria and scores considered in the selection of the measures actions to include in the TAP**
Improve the public budgeting effectiveness and efficiency	**Overall score: 16.5** Effectiveness: *3.* While budget is critical for SCFM, increasing the public/the government budgeting is challenge due to the national budget constraints. So, the impact on SCFM, especially finance could possibly moderate. Efficiency: *4.* There may not be large investment in implementing this measure, except studies and develop best public budgeting models. It deems efficient compare to the government budget to be allocated for SCMM (e.g., US$ 55,000 per year). Cost-benefit: *3.5.* Considering effectiveness and efficiency. Co-benefit/Interaction with other measures: 3. Sustainability: *4.* Despite small budget, the government funding for SCFM is mandatory and likely endless.

Increase resources mobilisation for SCFM	Overall score 20: Effectiveness: *4.* **There is high possibility to increase resources by implementing this measure. However, with or without external technical support, there is a challenge to fully access to international financial support, which is variable.** Efficiency: *4.* **There may be large investments, except studies on funding sources, development of financeable project proposals including good financial and economic analysis to convince an investment and financial support. The benefit could possibly be high considering the potential financial support to be received, although there may be a risk.** Cost-benefit: *4.* **It is convinced that a fund or financial support would be secured following resources mobilisation. In this regard, benefit would overweight the cost.** Co-benefit/Interaction with other measures: 4. Sustainability: *4.* **As the majority of village forests, especially degraded ones largely depend on financial support to sustain its management. Resources mobilisation would remain helpful in future although there may be a shift of funding sources.**
Increase revenue from ecosystem services and reinvest in SCFM	**Overall score 18:** **Effectiveness: *3.5.*** Revenue from ecosystem services are important sources of income for sustaining SCFM. However, it could be hard to significantly increase the revenue since many village forests have degraded and low ecotourism and NTFP potentials. In addition, applying and increase resources fee or tax are challenges due limited revenue and effective legal framework. **Efficiency: *3.5.*** The efficiency of investing in promoting sustainable tourism and NTFP could be moderate to high, comparing potential revenue that ecotourism and NTFP possibly generate to local economy including SCFM and product development and Marketing costs. However, the direct income to be collected and allocated for SCFM could be moderate since regulation and enforcement of resources fee or tax are either unclear or hard to implement effectively. **Cost-benefit: *3.5.*** Considering the effectiveness and efficiency. **Co-benefit: *3.5.*** **Sustainability: *4.*** Sustainable tourism and NTFP, increase means SCFM as they are key elements of SCFM. Moderate to high revenue from the ecosystem services as well as financially self-reliance would help maintain SCFM to great extent.
Research and develop an effective and sustainable financial mechanism for SCFM	**Overall score: 15.5** **Effectiveness: *3.*** This measure possibly has moderate impact on SCFM as it is direct. Its effectiveness or impact depend on the actual enforcement and available resources. Although having good mechanism is in place, current and future resource shortfall would somehow prevent the effectiveness of the mechanism deployment. **Efficiency: *3.*** It requires certain technical and some financial resources for R&D, and considering the effectiveness and impact, the efficiency could be moderate. **Cost-benefit: *3.*** As efficiency is moderate. **Co-benefit: *3.***

	Sustainability: *3.5.* Especially when sustainable financing mechanism is definable to guide SCFM funding.
Develop legal framework for SCFM (e.g., redefine village forest definition, conversion and offset, resources fee/tax, SCFM)	**Overall score 19.5** **Effectiveness: *4.*** The perfect legal framework would lead to better or reduce burden for achieving SCFM. However, effectiveness of the law enforcement might not very high since the SCFM responsible organisations' capacity and enabling environment may not be much improved in near future. **Efficiency: *4.*** There would be some investments in R&D and formulation of the legal framework. However, considering its impact on SCFM, especially effective forest offset, contribution from businesses, the benefit could overweigh the cost. **Cost-benefit: *4***. as well as effectiveness and efficiency **Co-benefit: *3.5.*** **Sustainability: *4.*** Especially when it is inclusively and participatorily developed, and the SCFM responsible organisations are capable of enforcing with high commitment.
Increase organisational capacity and human resources	**Overall score 20:** **Effectiveness: *4.*** Especially when SCFM knowledge and skills are sufficient. However, it may not be very high considering current and future HR management of the key responsible organisations including leadership, commitment and know-how, which are not strong as it should be, and HR is not effectively deployed. **Efficiency: *4.*** Investing cost in human resources could be high, especially in the long term, and when knowledge and skills are effectively provided to right originations/ people who have influence on SCFM. **Cost-benefit: *4.*** as well as effectiveness and efficiency. **Co-benefit: *4.*** **Sustainability: *4.*** Investing in HR would lead to SCFM, especially in the long term. However, as mentioned, it depends on HRM systems and commitment toward SCFM.
Develop best practice guidelines for SCFM	**Overall score 18.5** **Effectiveness: *4.*** The best practice guidelines for SCFM is critical to guide CFM on track and be effective, especially when it is well-defined, developed and the responsible are capable of using it. Importantly, there is no such guidelines to guide the SCFM development. **Efficiency: *3.5.*** There may be some investments in R&D of the guidelines. However, considering its impact on SCFM, especially financing and increase revenue from ecosystem service, the benefit could overweigh the cost. **Cost-benefit: *3.5***. As efficiency is moderate. **Co-benefit: *3.5.*** **Sustainability: *4.*** Especially when it is well-defined, developed and the responsible are capable of using it.

Develop SCFM reference project (effective VF offset, fee/tax scheme, payment for ecosystem service)	**Overall score 20:** **Effectiveness: *4.*** The SCFM reference projects would, apart from being a model, possibly contribute to expansion of SCFM, especially when it is well-defined, developed and the responsible are capable of extension. Importantly, the reference projects to stimulate and guide the SCFM development. **Efficiency: *4.*** With a good design, the reference projects could be efficient. In addition, considering the potential of SCFM expansion following reference projects, it should be worthwhile or efficient. **Cost-benefit: *4***. As well as effectiveness and efficiency. **Co-benefit: *3.5.*** **Sustainability: *4.*** Especially when it is well-defined, developed and the responsible are capable of extension and adjust it to suit future context.
Research and develop information for SCFM (forest resources inventory and valuation, best practices etc.)	**Overall score 16.5** **Effectiveness: *3.5.*** The information is helpful for SCFM including development best practice guidelines, reference project, policy and capacity buildings. However, its impact is indirect or depend on utilisation. **Efficiency: *3.*** Quite large amount of money is needed R&D of the information. Its impact on SCFM is indirect or depend on utilisation. **Cost-benefit: *3***. As efficiency is moderate. **Co-benefit: *3.*** **Sustainability: *4.*** Sustainability of resources largely depend on how well we know about the resources and use the information for development and management. Importantly, the data and information are scanty and inadequate for SCFM.

3. Optimal plantation

Measures	**Criteria and scores considered in the selection of the measures actions to include in the TAP**

Increase the public budget for an optimal or a sustainable plantation	**Overall score: 16** **Effectiveness: *3.* It is anticipated that the public budget for the extension of sustainable plantation would remain small in future (e.g., <US$ 100,000 per year through the country) due to the national budget constraints. Although budget is very important for the extension, this small budget may only have low or maximum moderate impact on sustainable plantation development.** **Efficiency: *4.* There may not be large investment in implementing this measure such as data collection and administrative cost to formulate project proposals. However, it is efficient compare to the government budget to be obtained.** **Cost-benefit: *3.5.* Considering effectiveness and efficiency.** **Co-benefit/Interaction with other measures: *3.*** **Sustainability: *3.* Despite small amount, the government budget is a sustainable funding source, which keeps sustainable plantation extension in the long-term.**
Increase resources mobilisation	**Overall score: 15** **Effectiveness: *2.5.*** Considering current and future financial trends, there may not be big opportunity to mobilise resources for plantation development as it is private-orientated business. So, budget to be obtained from resources mobilisation might not high and have great impact on sustainable plantation. **Efficiency: *3.5.*** Despite mobilising resources including data collection and development of financeable project proposals may not cost much, there may be some risk involved or lesser chance to be funded. **Cost-benefit: *3.5.*** Especially, when a fund or financial support is secured following resources mobilisation. However, the cost-benefit may be moderate to high as well as effectiveness and efficiency. **Co-benefit/Interaction with other measures: *3.*** **Sustainability: *3.*** Although resources mobilisation still possible, but sustainability may reply on Market and financial access rather grants.
Expand access to finance	**Overall score: 20.5** **Effectiveness: *4.*** especially access to low interest loans, which are likely to accelerate plantation development compared to business-as-usual scenario. However, considering the current and near future capacity of plantation entrepreneurs and farmers, and financial Markets; access to finance may possibly limited, so that it might not have highest impact on the plantation expansion. **Efficiency: *4.5.*** Normally financial and economic feasible project is financed. In addition, loan utilisation is usually efficient as management is stricter. **Cost-benefit: *4.*** as the effectiveness and efficiency. **Co-benefit: *4.*** **Sustainability: *4.*** Especially in the Market oriented era, where access to loans play critical role in the development.

Access to Market	**Overall score: 21** **Effectiveness: *5.*** As plantation development, to great extent, depend on Market. Once Market is available and favourable, a plantation business would be substantially developed. Furthermore, if carbon Market is feasible, plantation would much more developed. **Efficiency: *4.*** Although there are some costs involving studies, promotion and engagement with Markets; once the products and services get accessed to Markets, the benefit would overweight the cost. **Cost-benefit: *4.*** as the effectiveness and efficiency are high. **Co-benefit: *4.*** **Sustainability: *4.*** Because demand for wood and non-wood products from plantations would higher in future, where such products from natural forests are limited.
Increase organisational capacity and human resources	**Overall score 20:** **Effectiveness: *4.*** It is believed that, with sufficient knowledge and skills of e.g., MAF and entrepreneurs, plantation would be more developed and sustained. However, the effectiveness might not reach highest level, considering current and near future capacity building quality, which are slightly variable. **Efficiency: *4.*** Investing in human resources is perceived to be efficient, especially in the long term, and when the responsible organisations are trained with right knowledge and skills and on the right time. However, the efficiency may not be very high considering level of the effectiveness. **Cost-benefit: *4.*** as well as effectiveness and efficiency. **Co-benefit/Interact with other measures: *4.*** **Sustainability: *4.*** Investing in HR should have great and long-term impact and lead to sustainable development, especially when right organisations or people's capacity is strengthened on the right time. However, sustainability may not be hundred percent guaranteed although capacity exists as it depends on other factors as well.
Develop and enforce legal framework on sustainable or an optimal plantation	**Overall score 19.5** **Effectiveness: *4.*** The legal framework such as decree or regulation on sustainable or an optimal plantation is prerequisite for promoting, guiding and managing plantation development in sustainable manner or general optima benefit. However, based on current and anticipated future law enforcement effectiveness, which it is not effective as it should be, and despite good law, the enforcement in near future may not be highly effective. **Efficiency: *4.*** Considering the investment in R&D of the best and innovative practices and guidelines, and the effectiveness or growth of agroforestry production and business following application of the best practices and guidelines. **Cost-benefit: *4***. As efficiency is moderate. **Co-benefit: *3.5.*** **Sustainability: *4.*** as it is for sustainability. However, it is hard to completely ensure the sustainability as it also depends on other factors. Sometimes it is hard to define the sustainability or acquire sufficient knowledge and skills to apply it.

Develop reference projects	**Overall score: 19.5** **Effectiveness: *4.*** The reference projects would, apart from being a model, possibly contribute to expansion of an optimal agroforestry, especially when it is well-defined, developed and the responsible are capable of extension. **Efficiency: *4.*** With a good design, the agroforestry production and business reference projects could be efficient. In addition, it would be more efficient when the projects are replicated/expanded following piloting. **Cost-benefit: *4.*** As well as effectiveness and efficiency. **Co-benefit: *3.5.*** **Sustainability: *4.*** Especially when it is well-defined, developed and the responsible are capable of extension and adjust it to suit future context.
Research and develop information (on optimal agroforestry production systems, technologies to maximise the production and access to Markets)	**Overall score: 17.5** **Effectiveness: *4.*** The information is very helpful as it is prerequisite of optimal agroforestry including development best practice guidelines, reference project, policy and capacity buildings. As Laos has very limited information, this action would have high impact on agroforestry development compare to business-as-usual scenario. **Efficiency: *3.*** Quite large amount of money is needed R&D of the information. Its impact on the agroforestry is indirect or depend on utilisation. **Cost-benefit: *3***. As efficiency is moderate. **Co-benefit: *3.5.*** **Sustainability: *4.*** Sustainability of resources largely depend on how well we know about the agroforestry systems as well as trees-crops interaction, productivity and technologies or silviculture practice to maximise the production. However, the sustainability depends on Market. the optimal systems might not always produce products that meet the Market demand.

