

## **Annex 5: DRAFT Technical Review of the Lao PDR FIP Investment Plan and Team Response**

### **INDEPENDENT TECHNICAL REVIEW FOREST INVESTMENT PROGRAM OF LAOS PDR**

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Submitted to the CIF Administrative Unit, Government of Laos,  
and the FIP Team leader of the World Bank and Asia Development Bank  
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### **INTRODUCTION**

The present paper contains a review of the concept draft version of the FIP Investment Plan of Laos dated September 19, 2011. This review has been prepared in accordance with the guidance provided by the CIF Unit of the World Bank.

Laos has the highest natural forest cover – estimated at about 40% in 2010 - of any country in South and Southeast Asia. The wide range of latitudes, elevations, regional climates and soil types results in a very diverse natural forest estate comprising the following major forest zones: six lowland forest formations – Evergreen (EF), Semi-evergreen (SEF), Mixed deciduous (MDF), Dry Dipterocarp (DDF) and Pek Savannas; four upland forest formations - Montane hardwood (MH), Montane conifer (MC), Mixed Montane Hardwood/Conifer (MMHC); and one northern sub-tropical formation - Evergreen Hardwood (SEH).

The proposed FIP is well documented and contains a broadly-based and (perhaps overly-) ambitious management proposal consisting of three projects: Project 1- Protecting Forests for Sustainable Environmental Service Delivery (supported by ADB, GIZ, JICA and KfW); Project 2 - Small-holder and Private Enterprise Partnerships (supported by IFC); and Project 3 - Scaling-up Participatory Sustainable Forest Management (supported by World Bank, Government of Finland and International Development Agency). The FIP generally acknowledges the national situation in natural resource and land management and past experiences, but there are numerous problems with emphasis, omissions and evident biases that constrain objective analysis. Perhaps the major criticism, however, is that the plan generally lacks a practical

and disciplined focus. Not everything can be done simultaneously and there should be much greater attention to the three foundations of FIP - emission reduction, poverty alleviation, and forest ecosystem recovery - and a realistic prioritization and sequencing of the activities that can be undertaken over the proposed management period with some expectation of success.

The proposal can be strengthened in three fundamental ways:

- better definition of what constitutes deforestation and degradation in different natural forest formations, since this definition is critical to the development of ecologically-appropriate forest management responses and interventions - natural management, rehabilitation (rest), restoration (enrichment plantings) and conversion (plantations).
- prioritization of the main elements of deforestation/degradation that should be addressed in the short- to medium-term for emission reductions, which I would suggest are: 1) unregulated agricultural/tree-crop expansion; 2) uncontrolled clearing for infrastructure and large-scale industrial development; 3) pioneering shifting cultivation (always to be differentiated from rotational swidden); and 4) illegal exploitation and international trade in forest/biodiversity products – all of which suggest that the single most important FIP strategy should be the support and further refinement of comprehensive and effective programs of compliance monitoring and enforcement of the natural resource and land management laws and regulations of GOL (note that this reviewer believes that most fire in dry forest communities and swidden cultivation do not contribute to deforestation and are at least low carbon emitters and may even have net carbon sequestration; and
- down-sizing, rationalization and technical improvement to the Lao timber processing industry, which would have the effect of reducing pressure on the natural forest, increasing the profitability of individual mills (and therefore the price they can pay for logs under PSFD), undercut the profitability of illegal timber harvest, and increase the quality (value-added) of products (furniture and fine hardwoods) which would significantly improve long-term sequestration of the carbon they contain.

These suggestions are discussed in more detail in Part III, below.

## PART I: GENERAL CRITERIA

The following table summarizes how the draft investment plan complies with the general criteria for FIB investment plans and programs.

<b>Criteria</b>	<b>Score</b>	<b>Comments</b>
Complies with the principles, objectives and criteria of the FIP as specified in the design documents and programming modalities	P	P, O & C of the FIP are taken into account but priority activities are not well thought out and thus some investment project priorities are questionable.
Takes into account the country capacity to implement the plan	N	Overly-ambitious and unfocussed given national capacity and competing development programs. Needs rigorous refocus and prioritization.
Developed on the basis of sound technical assessments	P	Project 3 is well conceived and documented, based on 12 years of past PSFM experience. Projects 1 and 2 are much more speculative and less convincing in their technical assessment and design.
Demonstrates how it will initiate transformative impact	P	Project 3 continues to be one of the most innovative and transformative projects in Asia (despite continuing problems associated with revenue-sharing and ethnic community engagement). Project 1 is innovative and potentially transformative but is totally untested. Project 2 is not innovative or transformative and could benefit from the experiences (positive and negative) of similar GOV/WB/KfW projects in Vietnam.
Provides for prioritization of investments, stakeholder	P	Prioritization of investments is constrained by the previously-

consultation and engagement, adequate capturing and dissemination of lessons learned, and monitoring and evaluation and links to the results framework		mentioned lack of “focus and prioritization” in FIP concept. Consultation/engagement, dissemination of lessons learned, and monitoring/evaluation have been chronic weaknesses in Laos and will require a renewed focus in FIP
Adequately addresses social and environmental issues, including gender	P	The 3 project statements pay the usual attention to social, environmental and gender issues