4. Optimal agroforestry

Measures	Criteria and scores considered in the section of the measures as actions to include in the TAP

Increase the public budget for agroforestry extension and development	Overall score: 16 Effectiveness: *3.* **It is anticipated that the public budget would remain small in future (e.g., US$ 125,000 per year through the country) due to the national budget constraints. Although budget is a determinant for agroforestry, this small budget may only have low or maximum moderate impact on agroforestry development.** Efficiency: *4.* **There may not be large investment in implementing this measure such as data collection and administrative cost to formulate project proposals. However, it is efficient compare to the government budget to be obtained.** Cost-benefit: *3.5.* **Considering effectiveness and efficiency.** Co-benefit/Interaction with other measures: *3.* Sustainability: *3.* **Despite small amount, the government budget is a sustainable funding source which could maintain agroforestry extension and sustainability in the long term.**
Increase resources mobilisation	**Overall score: 19.5** **Effectiveness: *4.*** Considering current and future financial trends, there are still great opportunity to mobilise resources for agroforestry extension and development. However, there may be some variations due to variable funding and capacity of the responsible organisations to use resources effectively in the agroforestry extension. **Efficiency: *4.*** This measure could be implemented with low cost, although some costs such as data collection and development of financeable project proposals included. In contrast, the benefit could possibly be high considering the potential financial support to be received from resource mobilisation. **Cost-benefit: *4.*** Especially when a fund or financial support is secured following resources mobilisation. In this regard, benefit would overweight the cost. **Co-benefit/Interaction with other measures: *3.5.*** **Sustainability: *4.*** Resources mobilisation would remain helpful in future although there may be a shift of funding sources.
Expand access to finance	**Overall score: 20.5** **Effectiveness: *4.*** As demand for agroforestry development and financial need are high, and with sufficient financial resources, especially low interest loan would lead to significant agroforestry growth compared to business-as-usual scenario. However, considering the current and near future capacity of agroforestry entrepreneurs and financial Market, access to finance may remain limited, so that it might not have highest impact on agroforestry development. **Efficiency: *4.5.*** Normally financial and economic feasible project is financed. In addition, loan utilisation is usually efficient as management is stricter. **Cost-benefit: *4.*** as the effectiveness and efficiency. **Co-benefit: *4.*** **Sustainability: *4.*** Especially in the Market oriented era, where access to loans play critical role in the development.

Access to Market	**Overall score: 21** **Effectiveness: *5.*** As agroforestry development largely depend on Market, once agroforestry products and services are fully accessible to Markets, the agroforestry production and business would be significantly grown. In addition, if carbon Market also works for agroforestry, there would be a big jump on the development of agroforestry. **Efficiency: *4.*** Although there are some costs involving studies, promotion and engagement with Markets; once the products and services get accessed to Markets, the benefit would overweight the cost. **Cost-benefit: *4.*** as the effectiveness and efficiency are high. **Co-benefit: *4.*** **Sustainability: *4.*** Despite access to Market is critical for agroforestry, considering the current and future capacity of the responsible authorities and the entrepreneurs, there might still be a variation to access to Market.
Increase organisational capacity and human resources	**Overall score: 20** **Effectiveness: *4.*** Agroforestry would be significantly developed when the responsible organisations e.g., MAF and entrepreneurs have, apart from financial resources, sufficient human resource including knowledge and skills, leadership and commitment. However, the effectiveness level could possibly be high, but may not be very high since quality of the capacity building and application of knowledge and skills to develop agroforestry, even with external support, might not be at highest level in near future. **Efficiency: *4.*** Investing in human resources is perceived to be efficient, especially in the long term, and when the responsible organisations are trained with right knowledge and skills on the right time. So that they can to effectively develop and deploy an optimal or a sustainable agroforestry. However, the efficiency may not be very high considering level of the effectiveness. **Cost-benefit: *4.*** as well as effectiveness and efficiency. **Co-benefit/Interact with other measures: *4.*** **Sustainability: *4.*** Investing in HR should have great and long-term impact on agroforestry sustainability, especially when capacity building is conducted to the right organisations or people, and leadership and HRM is effective. However, despite sufficient HR could possibly help sustaining agroforestry, it may not hundred percent sure since sustainability depends on other factors too.

Research and develop best practices and best practice guidelines for optimal agroforestry production systems	**Overall score: 19.5** **Effectiveness: *4.*** The best practice guidelines are very important for development and maximisation of benefit from agroforestry systems, especially when it is informative and practical, and the responsible can effectively use it. The innovative or best practices, and guidelines would lead to high or very impact on optimal agroforestry in Laos compare to application of existing agroforestry development model or business-as-usual. **Efficiency: *4.*** Considering the investment in R&D of the best and innovative practices and guidelines, and the effectiveness or growth of agroforestry production and business following application of the best practices and guidelines. **Cost-benefit: *4***. As efficiency is moderate. **Co-benefit: *3.5.*** **Sustainability: *4.*** as it is for sustainability. However, it is hard to completely ensure the sustainability as it also depends on other factors. Sometimes it is hard to define the sustainability or acquire sufficient knowledge and skills to apply it.
Develop reference projects	**Overall score: 19.5** **Effectiveness: *4.*** The reference projects would, apart from being a model, possibly contribute to expansion of an optimal agroforestry, especially when it is well-defined, developed and the responsible are capable of extension. **Efficiency: *4.*** With a good design, the agroforestry production and business reference projects could be efficient. In addition, it would be more efficient when the projects are replicated/expanded following piloting. **Cost-benefit: *4***. As well as effectiveness and efficiency. **Co-benefit: *3.5.*** **Sustainability: *4.*** Especially when it is well-defined, developed and the responsible are capable of extension and adjust it to suit future context.
Research and develop information (on optimal agroforestry production systems, technologies to maximise the production and access to Markets)	**Overall score: 17.5** **Effectiveness: *4.*** The information is very helpful as it is prerequisite of optimal agroforestry including development best practice guidelines, reference project, policy and capacity buildings. As Laos has very limited information, this action would have high impact on agroforestry development compare to business-as-usual scenario. **Efficiency: *3.*** Quite large amount of money is needed R&D of the information. Its impact on the agroforestry is indirect or depend on utilisation. **Cost-benefit: *3***. As efficiency is moderate. **Co-benefit: *3.5.*** **Sustainability: *4.*** Sustainability of resources largely depend on how well we know about the agroforestry systems as well as trees-crops interaction, productivity and technologies or silviculture practice to maximise the production. However, the sustainability depends on Market. the optimal systems might not always produce products that meet the Market demand.

Annex 3 Assessment of the measures to include into the TAP for climate change mitigation in the agriculture sector

1. Livestock feed improvement

Measures	Criteria and scores for consideration in the selection of the measures as actions to include in the TAP
Reduce cost on feed development (cost on seeds and other input, improve soil quality, tax, UXO, transport and logistics etc.)	**Overall score: 15.5** **Effectiveness: *3.5.*** Although this measure is critical for feed development, some costs are hard to reduce or avoid such as UXO clearance and improve soil quality. It is hard to reduce the costs since the public sector, which has had budget constraints and needs to maintain the tax at the moment. In addition, the effectiveness depends on other factors such as access to finance and Market. **Efficiency: *3.*** There may be quite large investment in implementing this measure. Compare to income to be generated from livestock industry including feed development, it is perceived that the efficiency level wold be moderate. **Cost-benefit: *3.*** Considering effectiveness and efficiency. **Co-benefit/Interaction with other measures: *3.*** **Sustainability: *3.*** Tax incentives, for example, may be of necessary at the beginning of business, but once business is well-established, it may reduce in future. However, cost on transportation and logistics is expected to reduce in future.
Increase the public budget for livestock feed extension and development	**Overall score: 17.5** **Effectiveness: *3.*** It is anticipated that the public budget for livestock feed extension including R&D would remain small in future (e.g., less than US$ 70,000 per year through the country) due to the national budget constraints. Although budget is crucial for the extension and development of livestock feed, the smaller budget means low or maximum moderate impact. **Efficiency: *4.*** There may not be large investment in implementing this measure such as data collection and administrative cost to formulate project proposals compared to the government budget to be allocated each year. **Cost-benefit: *3.5.*** Considering effectiveness and efficiency. **Co-benefit/Interaction with other measures: *3.5.*** **Sustainability: *4.*** Despite small amount, the government budget is a sustainable funding source.

Measures	Criteria and scores for consideration in the selection of the measures as actions to include in the TAP
Increase resources mobilisation (RM)	**Overall score: 17** **Effectiveness: *3.*** There are still opportunities to mobilise resources in near future for an extension of livestock including feed development, e.g., for poverty reduction. However, the grant may reduce in the long-term because the livestock industry including feed would be driven by private sector. Funding livestock for poverty reduction may be variable due to reduced poverty rate. Hence, RM may secure some technical and financial support, leading to only moderate impact on feed development. **Efficiency: *4.*** This measure could be implemented with low cost, although some costs such as data collection and development of financeable project proposals included. In contrast, the benefit could possibly be high considering the potential financial support to be received from resource mobilisation. **Cost-benefit: *3.5.*** Considering the effectiveness and efficiency. **Co-benefit/Interaction with other measures: *3.5.*** **Sustainability: *3.*** Although resources mobilisation remains helpful in near future, in the long-term sustainability of livestock including feed development may largely depend on commercial loans and private sector rather than grants.
Expand access to finance	**Overall score: 20.5** **Effectiveness: *4.*** As financial needs for livestock including feed development are high, and with sufficient financial resources, especially low interest loan would bring about significant growth of livestock including feed compared to business-as-usual scenario. However, considering the current and near future capacity of the entrepreneurs and financial Market, access to finance may remain limited, so that it might not have highest impact on livestock including feed yet in near future. **Efficiency: *4.5.*** Normally financial and economic feasible project is financed. In addition, loan utilisation is usually efficient as management is stricter. **Cost-benefit: *4.*** as the effectiveness and efficiency. **Co-benefit: *4.*** **Sustainability: *4.*** Especially in the Market and private sector-oriented era, where access to loans play critical role in the development.

Measures	Criteria and scores for consideration in the selection of the measures as actions to include in the TAP
Access to Market	**Overall score: 20** **Effectiveness: *4.*** As livestock including feed development largely depend on Market, once livestock including feed products are fully accessible to Markets, it would be significantly grown. **Efficiency: *4.*** Although there are some costs involving studies, promotion and engagement with Markets; once the products and services get accessed to Markets, the benefit would overweight the cost. **Cost-benefit: *4.*** as the effectiveness and efficiency are high. **Co-benefit: *4.*** **Sustainability: *4.*** Due to livestock including feed development largely depend on Market. However, considering the current and future capacity of the responsible authorities, the entrepreneurs and livestock industry growth trend, there might still be some limitation to fully develop feed, especially for mitigation.
Increase organisational capacity and human resources	**Overall score: 20** **Effectiveness: *4.*** Livestock including feed would be significantly developed when the responsible organisations e.g., MAF and entrepreneurs have, apart from financial resources, sufficient human resource including knowledge and skills, leadership and commitment. However, the effectiveness level may not be very high since quality of the capacity building and application of knowledge and skills to develop feed might be some limitations in near future. **Efficiency: *4.*** Investing in human resources is perceived to be efficient, especially in the long term, and when the responsible organisations are trained with right knowledge and skills on the right time. So that they can to effectively develop and deploy a sustainable feed development. However, the efficiency may not be very high considering level of the effectiveness. **Cost-benefit: *4.*** as well as effectiveness and efficiency. **Co-benefit/Interact with other measures: *4.*** **Sustainability: *4.*** Investing in HR should have great and long-term impact on feed sustainability, especially when capacity building is conducted to the right organisations or people, and leadership and HRM is effective. However, despite sufficient HR could possibly help sustaining agroforestry, it may not hundred percent sure since sustainability depends on other factors too.

Measures	Criteria and scores for consideration in the selection of the measures as actions to include in the TAP
Research and develop best practices and best practice guidelines for feed optimisation	**Overall score: 19.5** **Effectiveness: *4.*** The best practice guidelines are very important for optimise fodder or agrosilvopastoral production systems and feed concentrates, especially when it is informative and practical, and the responsible can effectively use it. The innovative or best practices, and guidelines would lead to high or very impact on optimal feed compare to business-as-usual feed development scenarios. **Efficiency: *4.*** Considering the investment in R&D of the best and innovative practices and guidelines, and the potential growth of feed production and business following application of the best practices and guidelines. **Cost-benefit: *4***. As efficiency is moderate. **Co-benefit: *3.5.*** **Sustainability: *4.*** Because, apart from sustainable growth, it is an effective and efficient resources uses.
Develop reference projects (optimal agro-silvopastoral production systems and feed concentrates)	**Overall score: 19.5** **Effectiveness: *4.*** The reference projects would, apart from being a model, possibly contribute to expansion of an optimal agrosilvopastoral production systems and feed concentrates, especially when it is well-defined, developed and the responsible are capable of extension. **Efficiency: *4.*** With a good design, the optimal feed production and business reference projects could be efficient. In addition, it would be more efficient when the projects are replicated/expanded following piloting. **Cost-benefit: *4***. As well as effectiveness and efficiency. **Co-benefit: *3.5.*** **Sustainability: *4.*** Especially when it is well-defined, developed and the responsible are capable of extension and adjust it to suit future context.
Research and develop information (agro-silvopastoral production systems and feed concentrates)	**Overall score: 18** **Effectiveness: *4.*** The information is very helpful as it is prerequisite of the agrosilvopastoral production systems and feed concentrates including development best practice guidelines, reference project, policy and capacity buildings. As it is little known about agrosilvopastoral production systems and feed concentrates, so with sufficient information it would have high impact on feed development compare to business-as-usual scenario. **Efficiency: *3.5.*** Although effective, quite large amount of money is needed R&D of the information. **Cost-benefit: *3***. As efficiency is moderate. **Co-benefit: *3.5.*** **Sustainability:*4.*** Sustainability of feed development largely depend on how well we know about the agrosilvopastoral production systems and feed concentrates including its technologies. However, the sustainability depends on other factor such as livestock industry.

Measures	Criteria and scores for consideration in the selection of the measures as actions to include in the TAP
Research and develop legal framework and enhance law enforcement	**Overall score: 19.5** **Effectiveness: *4.*** The best practice guidelines are very important for optimise fodder or agrosilvopastoral production systems and feed concentrates, especially when it is informative and practical, and the responsible can effectively use it. The innovative or best practices, and guidelines would lead to high or very impact on optimal feed compare to business-as-usual feed development scenarios. **Efficiency: *4.*** Considering the investment in R&D of the best and innovative practices and guidelines, and the potential growth of feed production and business following application of the best practices and guidelines. **Cost-benefit: *4***. As efficiency is moderate. **Co-benefit: *3.5.*** **Sustainability: *4.*** Because, apart from sustainable growth, it is an effective and efficient resources uses.

2. Organic farming

Measures	Criteria and scores for consideration in the selection of the measures as actions to include in the TAP
Increase the public budget for organic farming extension and development	**Overall score: 16** **Effectiveness: *3.*** Sufficient financial resources for extension would have high impact on the organic farming development. However, actual public budget for the extension still limited and may remain limited in future due to small national revenue and budget deficit. So, this limited financial support for extension would only have moderate impact on the organic farming development. **Efficiency: *4.*** There may not be large investment in implementing this measure such as data collection and administrative cost to formulate project proposals. However, it is efficient compare to the government budget to be obtained. **Cost-benefit: *3.5.*** Considering effectiveness and efficiency. **Co-benefit/Interaction with other measures: *3.*** **Sustainability: *3.*** The government budget is a sustainable funding source and may be able to maintain the level of impact moderately.

Measures	Criteria and scores for consideration in the selection of the measures as actions to include in the TAP
Increase resources mobilisation	**Overall score: 19** **Effectiveness: *4.*** Considering current and future financial trends, there would still be great opportunity to mobilise resources for the organic farming extension. However, there may be some variations due to variable funding and financial management capacity of the responsible organisations. **Efficiency: *4.*** This measure could be implemented with low cost, although some costs such as data collection and development of financeable project proposals included. In contrast, the benefit could possibly be high considering the potential financial support to be received from resource mobilisation. **Cost-benefit: *4.*** Especially when a fund or financial support is secured following resources mobilisation. In this regard, benefit would overweight the cost. **Co-benefit/Interaction with other measures: *3.5.*** **Sustainability: *3.5.*** Resources mobilisation would remain helpful in future although there may be a shift of funding sources.
Expand access to finance	**Overall score: 20** **Effectiveness: *4.*** As demand for the organic product and financial need for organic farming development are high, so once producers and entrepreneurs are affordable and accessible to finance, especially low interest loan, the organic farming would be significantly developed compared to current production and business. However, considering the current and near future financial Market and capacity of the organic farming entrepreneurs which are slowly developed; access to finance may remain limited, so that it might not have greatest impact on the organic farming yet. **Efficiency: *4.*** Although there are some costs on promoting and facilitating to access to finance. However, since only financial and economic feasible project is financed, and loan is usually managed efficiently or stricter; investing in the organic farming business would be efficient. **Cost-benefit: *4.*** as the effectiveness and efficiency. **Co-benefit: *4.*** **Sustainability: *4.*** Especially in the current Market oriented development, where access to loans is critical for the development.
Access to Market	**Overall score: 22** **Effectiveness: *5.*** The organic farming development largely depend on Market, so it means increase access to Markets of the organic farming products would bring about significant growth. In addition, if carbon Market also works for the organic farming, it would be important incentives and value-added, which stimulate and sustain the organic farming. **Efficiency: *4.*** Although there are some costs involving studies, promotion and engagement with Markets; once the products and services get accessed to Markets, the benefit would overweight the cost. **Cost-benefit: *4.*** as the effectiveness and efficiency are high. **Co-benefit: *4.*** **Sustainability: *5.*** Market is a determinant of the organic farming sustainability. So, maintaining or enhancing access to organic Markets, which is expected to be growing in future would help sustaining the organic farming production and business.

Measures	Criteria and scores for consideration in the selection of the measures as actions to include in the TAP
Increase organisational capacity and human resources	**Overall score: 20** **Effectiveness: *4.*** The organic farming production and business would be significantly developed when the responsible organisations e.g., MAF and entrepreneurs have sufficient human resource including knowledge and skills, leadership and commitment. However, the effectiveness level may not be highest in near future due to the capacity and application might not be fully developed and applied due to financial constraints. **Efficiency: *4.*** Investing in human resources is perceived to be efficient, especially in the long term, and when the responsible organisations are trained with right knowledge and skills on the right time. So that they can to effectively develop and deploy an optimal or a sustainable agroforestry. However, the efficiency may not be very high considering level of the effectiveness. **Cost-benefit: *4.*** as well as effectiveness and efficiency. **Co-benefit/Interact with other measures: *4.*** **Sustainability: *4.*** Investing in HR should have great and long-term impact on the organic farming sustainability, especially when capacity building is conducted to the right organisations or people, and leadership and HRM is effective. However, sustainability is complex and depends on other factors; sufficient HR may not be able 1guarantee hundred percent of the sustainability.
Research and develop best practices and best practice guidelines for optimise organic farming	**Overall score: 19.5 Effectiveness: *High.*** The best practice guidelines are very important for development and maximisation of benefit from the organic farming systems, especially when it is informative and practical, and the responsible can effectively use it. The innovative or best practices, and guidelines would lead to high or very impact on optimal agroforestry in Laos compare to application of existing agroforestry development model or business-as-usual. **Efficiency: *High.*** Considering the investment in R&D of the best and innovative practices and guidelines, and the effectiveness or growth of agroforestry production and business following application of the best practices and guidelines. **Cost-benefit: *High***. As efficiency is moderate. **Co-benefit: *Moderate to high.*** **Sustainability: *High*** as it is for sustainability. However, it is hard to completely ensure the sustainability as it also depends on other factors. Sometimes it is hard to define the sustainability or acquire sufficient knowledge and skills to apply it.
Develop reference projects	**Overall score: 19.5** **effectiveness: *4.*** The reference projects would, apart from being a model, possibly contribute to expansion of an optimal the organic farming, especially when it is well-defined, developed and the responsible are capable of extension. **Efficiency: *4.*** With a good design, the agroforestry production and business reference projects could be efficient. In addition, it would be more efficient when the projects are replicated/expanded following piloting. **Cost-benefit: *4***. As well as effectiveness and efficiency. **Co-benefit: *3.5.*** **Sustainability: *4.*** Especially when it is well-defined, developed and the responsible are capable of extension and adjust it to suit future context.

3. Manure-based biogas

Measures	Criteria and scores considered in the selection of the measures as actions to include in the TAP
Increase the public budget for biogas promotion and development	**Overall score: 16** **Effectiveness: *3.*** It is anticipated that the public budget would remain small in future (e.g., US$ 125,000 per year through the country) due to the national budget constraints. Although budget is a determinant for agroforestry, this small budget may only have low or maximum moderate impact on agroforestry development. **Efficiency: *4.*** There may not be large investment in implementing this measure such as data collection and administrative cost to formulate project proposals. However, it is efficient compare to the government budget to be obtained. **Cost-benefit: *3.5.*** Considering effectiveness and efficiency. **Co-benefit/Interaction with other measures: *3.*** **Sustainability: *3.*** Despite small amount, the government budget is a sustainable funding source which could maintain agroforestry extension and sustainability in the long term.
Increase resources mobilisation	**Overall score: 19.5** **Effectiveness: *4.*** Considering current and future financial trends, there are still great opportunity to mobilise resources for agroforestry extension and development. However, there may be some variations due to variable funding and capacity of the responsible organisations to use resources effectively in the agroforestry extension. **Efficiency: *4.*** This measure could be implemented with low cost, although certain costs such as data collection and development of financeable project proposals included. In contrast, the benefit could possibly be high considering the potential financial support to be received from resource mobilisation. **Cost-benefit: *4.*** Especially when a fund or financial support is secured following resources mobilisation. In this regard, benefit would overweight the cost. **Co-benefit/Interaction with other measures: *3.5.*** **Sustainability: *4.*** Resources mobilisation would remain helpful in future although there may be a shift of funding sources.

Measures	Criteria and scores considered in the selection of the measures as actions to include in the TAP
Expand access to finance	**Overall score: 20.5** **Effectiveness: *4.*** As demand for agroforestry development and financial need are high, and with sufficient financial resources, especially low interest loan would lead to significant agroforestry growth compared to business-as-usual scenario. However, considering the current and near future capacity of agroforestry entrepreneurs and financial Market, access to finance may remain limited, so that it might not have highest impact on agroforestry development. **Efficiency: *4.5.*** Normally financial and economic feasible project is financed. In addition, loan utilisation is usually more efficient as management is stricter. **Cost-benefit: *4.*** As the effectiveness and efficiency. **Co-benefit: *4.*** **Sustainability: *4.*** Especially in the Market oriented era, where access to loans play critical role in the development.
Access to Market	**Overall score: 21** **Effectiveness: *5.*** As agroforestry development largely depend on Market, once agroforestry products and services are fully accessible to Markets, the agroforestry production and business would be significantly grown. In addition, if carbon Market also works for agroforestry, there would be a big jump on the development of agroforestry. **Efficiency: *4.*** Although there are some costs involving studies, promotion and engagement with Markets; once the products and services get accessed to Markets, the benefit would overweight the cost. **Cost-benefit: *4.*** As the effectiveness and efficiency are high. **Co-benefit: *4.*** **Sustainability: *4.*** Despite access to Market is critical for agroforestry, considering the current and future capacity of the responsible authorities and the entrepreneurs, there might still be a variation to access to Market.

Measures	Criteria and scores considered in the selection of the measures as actions to include in the TAP
Increase organisational capacity and human resources	**Overall score: 20** **Effectiveness: *4.*** Agroforestry would be significantly developed when the responsible organisations e.g., MAF and entrepreneurs have, apart from financial resources, sufficient human resource including knowledge and skills, leadership and commitment. However, the effectiveness level could possibly be high, but may not be very high since quality of the capacity building and application of knowledge and skills to develop agroforestry, even with external support, might not be at highest level in near future. **Efficiency: *4.*** Investing in human resources is perceived to be efficient, especially in the long term, and when the responsible organisations are trained with right knowledge and skills on the right time. So that they can to effectively develop and deploy an optimal or a sustainable agroforestry. However, the efficiency may not be very high considering level of the effectiveness. **Cost-benefit: *4.*** As well as effectiveness and efficiency. **Co-benefit/Interact with other measures: *4.*** **Sustainability: *4.*** Investing in HR should have great and long-term impact on agroforestry sustainability, especially when capacity building is conducted to the right organisations or people, and leadership and HRM is effective. However, despite sufficient HR could possibly help sustaining agroforestry, it may not hundred percent sure since sustainability depends on other factors too.
Research and develop best practices and best practice guidelines for promoting biogas energy	**Overall score: 19.5** **Effectiveness: *4.*** The best practice guidelines are very important for development and maximisation of benefit from agroforestry systems, especially when it is informative and practical, and the responsible can effectively use it. The innovative or best practices, and guidelines would lead to high or very impact on optimal agroforestry in Laos compare to application of existing agroforestry development model or business-as-usual. **Efficiency: *4.*** Considering the investment in R&D of the best and innovative practices and guidelines, and the effectiveness or growth of agroforestry production and business following application of the best practices and guidelines. **Cost-benefit: *4***. As efficiency is moderate. **Co-benefit: *3.5.*** **Sustainability: *4.*** As it is for sustainability. However, it is hard to completely ensure the sustainability as it also depends on other factors. Sometimes it is hard to define the sustainability or acquire sufficient knowledge and skills to apply it.

Measures	Criteria and scores considered in the selection of the measures as actions to include in the TAP
Develop reference projects	**Overall score: 19.5** **Effectiveness: *4.*** The reference projects would, apart from being a model, possibly contribute to expansion of an optimal agroforestry, especially when it is well-defined, developed and the responsible are capable of extension. **Efficiency: *4.*** With a good design, the agroforestry production and business reference projects could be efficient. In addition, it would be more efficient when the projects are replicated/expanded following piloting. **Cost-benefit: *4***. As well as effectiveness and efficiency. **Co-benefit: *3.5.*** **Sustainability: *4.*** Especially when it is well-defined, developed and the responsible are capable of extension and adjust it to suit future context.
Research and develop information (on biogas technologies, feedstock, o access to finance and Markets)	**Overall score: 17.5** **Effectiveness: *4.*** The information is very helpful as it is prerequisite of optimal agroforestry including development best practice guidelines, reference project, policy and capacity buildings. As Laos has very limited information, this action would have high impact on agroforestry development compare to business-as-usual scenario. **Efficiency: *3.*** Quite large amount of money is needed R&D of the information. Its impact on the agroforestry is indirect or depend on utilisation. **Cost-benefit: *3***. As efficiency is moderate. **Co-benefit: *3.5.*** **Sustainability: *4.*** Sustainability of resources largely depend on how well we know about the agroforestry systems as well as trees-crops interaction, productivity and technologies or silviculture practice to maximise the production. However, the sustainability depends on Market. the optimal systems might not always produce products that meet the Market demand.

4. Agricultural residue-based biomass energy

Measures	criteria and scores considered in the section of the measures as actions to include in the TAP
Increase the public budget for biomass energy promotion and development	**Overall score: 16** **Effectiveness: *3.*** It is anticipated that the public budget would remain small in future (e.g., US$ 125,000 per year through the country) due to the national budget constraints. Although budget is a determinant for agroforestry, this small budget may only have low or maximum moderate impact on agroforestry development. **Efficiency: *4.*** There may not be large investment in implementing this measure such as data collection and administrative cost to formulate project proposals. However, it is efficient compare to the government budget to be obtained. **Cost-benefit: *3.5.*** Considering effectiveness and efficiency. **Co-benefit/Interaction with other measures: *3.*** **Sustainability: *3.*** Despite small amount, the government budget is a sustainable funding source which could maintain agroforestry extension and sustainability in the long term.
Increase resources mobilisation	**Overall score: 19.5** **Effectiveness: *4.*** Considering current and future financial trends, there are still great opportunity to mobilise resources for agroforestry extension and development. However, there may be some variations due to variable funding and capacity of the responsible organisations to use resources effectively in the agroforestry extension. **Efficiency: *4.*** This measure could be implemented with low cost, although certain costs such as data collection and development of financeable project proposals included. In contrast, the benefit could possibly be high considering the potential financial support to be received from resource mobilisation. **Cost-benefit: *4.*** Especially when a fund or financial support is secured following resources mobilisation. In this regard, benefit would overweight the cost. **Co-benefit/Interaction with other measures: *3.5.*** **Sustainability: *4.*** Resources mobilisation would remain helpful in future although there may be a shift of funding sources.

Measures	criteria and scores considered in the section of the measures as actions to include in the TAP
Expand access to finance	**Overall score: 20.5** **Effectiveness: *4.*** As demand for agroforestry development and financial need are high, and with sufficient financial resources, especially low interest loan would lead to significant agroforestry growth compared to business-as-usual scenario. However, considering the current and near future capacity of agroforestry entrepreneurs and financial Market, access to finance may remain limited, so that it might not have highest impact on agroforestry development. **Efficiency: *4.5.*** Normally financial and economic feasible project is financed. In addition, loan utilisation is usually efficient as management is stricter. **Cost-benefit: *4.*** As the effectiveness and efficiency. **Co-benefit: *4.*** **Sustainability: *4.*** Especially in the Market oriented era, where access to loans play critical role in the development.
Access to Market	**Overall score: 21** **Effectiveness: *5.*** As agroforestry development largely depend on Market, once agroforestry products and services are fully accessible to Markets, the agroforestry production and business would be significantly grown. In addition, if carbon Market also works for agroforestry, there would be a big jump on the development of agroforestry. **Efficiency: *4.*** Although there are some costs involving studies, promotion and engagement with Markets; once the products and services get accessed to Markets, the benefit would overweight the cost. **Cost-benefit: *4.*** As the effectiveness and efficiency are high. **Co-benefit: *4.*** **Sustainability: *4.*** Despite access to Market is critical for agroforestry, considering the current and future capacity of the responsible authorities and the entrepreneurs, there might still be a variation to access to Market.

Measures	criteria and scores considered in the section of the measures as actions to include in the TAP
Increase organisational capacity and human resources	**Overall score: 20** **Effectiveness: *4.*** Agroforestry would be significantly developed when the responsible organisations e.g., MAF and entrepreneurs have, apart from financial resources, sufficient human resource including knowledge and skills, leadership and commitment. However, the effectiveness level could possibly be high, but may not be very high since quality of the capacity building and application of knowledge and skills to develop agroforestry, even with external support, might not be at highest level in near future. **Efficiency: *4.*** Investing in human resources is perceived to be efficient, especially in the long term, and when the responsible organisations are trained with right knowledge and skills on the right time. So that they can to effectively develop and deploy an optimal or a sustainable agroforestry. However, the efficiency may not be very high considering level of the effectiveness. **Cost-benefit: *4.*** As well as effectiveness and efficiency. **Co-benefit/Interact with other measures: *4.*** **Sustainability: *4.*** Investing in HR should have great and long-term impact on agroforestry sustainability, especially when capacity building is conducted to the right organisations or people, and leadership and HRM is effective. However, despite sufficient HR could possibly help sustaining agroforestry, it may not hundred percent sure since sustainability depends on other factors too.
Research and develop best practices and best practice guidelines for biomass energy and technologies	**Overall score: 19.5** **Effectiveness: *4.*** The best practice guidelines are very important for development and maximisation of benefit from agroforestry systems, especially when it is informative and practical, and the responsible can effectively use it. The innovative or best practices, and guidelines would lead to high or very impact on optimal agroforestry in Laos compare to application of existing agroforestry development model or business-as-usual. **Efficiency: *4.*** Considering the investment in R&D of the best and innovative practices and guidelines, and the effectiveness or growth of agroforestry production and business following application of the best practices and guidelines. **Cost-benefit: *4***. As efficiency is moderate. **Co-benefit: *3.5.*** **Sustainability: *4.*** As it is for sustainability. However, it is hard to completely ensure the sustainability as it also depends on other factors. Sometimes it is hard to define the sustainability or acquire sufficient knowledge and skills to apply it.

Measures	criteria and scores considered in the section of the measures as actions to include in the TAP
Develop reference projects	**Overall score: 19.5** **Effectiveness: *4.*** The reference projects would, apart from being a model, possibly contribute to expansion of an optimal agroforestry, especially when it is well-defined, developed and the responsible are capable of extension. **Efficiency: *4.*** With a good design, the agroforestry production and business reference projects could be efficient. In addition, it would be more efficient when the projects are replicated/expanded following piloting. **Cost-benefit: *4***. As well as effectiveness and efficiency. **Co-benefit: *3.5.*** **Sustainability: *4.*** Especially when it is well-defined, developed and the responsible are capable of extension and adjust it to suit future context.
Research and develop information (on biomass technologies, feedstock, access to finance and Markets)	**Overall score: 17.5** **Effectiveness: *4.*** The information is very helpful as it is prerequisite of optimal agroforestry including development best practice guidelines, reference project, policy and capacity buildings. As Laos has very limited information, this action would have high impact on agroforestry development compare to business-as-usual scenario. **Efficiency: *3.*** Quite large amount of money is needed R&D of the information. Its impact on the agroforestry is indirect or depend on utilisation. **Cost-benefit: *3***. As efficiency is moderate. **Co-benefit: *3.5.*** **Sustainability: *4.*** Sustainability of resources largely depend on how well we know about the agroforestry systems as well as trees-crops interaction, productivity and technologies or silviculture practice to maximise the production. However, the sustainability depends on Market. the optimal systems might not always produce products that meet the Market demand.

Annex 4 Defining Schedule and Cost of the TAP for climate change mitigation in the Forestry Sector

1. Effective protected area management-EPAM

A. Schedule

Action/Activities		Planning (month/year)		Implementation (month/year)		Responsibility	
		Start	***Complete***	***Start***	***Complete***	***Primary***	***Secondary***
Action 1	**Maintain and enhance the public budget for PAM**						
Activity 1.1	*Develop strategy on EPAM and action plan of all NBCAs*	*May 18*	*May 18*	*Apr 18*	*May 19*	*MAF: DOF/ CFD*	*MAF: DFIP*
Activity 1.2	*Develop and submit comprehensive and financeable project proposal including reliable financial and economic analysis*	*Jun 18*	*Jul 18*	*Aug 18*	*Dec 19*	*MAF: DOF/ CFD*	*MAF: DOF/DOC, FPF* *MoNRE: EPF, DCC,*
Activity 1.3	*Improve effectiveness of public financing projects including M&E of the project impact, budget management system and reporting best practices*	*May 18*	*May 18*	*May 18*	*Sep 18*	*MAF: DOF/ CFD, DOC*	*MoNRE: EPF, DCC, DEP*
Action 2	**Increase revenue from ecosystem service and reinvest in EPAM**						
Activity 2.1	*Enhance sustainable ecotourism*	*May 18*	*May 18*	*May 18*	*Sep 18*	*MAF: DOF/ CFD* *MICT: DTPM*	*LNCCI: tourism association*
Activity 2.2	*Enhance sustainable non-timber forest products*	*May 18*	*May 18*	*May 18*	*Sep 18*	*MAF: DOF/ CFD, DAFE*	*LNCCI* *MAF: NAFRI* *FOF*
Activity 2.3	*Promote carbon credit mechanism*	*May 18*	*May 18*	*May 18*	*Sep 18*	*MAF: DOF/CFD*	*MAF: REDD Office* *MoNRE: DCC*
Activity 2.4	*R&D of effective or appropriate mechanisms and best practices, and apply them to improve payment for ecosystem services and reinvestment in EPAM*	*May 18*	*May 18*	*May 18*	*Sep 18*	*MAF: NAFRI* *NUOL: FOF, EFS, FOBE*	*MAF: DOF/CFD* *MICT: DTDM* *MoNRE: DEP* *Mining and HPD*

Action/Activities		Planning (month/year)		Implementation (month/year)		Responsibility	
		Start	***Complete***	***Start***	***Complete***	***Primary***	***Secondary***
Activity 2.5	*M&E and apply best practices to promote and enforce regulations on the contribution of businesses involving with NBCAs*	*May 18*	*May 18*	*May 18*	*Sep 18*	*MAF: DOF/ CFD*	*MAF: DOF/LLD, DFI MOJ* *MoNRE: DESA*
Action 3	**Enhance resource mobilisation**						
Activity 3.1	*Conduct financial needs and resources assessment*	*May 18*	*May 18*	*May 18*	*Sep 18*	*MAF: DOF/ CFD, DOC*	*MAF: FPF, REDD office, NAFRI. NUOL: FOF* *MICT: DTDM* *MoNRE: EPF, DCC*
Activity 3.2	*Develop financial resource directory*	*May 18*	*May 18*	*May 18*	*Sep 18*	*MAF: DOF/ CFD*	*MAF: FPF, DOC* *MoNRE: EPF*
Activity 3.3	*Develop and implement resource mobilisation plan*			*Oct 18*	*Dec 18*	*MAF: DOF/ CFD*	*MAF: FPF, DOC* *MoNRE: EPF*
Activity 3.4	*Increase capacity to develop financeable project proposal including financial and economic analysis*	*May 18*	*May 19*	*May 18*	*May 18*	*MAF: DOF/ CFD*	*MAF: FPF, DOC* *MoNRE: EPF*
Activity 3.5	*Increase cooperation and partnership with development partners, international originations, NGOs and NPO to increase financial resources for NBCAs*	*May 18*	*May 19*	*May 18*	*May 18*	*MAF: DOF/ CFD*	*MAF: FPF, DOC* *MoNRE: EPF*
Activity 3.6	*Improve financial aids management system including recording, reporting, M&E*	*May 18*	*May 19*	*May 18*	*May 18*	*MAF: DOF/ CFD*	*MAF: FPF, DOC* *MoNRE: EPF*
Action 4	**Increase organisational capacity and human resources**						
Activity 4.1	*Improve human resource development system including capacity development plan, staff knowledge, building learning culture and commitment (e.g., MAF and MoNRE)*	*May 18*	*May 19*	*May 18*	*May 18*	*MAF: DOF/ CFD, DPO*	*MAF: FPF, REDD office, NAFRI. NUOL: FOF* *MoNRE: EPF, DCC*
Activity 4.2	*Building national, local authorities and communities on effective or sustainable PAM through professional training and capacity building activities*	*May 18*	*May 19*	*May 18*	*May 18*	*MAF: DOF/ CFD, DPO*	*MAF: FPF, REDD office, NAFRI. NUOL: FOF* *MoNRE: EPF, DCC,*
Activity 4.3	*Increase staff and volunteers for EPAM*	*May 18*	*May 19*	*May 18*	*May 18*	*MAF: DOF/ CFD, DPO*	*MAF: FPF, REDD office, NAFRI. NUOL: FOF*

Action/Activities		Planning (month/year)		Implementation (month/year)		Responsibility	
		Start	***Complete***	***Start***	***Complete***	***Primary***	***Secondary***
							MoNRE: EPF, DCC
Activity 4.4	*Develop and implement strategy and action plans for all NBCAs*	*May 18*	*May 19*	*May 18*	*May 18*	*MAF: DOF/ CFD*	*MAF: DOC, DAFE* *MoNRE: DEP*
Activity 4.5	*Promote PA conservation network, think-tank and civil organisation and information exchanges*	*May 18*	*May 19*	*May 18*	*May 18*	*MAF: DOF/ CFD*	*MAF: DPO, DOC*
Activity 4.6	*Improve EPAM education and research in high education*	*May 18*	*May 19*	*May 18*	*May 18*	*NUOL: FOF*	*MAF: DOF/DCF, NAFRI*
Action 5	**Research and develop information for EPAM**						
Activity 5.1	*Conduct inventory of social and forest resources, ecosystem services including carbon sequestration and valuation*	*May 18*	*May 18*	*May 18*	*May 20*	*MAF: DFIP, DOF/ CFD, NAFRI*	*NUOL; FOF* *MoNRE: DCC*
Activity 5.2	*R&D of best practices on sustainable or EPAM (to support other actions)*	*May 18*	*May 18*	*May 18*	*May 20*	*MAF: NAFRI*	*MAF: DOF/CFD* *MoNRE: NRRI* *NUOL: FOF, FOBE*
Activity 5.3	*Improve information management systems and dissemination*	*May 18*	*May 19*	*May 18*	*May 18*	*MAF: NAFRI*	*MAF: DOF/CFD,* *MoNRE: DEF, NRRI* *NUOL: FOF, FOBE*
Action 6	**Pilot and expand EPAM reference projects and best practices**						
Activity 6.1	*Expand public-private partnership EPAM in Nam Ou, Nam Ha, Nam Ngum, Nam Leek, Nam Kading, Xe Banhieng, Xe Set, Xe Kong river basin*	*May 18*	*May 19*	*May 18*	*May 18*	*MAF: DOF/ CFD* *MEM: DEB, DEPP HPD*	*MAF: DOF/CFD, NAFRI FOF*
Activity 6.2	*Expand best practice community-based sustainable forest resources management*					*MAF: DOF/ CFD CRPR*	*MAF: DOF/VFD, DAFE, NAFRI,* *FOF*
Activity 6.3	*Law enforcement (contributions of the development projects and businesses involving with NBCAs to EPAM, polluter pays, justice)*	*May 18*	*May 19*	*May 18*	*May 18*	*MAF: DOF/CFD* *EDL, Hydro-power developers*	*MEM: DEB, DEPP* *MoNRE: DESA* *Ministry of Justices*
Activity 6.4	*Application of best technologies for monitoring of environmental changes and patrolling in NBCAs*	*May 18*	*May 19*	*May 18*	*May 18*	*MAF: DOF/ CFD*	*MST*

Action/Activities		Planning (month/year)		Implementation (month/year)		Responsibility	
		Start	***Complete***	***Start***	***Complete***	***Primary***	***Secondary***
Activity 6.5	*Forest restoration best practices*	*May 18*	*May 19*	*May 18*	*May 18*	*MAF: DOF/FRD*	*MAF: DOF/CFD and FPD*

B. Cost

Action	Activity	Cost (US$ Th.)
Action 1	**Maintain and enhance the public budget for PAM**	
Activity 1.1	*Develop strategy on EPAM and action plans of all 24 NBCAs*	*820.00*
Activity 1.2	*Develop comprehensive and financeable project proposal including reliable financial and economic analysis*	*170.00*
Activity 1.3	*Improve effectiveness of public financing projects including M&E of the project impact, budget management system and reporting best practices*	*13.00*
Action 2	**Increase revenue from ecosystem service and reinvest in EPAM**	
Activity 2.1	*Enhance promotion of sustainable ecotourism*	*1,320.00*
Activity 2.2	*Enhance sustainable non-timber forest products*	*2,400.00*
Activity 2.3	*Promote carbon credit mechanism*	*1,050.00*
Activity 2.4	*R&D effective and best practice guidelines on payment for ecosystem services and reinvestment in EPAM*	*610.00*
Activity 2.5	*M&E and apply best practices to promote and enforce regulations on the contribution of development projects and businesses involving with NBCAs*	*390.00*
Action 3	**Enhance resource mobilisation**	
Activity 3.1	*Conduct financial assessment to identify potential funding sources, edibility and capacity needs to access to the funding sources*	*815.00*
Activity 3.2	*Develop financial resource directory*	*13.00*
Activity 3.3	*Develop and implement resource mobilisation and donor engagement plan*	*90.00*
Activity 3.4	*Increase capacity to develop financeable project proposal including financial and economic analysis*	*150.00*
Activity 3.5	*Increase cooperation and partnership with development partners, international originations, NGOs and NPO to increase financial resources for NBCAs*	*55.00*

Activity 3.6	*Improve financial aids management system including recording, reporting, M&E*	*15.00*
Action 4	**Increase organisational capacity and human resources**	
Activity 4.1	*Improve human resource development system including capacity development plan, staff knowledge, building learning culture and commitment (e.g., MAF and MoNRE)*	*75.00*
Activity 4.2	*Building national, local authorities and communities on effective or sustainable PAM through professional training and capacity building activities*	*220.00*
Activity 4.3	*Increase staff and volunteers for EPAM*	*340.00*
Activity 4.4	*Promote PA conservation network, think-tank and civil organisation and information exchanges*	*60.00*
Activity 4.5	*Improve EPAM education and research in high education*	*100.00*
Action 5	**Research and develop information for EPAM**	
Activity 5.1	*Conduct inventory of social and forest resources, ecosystem services including carbon stock and valuation*	*1,500.00*
Activity 5.2	*R&D of best practices on sustainable or EPAM (to support other actions)*	*180.00*
Activity 5.3	*Improve information management systems and dissemination*	*20.00*
Action 6	**Pilot and expand EPAM reference projects (deploying best practices)**	
Activity 6.1	*Expand public-private (hydropower developers) partnership EPAM to protect PAs in Nam Ou, Nam Ha, Nam Ngum, Nam Leek, Nam Kading, Xe Banhieng, Xe Set, Xe Kong river basin*	*5,000.00*
Activity 6.2	*Expand best practice community-based sustainable forest resources management*	*5,750.00*
Activity 6.3	*Enhance law enforcement (contributions of the development projects and businesses involving with NBCAs to EPAM)*	*1,450.00*
Activity 6.4	*Enhance application of best technologies for monitoring of environmental changes and NBCAs patrolling*	*2,350.00*
Activity 6.5	*Enhance forest restoration*	*8,800.00*
Total		**34,536**

2. Sustainable community forestry management-SCFM

A. Schedule

Action	**Activity**	**Planning (month/year)**		**Implementation (month/year)**		**Responsibility**	
		Start	***Com-plete***	***Start***	***Com-plete***	***Primary***	***Secondary***
Action 1	**Maintain and enhance the public budget for SCFM**						

Action	Activity	Planning (month/year)		Implementation (month/year)		Responsibility	
		Start	***Com-plete***	***Start***	***Com-plete***	***Primary***	***Secondary***
Activity 1.1	*Develop strategy on SCFM including financial needs and resources assessment*	*May 18*	*May 18*	*May 18*	*Dec 18*	*MAF: DOF/ VFD*	*MAF: DOC*
Activity 1.2	*Develop financeable project proposal including reliable financial and economic analysis*	*Jun 18*	*Jul 18*	*Aug 18*	*Aug 19*	*MAF: DOF/ VFD*	*MAF:DOC, FPF*
Activity 1.3	*Improve public budget management system including recording, reporting, M&E*	*May 18*	*May 18*	*May 18*	*Dec 20*	*MAF: DOF/ VFD*	*MAF: DOC*
Action 2	**Enhance sustainable non-timber forest products**						
Activity 2.1	*Conduct NTFPs and value chains assessment*	*May 18*	*May 18*	*May 18*	*Dec 19*	*MAF: DOF/ VFD*	*MAF: DFIP/ NAFRI FOF, FOBE*
Activity 2.2	*Research and develop a sustainable NTFP management planning including sustainable harvesting*	*Jun 18*	*Jul 18*	*Aug 18*	*May 20*	*MAF: DOF/ VFD*	*MAF: DFIP/ NAFRI FOF*
Activity 2.3	*Improve NTFP Marketing and access to Markets*	*Aug 18*	*Sep 18*	*Oct 18*	*May 20*	*MAF: DOF/ VFD*	*NAFRI, FOF, FOBE SMEPD, LNCCI*
Activity 2.4	*Improve NTFP product diversification including processing capacity and quality improvement*	*Oct 18*	*Nov 18*	*May 19*	*May 20*	*MAF: DOF/ VFD*	*NAFRI, FOF, FOBE SMEPD, LNCCI*
Activity 2.5	*Improve NTFP production including domestication*	*Oct 18*	*Nov 18*	*May 19*	*May 20*	*MAF: DOF/ VFD*	*DOA, NAFRI DAFE FOF*
Action 3	**Enhance resource mobilisation**						
Activity 3.1	*Develop financial resource directory*	*May 18*	*May 18*	*May 19*	*Jun 19*	*MAF: DOF/ VFD*	*MAF: FFP DOC*
Activity 3.2	*Develop and implement resource mobilisation plan*	*Jun 18*	*Jul 18*	*Jul 18*	*Dec 18*	*MAF: DOF/ VFD*	*MAF: FFP DOC*
Activity 3.3	*Develop financeable project proposal including comprehensive financial and economic analysis (activity 1.2)*	*Oct 18*	*Nov 18*	*May 19*	*Dec 19*	*MAF: DOF/ VFD*	*DOC NAFRI, DAFE, FOF, SMEPD, LNCCI*
Activity 3.4	*Increase cooperation and partnership with development partners, international originations, NGOs and NPO*	*May 18*	*May 18*	*May 18*	*Dec 20*	*MAF: DOF/ VFD*	*MAF: DOC*

Action	Activity	Planning (month/year)		Implementation (month/year)		Responsibility	
		Start	***Com-plete***	***Start***	***Com-plete***	***Primary***	***Secondary***
Activity 3.5	*Improve financial aids management system including recording, reporting, M&E*	*May 18*	*May 18*	*May 18*	*Dec 18*	*MPI: DOP, DM&E*	*MAF: DOF/ VFD*
Action 4	**Increase organisational capacity and human resources**						
Activity 4.1	*Improve human resource development system including capacity development plan, staff knowledge, building learning culture and commitment (e.g., MAF and MoNRE)*	*May 18*	*May 18*	*May 18*	*May 19*	*MAF: DOF/ VFD*	*MAF: DPO, FOF*
Activity 4.2	*Building national, local authorities and communities on SCFM through professional training and capacity building activities*	*May 18*	*May 18*	*May 19*	*Dec 20*	*MAF: DOF/ VFD*	*MAF: DPO, FOF*
Activity 4.3	*Increase extension staff and volunteers to work with communities*	*Jun 18*	*Jul 18*	*Aug 18*	*Aug 20*	*MAF: DOF/ VFD*	*MAF: DPO, FOF, FOES FOBE*
Activity 4.4	*Improve SCFM education and research in high education*	*May 18*	*May 18*	*May 18*	*Jun 20*	*MAF: FOF, FOA, FOSS*	*DOF/ VFD*
Activity 4.5	*Promote SCFM network, think-tank and civil organisation and information exchanges*	*May 18*	*May 18*	*May 18*	*Dec 20*	*MAF: NAFRI*	*MAF: DOF/VFD, DPO, FOF*
Action 5	**Research and develop information for SCFM**						
Activity 5.1	*Conduct inventory of social and forest resources, ecosystem services including carbon sequestration and valuation*	*May 18*	*May 18*	*May 18*	*May 20*	*MAF: DFIP*	*MAF: NAFRI, FOF, FOES FOBE, DCC*
Activity 5.2	*R&D of best practices and guidelines on SCFM including sustainable resources harvesting, financing and organisation*	*May 18*	*May 18*	*May 18*	*May 20*	*MAF: NAFRI*	*MAF: DOF/VFD DAFE, FOF*
Activity 5.3	*Improve information management systems and information dissemination*	*May 18*	*May 18*	*May 18*	*May 20*	*MAF: NAFRI*	*MAF: DOF/VFD DAFE, FOF*
Action 6	***Eliminate poverty***						
Activity 6.1	*Survey and assess land use and sustainability of community settlement*	*May 18*	*Jun 18*	*Jul 18*	*Dec 22*	*MAF: DOF /VFD DPs*	*NAFRI, FOF DEB, DEPP DESA*
Activity 6.2	*Develop sustainable or resilient rural or town and land use plans*	*May 18*	*Jun 19*	*Jul 18*	*Dec 21*	*MAF: DOF/ VFD*	*NAFRI, FOF DOA*

Action	Activity	Planning (month/year)		Implementation (month/year)		Responsibility	
		Start	***Com-plete***	***Start***	***Com-plete***	***Primary***	***Secondary***
Activity 6.3	*Develop infrastructures and facilities for improve services in communities*	*May 18*	*Aug 18*	*Sep 18*	*Dec 22*	*MAF: DOF/VFD*	*DOF/FRD, NAFRI, FOF*
Action 7	**Improve SCFM legal framework**						
Activity 7.1	*Review and update the decree on village forest*	*May 18*	*May 18*	*May 18*	*Jun 18*	*MAF: DOF/ VFD*	*MAF: DOF/LLD MOJ*
Activity 7.2	*Enforce rules of law such as illegal conversion or encroachment and offset of village forests*	*Jun 18*	*Jul 18*	*Aug 18*	*Dec 19*	*MAF: DOF/ VFD*	*MAF: DOF/LLDMOJ*
Action 8	***R&D SCFM reference projects***						
Activity 8.1	*Expand public-private partnership on the SCFM affected and offset in development projects*	*May 18*	*Jun 18*	*Jul 18*	*Dec 22*	*MAF: DOF /VFD DPs*	*NAFRI, FOF DEB, DEPP DESA*
Activity 8.2	*Piloting NTFP domestication*	*May 18*	*Jun 19*	*Jul 18*	*Dec 21*	*MAF: DOF/ VFD*	*NAFRI, FOF DOA*
Activity 8.3	*Forest restoration*	*May 18*	*Aug 18*	*Sep 18*	*Dec 22*	*MAF: DOF/VFD*	*DOF/FRD, NAFRI, FOF*

B. Cost

Action/Activity		Cost (US$ th.)
Action 1	**Maintain and enhance the public budget for SCFM**	
Activity 1.1	*Develop strategy on SCFM including financial needs and resources assessment*	*20.00*
Activity 1.2	*Develop financeable project proposals including reliable financial and economic analysis*	*48.00*
Activity 1.3	*Improve public budget management system including recording, reporting, M&E*	*10.00*
Action 2	**Enhance reinvestment from sustainable non-timber forest products management**	
Activity 2.1	*Enhance conservation, production and commercialisation of NTFPs including improvement of NTFP production techniques and domestication, product diversification and quality, Marketing and access to Markets etc.*	*900.00*
Activity 2.2	*Research and develop a regulation on resources tax and fee for NTPF exploitation*	*70.00*
Action 3	**Enhance resource mobilisation**	

Activity 3.1	*Develop financial resource directory*	*3.00*
Activity 3.2	*Develop and implement resource mobilisation plan*	*12.00*
Activity 3.3	*Develop financeable project proposal including comprehensive financial and economic analysis (excluding activity 1.2)*	*48.00*
Activity 3.4	*Expand cooperation and partnership with development partners, international originations, NGOs and NPO*	*20.00*
Activity 3.5	*Improve financial aids management system including recording, reporting, M&E*	*5.00*
Action 4	**Increase organisational capacity and human resources**	
Activity 4.1	*Improve human resource development system including capacity development plan, staff knowledge, building learning culture and commitment (e.g., MAF and MoNRE)*	*50.00*
Activity 4.2	*Building national, local authorities and communities on SCFM through professional training and capacity building activities*	*120.00*
Activity 4.3	*Increase extension staff and volunteers to work with communities*	*90.00*
Activity 4.4	*Improve SCFM education and research in high education*	*80.00*
Activity 4.5	*Promote SCFM network, think-tank and civil organisation and forum*	*15.00*
Action 5	**Research and develop information for SCFM**	
Activity 5.1	*Conduct inventory of social and forest resources, ecosystem services including carbon sequestration and valuation*	*500.00*
Activity 5.2	*R&D of best practices and guidelines on SCFM including sustainable resources harvesting, financing and organisation*	*75.00*
Activity 5.3	*Improve information management systems and information dissemination*	*9.00*
Action 6	***Eliminate poverty***	
Activity 6.1	*Survey and assess land use and sustainability of community settlement*	*220.00*
Activity 6.2	*Develop sustainable or resilient rural or town and land use plans*	*850.00*
Activity 6.3	*Develop infrastructures and facilities for improve services in communities*	*5,350.00*
Action 7	**Improve SCFM legal framework**	
Activity 7.1	*Review and update the decree on village forest*	*25.00*
Activity 7.2	*Enforce rules of law such as illegal conversion or encroachment and offset of village forests*	*525.00*
Action 8	***Develop SCFM reference projects***	
Activity 8.1	*Expand public-private partnership SCFM: Sustainable offset forests management*	*2,220.00*
Activity 8.2	*Livelihood-based SCFM: Sustainable NTFP restoration, domestication and commercialisation*	*3,350.00*
Activity 8.3	*Effective law enforcement for coping with illegal forest conversion and encroachment*	*1,350.00*
Total		***15,965.00***

3. Optimal plantation

A. Schedule

Action	Activities	Planning (month/year)		Implementation (month/year)		Responsibility	
		Start	***Complete***	***Start***	***Complete***	***Primary***	***Secondary***
Action 1	**Expand access to finance**						
Activity 3.1	*Strengthening cooperation between domestic and regional banks and financial institutes (to expand financial markets, lowering interest rate for borrowing)*	*May 18*	*Jun 18*	*Jul 18*	*Dec 22*	*MOF: BOL* *MPI: DIP* *MOIC:SMEPD*	*DOF/PFD* *Public and private banks.* *LNCCI*
Activity 3.2	*Increase financial capacity and readiness and of entrepreneurs*	*May 18*	*May 19*	*May 18*	*Dec 22*	*LNCCI*	*DOF/PFD.* *MOCI: SMEPD.* *MPI: DIP.*
Activity 3.3	*Organise financial access dialogue on SPF financing*	*May 18*	*Apr 19*	*May 18*	*Dec 22*	*LNCCI*	*BOL* *DOF/ PFD.* *SMEPD* *DIP.*
Action 2	**Expand access to market**						
Activity 2.1	*Improve plantation registration*	*May 18*	*May 18*	*May 18*	*Dec 22*	*MAF: DOF/ PFD*	*LNCCI*
Activity 2.2	*Develop market strategy (based on market research, see action 4)*	*May 18*	*Apr 18*	*May 18*	*May 19*	*MAF: DOF/ PFD*	*MOCI: SMEPD*
Activity 2.3	*Organise business trips and dialogues*	*May 18*	*Jun 18*	*Oct 18*	*Dec 22*	*LNCCI*	*BOL* *DOF/ PFD.* *SMEPD* *DIP*
Activity 2.4	*Continue organising and participating trade fairs on plantation and plantation products*	*May 18*	*May 18*	*Oct 18*	*Dec 22*	*MAF: DOF/ PFD*	*SMEPD*
Activity 2.5	*Enhance trading under Forest Law Enforcement, Governance and Trade (FLEGT) with EU and similar scheme with other countries*	*May 18*	*May 18*	*May 18*	*Dec 20*	*MAF: DOF/ PFD*	*SMEPD*

Action	Activities	Planning (month/year)		Implementation (month/year)		Responsibility	
		Start	***Complete***	***Start***	***Complete***	***Primary***	***Secondary***
Action 3	**Increase organisational capacity and human resources**						
Activity 3.1	*Conduct capacity needs assessment*	*May 18*	*May 18*	*May 18*	*Dec 18*	*DOF/ PFD*	*DPO* *LNCCI*
Activity 3.2	*Conduct financial and technical support assessment*	*May 18*	*May 18*	*May 18*	*Apr 19*	*DOF/ PFD*	*DPO* *NAFRI* *LNCCI*
Activity 3.3	*Develop a plan to access to financial and technical support*	*May 18*	*Jun 18*	*Aug 18*	*Dec 18*	*DOF/ PFD*	*FPF, EPF* *LNCCI*
Activity 3.4	*Provide SFP technical and financial trainings including skills develop financeable project proposal*	*May 18*	*May 18*	*May 18*	*Dec 22*	*DOF/ PFD*	*FPF, EPF* *LNCCI*
Activity 3.5	*Increase cooperation and partnership with development partners, international originations and INGOs on capacity building*	*May 18*	*Jun 18*	*Aug 18*	*Dec 22*	*DOF/ PFD*	*DPO* *LNCCI*
Activity 3.6	*Improve financial aids management system including recording, reporting, M&E*	*May 18*	*May 18*	*May 18*	*Dec 18*	*DOF/ PFD*	*LNCCI*
Activity 3.7	*Develop SPF strategy and action plans*	*May 18*	*May 18*	*May 18*	*Dec 18*	*DOF/ PFD*	*DOC*
Activity 4.5	*Promote establishment of SPF network, think-tank and civil organisation and information exchanges*	*May 18*	*May 18*	*Apr 18*	*Dec 22*	*DOF/ PFD*	*DOC* *LNCCI*
Activity 4.6	*Improve SFP education and research in high education*	*May 18*	*May 18*	*May 18*	*May 19*	*FOF*	*DOF/ PFD*
Action 4	**Enhance research and piloting SFP practices**						
Activity 4.1	*R&D land suitability map including tree species matching for plantations*	*May 18*	*May 18*	*Apr 18*	*May 19*	*MAF: NAFRI*	*DOF/PFD, DFIP* *FOF*
Activity 4.2	*R&D optimal plantation systems that possibly generate socioeconomic and environmental benefit including mitigation for a plantation land*	*May 18*	*May 18*	*Apr 18*	*Dec 21*	*MAF: NAFRI*	*DOF/PFD, DFIP* *FOF* *LNCCI*

Action	Activities	Planning (month/year)		Implementation (month/year)		Responsibility	
		Start	***Complete***	***Start***	***Complete***	***Primary***	***Secondary***
Activity 4.3	*R&D Silviculture techniques to increase plantation productivity including maintaining soil nutrients and carbon*	*May 18*	*May 18*	*Apr 18*	*Dec 22*	*MAF: NAFRI*	*DOF/PFD, DFIP FOF LNCCI*
Activity 4.4	*R&D best practices on community participatory plantation development including contract farming*	*May 18*	*May 18*	*Apr 18*	*Dec 22*	*MAF: NAFRI*	*DOF/PFD FOF LNCCI*
Activity 4.5	*Carry out feasibility of financial and economic incentives (tax reduction, subsidies etc.) for promoting sustainable plantation*	*May 18*	*May 19*	*May 18*	*May 18*	*MPI: ERI NAFRI FOBE*	*DOF/PFD FOF LNCCI*
Activity 4.6	*Conduct value chain analysis of SPF products and market research*	*May 18*	*May 18*	*May 18*	*May 20*	*MPI: ERI NAFRI FOBE*	*DOF/PFD FOF LNCCI*
Activity 4.7	*Study feasibility to adopt an international SPF practices e.g., FSC and best practices to support policy development*	*May 18*	*May 19*	*May 18*	*May 18*	*MPI: ERI NAFRI*	*DOF/PFD FOF LNCCI*
Action 5	***Develop policy or regulation on SFP***						
Activity 5.1	*Formulate a policy or regulation on SFP (based on action 4, R&D)*	*May 18*	*May 18*	*Apr 18*	*Dec 19*	*MAF: DOF/ PFD*	*MAF: DOF/LLD Ministry of Justices*

B. Cost

Action/Activities		Cost (US$ thousand)
Action 1	**Expand access to finance**	
Activity 3.1	*Strengthening cooperation between domestic and regional banks and financial institutes (to expand domestic financial markets including lowering interest rate and simply procedures for borrowing)*	*90.00*
Activity 3.2	*Increase financial capacity and readiness and of entrepreneurs*	*120.00*
Activity 3.3	*Organise financial access dialogue on SPF financing*	*70.00*

Action 2	**Expand access to Market**	
Activity 2.1	*Improve plantation registration*	*50.00*
Activity 2.2	*Develop Market strategy (based on Market research, see action 4)*	*20.00*
Activity 2.3	*Organise business trips and dialogues*	*80.00*
Activity 2.4	*Continue organising and participating trade fairs on plantation and plantation products*	*100.00*
Activity 2.5	*Enhance trading under Forest Law Enforcement, Governance and Trade (FLEGT) with EU and similar scheme with other countries*	*65.00*
Action 3	**Increase organisational capacity and human resources**	
Activity 3.1	*Conduct capacity needs assessment*	*12.00*
Activity 3.2	*Conduct financial and technical support assessment*	*25.00*
Activity 3.3	*Develop a plan to access to financial and technical support*	*15.00*
Activity 3.4	*Provide SFP technical and financial trainings including skills develop financeable project proposal*	*60.00*
Activity 3.5	*Increase cooperation and partnership with development partners, international originations and INGOs on capacity building*	*20.00*
Activity 3.6	*Improve financial aids management system including recording, reporting, M&E*	*6.00*
Activity 3.7	*Develop SPF strategy and action plans*	*15.00*
Activity 4.5	*Promote establishment of SPF network, think-tank and civil organisation and information exchanges*	*30.00*
Activity 4.6	*Improve SFP education and research in high education*	*80.00*
Action 4	**Enhance research and piloting SFP practices**	
Activity 4.1	*R&D land suitability map including tree species matching for plantations*	*500.00*
Activity 4.2	*R&D optimal plantation systems that possibly generate socioeconomic and environmental benefit including mitigation for a plantation land*	*65.00*
Activity 4.3	*R&D Silviculture techniques to increase plantation productivity including maintaining soil nutrients and carbon*	*70.00*
Activity 4.4	*R&D best practices on community participatory plantation development including contract farming*	*55.00*
Activity 4.5	*Carry out feasibility of financial and economic incentive (tax reduction, subsidies etc.) for promoting sustainable plantation*	*25.00*
Activity 4.6	*Conduct value chain analysis of SPF products and market research*	*150.00*
Activity 4.7	*Research and identify feasibility and best practices to adopt an international SPF practices e.g., FSC to support policy development*	*30.00*
Action 5	***Develop policy or regulation on SFP***	
Activity 5.1	*Formulate a policy or regulation on SFP (based on research in action 4)*	*15.00*

Total		***8,784.00***

4. Optimal agroforestry

A. Schedule

Action/Activity		**Planning (month/year)**		**Implementation (month/year)**		**Responsibility**	
		Start	*Complete*	*Start*	*Complete*	Primary	*Secondary*
Action 1	**Maintain public financial support and enhance resource mobilisation for agroforestry extension**						
Activity 1.1	*Conduct financial assessment-identification of funding sources and feasibility*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*
Activity 1.2	*Develop and implement resource mobilisation plan*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*
Activity 1.3	*Increase capacity to develop financeable project proposal including financial and economic analysis*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*
Activity 1.4	*Engage and reach cooperation and partnership agreement with development partners, international originations, NGOs, NPOs and private sector to access to financial support*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*
Activity 1.5	*Improve financial aids management system including financial sources or donor directory, M&E, reporting, and roundtable for feedback*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*
Action 2	**Expand access to finance**						
Activity 2.1	*Facilitate cooperation between domestic and regional banks and financial institute to expand domestic financial Markets including lowering interest rate and simply procedures for borrowing*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*

Activity 2.2	*Develop a fund for agriculture development*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*
Activity 2.3	*Increase financial capacity and readiness and of entrepreneurs*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*
Activity 2.4	*Organise agroforestry forum including financial access*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*
Action 3	**Increase organisational capacity and human resources**						
Activity 3.1	*Improve human resource development system including capacity development plan, staff knowledge, building learning culture and commitment (e.g., MAF)*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*
Activity 3.2	*Building national, local authorities and communities on agroforestry*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*
Activity 3.3	*Increase extension staff-mobile team*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*
Activity 3.4	*Develop and implement strategy and action plans for agroforestry*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*
Activity 3.5	*Promote agroforestry network, think-tank and civil organisation and information exchanges*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*
Activity 3.6	*Improve agroforestry education and research in high education*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*
Action 4	**Research and develop information and best practice guidelines**						
Activity 4.1	*Conduct studies and disseminate information on agroforestry systems, its performance and optimal agroforestry systems*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*

Activity 4.2	*Develop and disseminate information about land suitability map including trees and crops matching, optimal production systems including financial analysis of each system*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*
Activity 4.3	*Develop and disseminate information about agroforestry product Markets, finance, production and processing technologies, inputs and networks*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*
Activity 4.4	*R&D of best practices and guidelines on sustainable or optimal agroforestry systems including one for access to carbon Market,*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*
Action 4	***Develop reference projects on optimal agroforestry systems***						
Activity 4.1	*Pilot (3) optimal agroforestry systems*	*May 18*	*May 19*	*May 18*	*May 18*	*MOF: DOF, DOA*	*MAF: DOC, FPF, DAFE*

B. Cost

Action/Activity		**Cost (US$ th.)**
Action 1	**Enhance resource mobilisation for agroforestry extension**	
Activity 1.1	*Conduct financial needs and resources assessment*	*45.00*
Activity 1.2	*Develop financial resource directory*	*5.00*
Activity 1.3	*Develop and implement resource mobilisation plan*	*25.00*
Activity 1.4	*Increase capacity to develop financeable project proposal including financial and economic analysis*	*40.00*
Activity 1.5	*Increase cooperation and partnership with development partners, international originations, NGOs and NPOs*	*25.00*
Activity 1.6	*Improve financial aids management system including recording, reporting, M&E*	*7.00*
Action 2	**Expand access to finance**	
Activity 2.1	*Strengthening cooperation between domestic and regional banks and financial institutes (to expand domestic financial Markets including lowering interest rate and simply procedures for borrowing)*	*80.00*
Activity 2.2	*Develop a fund for agriculture development*	*2,000.00*
Activity 2.3	*Increase financial capacity and readiness and of entrepreneurs*	*70.00*
Activity 2.4	*Organise agroforestry forum including financial access forum*	*50.00*
Action 3	**Increase organisational capacity and human resources**	

Activity 3.1	*Improve human resource development system including capacity development plan, staff knowledge, building learning culture and commitment (e.g., MAF)*	*65.00*
Activity 3.2	*Building national, local authorities and communities on agroforestry*	*110.00*
Activity 3.3	*Increase extension staff-mobile team*	*290.00*
Activity 3.4	*Develop and implement strategy and action plans for agroforestry*	*35.00*
Activity 3.5	*Promote agroforestry network, think-tank and civil organisation and information exchanges*	*45.00*
Activity 3.6	*Improve agroforestry education and research in high education*	*80.00*
Action 4	**Research and develop information and best practice guidelines**	
Activity 4.1	*Conduct studies and disseminate information on agroforestry systems, its performance and optimal agroforestry systems*	*135.00*
Activity 4.2	*Develop land suitability map, assess trees and crops matching, and identify optimal production systems including financial analysis of each system*	*1,120.00*
Activity 4.3	*Develop and disseminate information about agroforestry product Markets, finance, production and processing technologies, inputs and networks*	*345.00*
Activity 4.4	*R&D of best practices and guidelines on sustainable or optimal agroforestry systems including one for access to carbon market,*	*140.00*
Action 5	***Develop reference projects***	
Activity 5.1	*Pilot a sustainable or optimal agroforestry*	*4,300.00*
Total		***17,012.00***

Annex 5 Defining Schedule and Cost of the TAP for climate change mitigation in the agriculture sector

1. Livestock feed improvement

A. Schedule

Actions	**Activities**	**Preparation**		**Implementation**		**Responsible body**	
		Start	Complete	Start	Complete	Primary	Secondary
Action 1	**Improve the public budget and resource mobilisation**						
Activity 1.1	*Conduct financial assessment*	*May 18*	*May 18*	*May 18*	*Dec 18*	*MAF: DOLF*	*MAF: DOC LNCCI*
Activity 1.2	*Develop and implement resource mobilisation plan*	*May 18*	*May 18*	*May 18*	*Dec 22*	*MAF: DOLF*	*MAF: DOC LNCCI*

Activity 1.3	*Increase capacity to develop financeable project proposal including financial and economic analysis*	*May 18*	*May 18*	*May 18*	*Dec 22*	*MAF: DOLF*	*MAF: DOC LNCCI*
Activity 1.4	*Increase cooperation and partnership with development partners, international originations, NGOs and NPOs*	*May 18*	*May 18*	*May 18*	*Dec 22*	*MAF: DOLF*	*MAF: DOC LNCCI*
Activity 1.5	*Develop financial resource directory and improve financial aids management system including recording, reporting, M&E*	*May 18*	*May 18*	*May 18*	*Dec 18*	*MAF: DOLF*	*MAF: DOC LNCCI*
Action 2	**Expand access to finance**						
Activity 2.1	*Facilitate cooperation between domestic and regional banks and financial institutes (to expand domestic financial Markets including lowering interest rate and simply procedures for borrowing)*	*May 18*	*Jun 18*	*Jul 18*	*Jul 22*	*MAF: DOLF*	*MAF: DOC LNCCI*
Activity 2.2	*Increase financial capacity and readiness and of entrepreneurs*	*May 18*	*May 18*	*Jun 18*	*Dec 22*	*MAF: DOLF*	*MAF: DOC LNCCI*
Action 3	**Expand access to Market**						
Activity 3.1	*Increase promotion of an optimal agrosilvopastoral production systems and feed concentrates*	*May 18*	*May 18*	*May 18*	*Dec 19*	*MAF: DOLF*	*MAF: DOC LNCCI*
Action 4	**Increase organisational capacity and human resources**						
Activity 4.1	*Improve human resource development system including capacity development plan, staff knowledge, building learning culture and commitment (e.g., MAF and LNCCI)*	*May 18*	*May 18*	*May 18*	*Dec 18*	*MAF: DOLF*	*MAF: DOC LNCCI*
Activity 4.2	*Increase professional trainings on livestock feed including fodder resources, production techniques and technologies, legal system*	*May 18*	*May 18*	*May 18*	*Dec 18*	*MAF: DOLF*	*MAF: DOC LNCCI*
Activity 4.3	*Increase extension staff-mobile team*	*May 18*	*May 18*	*May 18*	*Dec 18*	*MAF: DOLF*	*MAF: DOC LNCCI*
Activity 4.4	*Enhance the livestock including feed development network*	*May 18*	*May 18*	*May 18*	*Dec 18*	*MAF: DOLF*	*MAF: DOC LNCCI*
Activity 4.5	*Improve the livestock feed education and research in high education*	*May 18*	*May 18*	*May 18*	*Dec 18*	*MAF: DOLF*	*MAF: DOC LNCCI*

Activity 4.6	*Develop feed development strategy and action plans for extension and development*	*May 18*	*May 18*	*May 18*	*Dec 18*	*MAF: DOLF*	*MAF: DOC LNCCI*
Action 5	***Develop and pilot an optimal agrosilvopastoral system and feed including concentrates***						
Activity 5.1	*R&D best practices and pilot an optimal agrosilvopastoral and crop diversification system that may possibly generate maximum benefits on a land use*	*May 18*	*May 18*	*May 18*	*Dec 18*	*MAF: DOLF*	*MAF: DOC LNCCI*
Action 6	***Develop legal framework on feed management and enhance law enforcement***						
Activity 6.1	*Research and develop policies on feed management including livestock land, feed/fodder resources conservation and development*	*May 18*	*May 18*	*May 18*	*Dec 18*	*MAF: DOLF*	*MAF: DOC LNCCI*

B. Cost

Actions	Activities	Cost (UD$ Th.)
Action 1	**Improve the public budget and resource mobilisation**	
Activity 1.1	*Conduct financial assessment including financial needs, feasibility of tax reduction, subsidies, business and cost sharing models.*	*35.00*
Activity 1.2	*Develop resource mobilisation plan*	*12.00*
Activity 1.3	*Increase capacity to develop financeable project proposal including financial and economic analysis*	*60.00*
Activity 1.4	*Increase cooperation and partnership with development partners, international originations, NGOs and NPOs*	*15.00*
Activity 1.5	*Develop financial resource directory and improve financial aids management system including recording, reporting, M&E*	*10.00*
Action 2	**Expand access to finance**	
Activity 2.1	*Facilitate cooperation between domestic and regional banks and financial institutes (to expand domestic financial Markets including lowering interest rate and simply procedures for borrowing)*	*80.00*
Activity 2.2	*Increase trainings on business and financial management for entrepreneurs*	*60.00*
Action 3	**Expand access to Market**	
Activity 3.1	*Increase promotion of an optimal agrosilvopastoral production systems and feed concentrates*	*750.00*
Action 4	**Increase organisational capacity and human resources**	

Activity 4.1	*Improve human resource development system including capacity development plan, staff knowledge, building learning culture and commitment*	*25.00*
Activity 4.2	*Increase professional trainings on livestock feed including fodder resources, production techniques and technologies, legal system*	*100.00*
Activity 4.3	*Increase extension staff-mobile team*	*75.00*
Activity 4.4	*Enhance the livestock including feed development network*	*45.00*
Activity 4.5	*Improve the livestock feed education and research in high education*	*60.00*
Activity 4.6	*Develop feed development strategy and action plans for extension and development*	*30.00*
Action 5	***Develop and pilot an optimal agrosilvopastoral system and feed including concentrates***	
Activity 5.1	*Pilot an upgrading degraded and develop agrosilvopastoral system that may possibly generate maximum benefits on a land use*	*5,065.00*
Activity 5.2	*Pilot development of optimal feed including concentrates*	*850.00*
Action 6	***Develop legal framework on feed management and enhance law enforcement***	
Activity 6.1	*Research and develop policies on feed management including livestock land, feed/fodder resources conservation and development*	*20.00*
	Total	***7,229.00***

2. Organic farming

A. Schedule

Action	**Activity**	**Preparation**		**Implementation**		**Responsible**	
		Start	Complete	Start	Complete	Primary	Secondary
Action 1	**Improve the public budget and resource mobilisation**						
Activity 1.1	*Conduct financial assessment*	*May 18*	*May 18*	*May 18*	*Dec 18*	*MAF: DOA*	*MAF: DOC LNCCI*
Activity 1.2	*Develop and implement resource mobilisation plan*	*May 18*	*May 18*	*Oct 18*	*May 19*	*MAF: DOA*	*MAF: DOC LNCCI*
Activity 1.3	*Increase capacity and develop financeable project proposal including financial and economic analysis*	*May 18*	*May 18*	*May 18*	*Dec 22*	*MAF: DOA*	*MAF:DOC NAFRI. LNCCI*
Activity 1.4	*Increase cooperation and partnership with development partners, international originations, NGOs and NPOs*	*May 18*	*May 18*	*Jun 18*	*Dec 22*	*MAF: DOA*	*MAF: DOC LNCCI*
Activity 1.5	*Develop financial resource directory and improve financial aids management system including recording, reporting, M&E*	*May 18*	*May 18*	*May 18*	*Dec 18*	*MAF: DOA*	*MAF: DOC LNCCI*

Action 2	**Expand access to finance**						
Activity 2.1	*Strengthening cooperation between domestic and regional banks and financial institutes (to expand financial Markets including lowering interest rate of loan)*	*May 18*	*May 18*	*Jun 18*	*Dec 22*	*MOF: BOL, LADB, NB*	*MAF:DOA MOCI: SMEPD LNCCI*
Activity 2.2	*Increase financial capacity and readiness and of entrepreneurs*	*May 18*	*May 18*	*Jun 18*	*Dec 22*	*SMEPD LNCCI*	*DOA*
Activity 2.3	*Organise the organic farming business forum including financial access forum*	*May 18*	*May 18*	*Jun 18*	*Dec 22*	*LNCCI SMEPD*	*DOA*
Action 3	**Expand access to Market**						
Activity 3.1	*Market assessment (domestic and regional Markets)*	*May 18*	*May 18*	*Jun 18*	*Dec 18*	*SMEPD LNCCI*	*DOA*
Activity 3.2	*Develop Marketing and promotional strategy*	*May 18*	*May 18*	*Sep 18*	*May 19*	*SMEPD LNCCI*	*DOA*
Activity 3.3	*Organise business trips and dialogues in the regions*	*May 18*	*May 18*	*Jun 18*	*Dec 22*	*SMEPD LNCCI*	*DOA*
Activity 3.4	*Continue organising and participating trade fairs*	*May 18*	*May 18*	*Jun 18*	*Dec 22*	*SMEPD LNCCI*	*DOA*
Activity 3.5	*Cooperate with actors to expand Market places*	*May 18*	*May 18*	*Jun 18*	*Dec 22*	*SMEPD LNCCI*	*DOA*
Action 4	**Increase organisational capacity and human resources**						
Activity 4.1	*Improve human resource development system including capacity development plan, staff knowledge, building learning culture and commitment (e.g., MAF)*	*May 18*	*May 18*	*Apr 18*	*Dec 22*	*DPO*	*DOA SMEPD LNCCI*
Activity 4.2	*Increase professional trainings on the organic farming*	*May 18*	*May 18*	*Apr 18*	*Dec 22*	*DOA SMEPD LNCCI*	*FOA*
Activity 4.3	*Increase extension staff-mobile team*	*May 18*	*May 18*	*Apr 18*	*Dec 18*	*DOA LNCCI*	*SMEPD*
Activity 4.4	*Enhance the organic farming network, think-tank and civil organisation*	*May 18*	*May 18*	*Apr 18*	*Dec 22*	*NAFRI*	*DOA SMEPD LNCCI*
Activity 4.5	*Improve the organic farming education and research in high education*	*May 18*	*May 18*	*Apr 18*	*Apr 19*	*FOA*	*DOA NAFRI*

							SMEPD
Action 5	***Develop and pilot an optimal organic farming system***						
Activity 5.1	*Research and define an optimal organic farming system that may possibly generate maximum benefits on a land use*	*May 18*	*May 18*	*Apr 18*	*Apr 19*	*DOA*	*NAFRI* *FOA* *FOF*
Activity 5.2	*Pilot a sustainable or optimal organic farming systems including integrated farming, home garden, agroforestry, crop diversification etc.*	*May 18*	*May 18*	*Jun 18*	*Dec 22*	*DOA*	*NAFRI* *FOA, FOF* *SMEPD*

B. Cost

Action	Activity	Cost (US$ th.)
Action 1	**Improve the public budget and resource mobilisation**	
Activity 1.1	*Conduct financial assessment*	*50.00*
Activity 1.2	*Develop and implement resource mobilisation plan*	*20.00*
Activity 1.3	*Increase capacity to develop financeable project proposal including financial and economic analysis*	*75.00*
Activity 1.4	*Increase cooperation and partnership with development partners, international originations, NGOs and NPOs*	*5.00*
Activity 1.5	*Develop financial resource directory and improve financial aids management system including recording, reporting, M&E*	*6.00*
Action 2	**Expand access to finance**	
Activity 2.1	*Strengthening cooperation between domestic and regional banks and financial institutes (to expand domestic financial markets including lowering interest rate and simply procedures for borrowing)*	*60.00*
Activity 2.2	*Increase financial capacity and readiness and of entrepreneurs*	*70.00*
Activity 2.3	*Organise the organic farming business forum including financial access forum*	*45.00*
Action 3	**Expand access to market**	
Activity 3.1	*Market assessment (domestic and regional markets)*	*70.00*
Activity 3.2	*Develop marketing and promotional strategy*	*10.00*
Activity 3.3	*Organise business trips and dialogues in the regions*	*90.00*
Activity 3.4	*Continue organising and participating trade fairs*	*85.00*
Activity 3.5	*Coordinate and cooperate with actors to expand market places*	*15.00*
Action 4	**Increase organisational capacity and human resources**	

Activity 4.1	*Improve human resource development system including capacity development plan, staff knowledge, building learning culture and commitment*	*40.00*
Activity 4.2	*Increase professional trainings on the organic farming*	*105.00*
Activity 4.3	*Increase extension staff-mobile team*	*150.00*
Activity 4.4	*Enhance the organic farming network, think-tank and civil organisation*	*22.00*
Activity 4.5	*Improve the organic farming education and research in high education*	*70.00*
Action 5	***Develop and pilot an optimal organic farming system***	
Activity 5.1	*Research and define an optimal organic farming system that may possibly generate maximum benefits on a land use*	*110.00*
Activity 5.2	*Pilot a sustainable or optimal organic farming systems including integrated farming, home garden, agroforestry, crop diversification etc.*	*6,800.00*
Total		***7,898.00***

3. Manure-based biogas

A. Schedule

B. Cost

Action	Activity	Cost (US$ Th.)
Action 1	Expand access to finance	
Activity 1.1	Strengthening cooperation between domestic and regional banks and financial institutes (to expand domestic financial markets including lowering interest rate and simply procedures for borrowing)	85
Activity 1.2	Increase financial capacity and readiness and of entrepreneurs	80
Activity 1.3	Organise financial access dialogue on biogas development including financing	75
Action 2	Increase the public supports including subsidise to promote larger and standard farm and technologies	
Activity 2.1	Conduct feasibility, impact, trade-off of the public subsidies on biogas and define sustainable financial mechanism for biogas development	30
Activity 2.2	M&E and expand a sustainable financial mechanism for biogas development	16,000
Action 3	Increase organisational capacity and human resources	
Activity 3.1	Provide professional training and exchanges on biomass energy development including technologies, access to finance and mitigation	80
Activity 3.2	Improve HRD system of the public organisations responsible for biomass energy	50

Action	Activity	Cost (US$ Th.)
Activity 3.3	Improve biogas energy education and research in high education	75
Activity 3.4	Promote establishment of renewable energy including biogas network, expert group and exchanges	40
Action 4	Improve raw material and feedstock	
Activity 4.1	Promote larger and standard animal farms	120
Activity 4.2	Conduct assessment of biogas including present and future availability of feedstock	35
Activity 4.3	R&D and diversify or define alternative raw materials for biogas	45
Action 5	Improve and enforce policy or regulation on renewable, biogas and environment including environmentally friendly technologies	
Activity 5.1	Formulate and enforce policies or regulations on environmentally friendly technologies	30
Activity 5.2	Improve and enforce policies on biogas development and management	30
		16,775

4. Agricultural residue-based biomass energy

A. Schedule

Action	**Activity**	**Planning**		**Implementation**		**Responsibility**	
		Start	***Complete***	***Start***	***Complete***	**Primary**	**Secondary**
Action 1	**Expand access to finance**						
Activity 1.1	*Strengthening cooperation between domestic and regional banks and financial institutes (to expand financial Markets including lowering interest rate of a loan for business)*	*May 18*	*Jun 18*	*Jul 18*	*Jul 22*	*MOF: BOL* *MPI: DIP* *MOIC: SMEPD*	*MEM: DEB, DEPP* *Public and private banks, LNCCI*
Activity 1.2	*Increase financial capacity and readiness and of entrepreneurs*	*May 18*	*May 18*	*Sep 18*	*Sep 22*	*BOL* *DIP* *SMEPD*	*LNCCI,* *DEB, DEPP*
Activity 1.3	*Organise financial access dialogue on biomass financing*	*May 18*	*May 18*	*Jun 18*	*Jun 22*	*BOL* *DIP* *SMEPD*	*LNCCI,* *DEB, DEPP*

Action	Activity	Planning		Implementation		Responsibility	
		Start	***Complete***	***Start***	***Complete***	**Primary**	**Secondary**
Action 2	**Increase and subsidise renewable energy price and apply policies on feed-in tariff or adder**						
Activity 2.1	*Conduct feasibility, impact, trade-off and define appropriate feed-in-tariff or adder mechanism*	*May 18*	*May 18*	*Apr 18*	*Dec 18*	*BOL DIP SMEPD*	*DEB, DEPP EDL*
Activity 2.2	*Piloting and M&E of feed-in-tariff or adder mechanism*	*Oct 18*	*Dec 18*	*May 19*	*May 22*	*BOL*	*MOF: DOFP, DOR*
Action 3	**Increase organisational capacity and human resources**						
Activity 3.1	*Provide professional training and exchanges on biomass energy development including technologies, access to finance, policy and climate change mitigation*	*May 18*	*May 18*	*Jun 18*	*Jun 22*	*DEB, DEPP*	*LNCCI MST*
Activity 3.2	*Improve human resources development system of the public organisations responsible for biomass energy*	*May 18*	*May 18*	*Jun 18*	*Jun 22*	*DEPP DEB*	*LNCCI, EDL*
Activity 3.3	*Improve biomass energy education and research in high education*	*May 18*	*May 18*	*Jun 18*	*Jun 22*	*NUOL: FOE*	*DEB, DEPP MST*
Activity 3.4	*Promote establishment of renewable energy including biomass network, think-tank and information exchanges*	*May 18*	*May 18*	*Jun 18*	*Jun 22*	*BOL. DIP SMEPD*	*LNCCI, DEB, DEPP*
Action 4	**Improve raw material and feedstock**						
Activity 4.1	*Study feasibility of large farm/merging farm*	*May 18*	*May 18*	*Jun 18*	*Jun 22*	*BOL. DIP SMEPD*	
Activity 4.2	*Conduct assessment of biomass feedstock*	*May 18*	*May 18*	*Jun 18*	*Jun 22*	*BOL. DIP SMEPD*	
Activity 4.3	*R&D of substitute or alternative raw materials*	*May 18*	*May 18*	*Jun 18*	*Jun 22*	*BOL. DIP SMEPD*	
Action 5	***Develop policy or regulation on renewable including biomass promotion***						
Activity 5.1	*Formulate a policy or regulation on feed-in-tariff*	*May 18*	*May 18*	*Jun 18*	*Jun 22*	*BOL. DIP SMEPD*	

Action	Activity	Planning		Implementation		Responsibility	
		Start	***Complete***	***Start***	***Complete***	**Primary**	**Secondary**
Activity 5.2	*Formulate a policy or regulation on the use of agriculture and forestry residues*	*May 18*	*May 18*	*Jun 18*	*Jun 22*	*BOL. DIP SMEPD*	

B. Cost

Action	Activity	Cost (US$ Th.)
Action 1	Expand access to finance	
Activity 1.1	Strengthening cooperation between domestic and regional banks and financial institutes (to expand financial Markets)	85.00
Activity 1.2	Increase financial capacity and readiness of entrepreneurs to access to finance	80.00
Activity 1.3	Organise financial access dialogue on biomass financing	75.00
Action 2	Increase and subsidise renewable energy price and apply policies on feed-in tariff or adder	
Activity 2.1	Conduct feasibility, impact, trade-off and define appropriate feed-in-tariff or adder mechanism	30.00
Activity 2.2	Piloting and M&E of feed-in-tariff or adder mechanism	26,000
Action 3	Increase organisational capacity and human resources	
Activity 3.1	Provide professional training and exchanges on biomass energy development including technologies, access to finance, policy and mitigation	80.00
Activity 3.2	Improve human resources development system of the biomass energy responsible organisations	50.00
Activity 3.3	Improve biomass energy education and research in high education	75.00
Activity 3.4	Promote establishment of renewable energy including biomass network, think-tank and information exchanges	40.00
Action 4	Improve raw material and feedstock	
Activity 4.1	Study feasibility of large farm/merging farm	120.00
Activity 4.2	Conduct assessment of biomass feedstock	85.00
Activity 4.3	R&D of substitute or alternative raw materials	95.00
Action 5	Develop policy or regulation on renewable including biomass promotion	
Activity 5.1	Formulate a policy or regulation on feed-in-tariff	30.00
Activity 5.2	Formulate a policy or regulation on the use of agriculture and forestry residues	30.00

Action	Activity	Cost (US$ Th.)
	26,875	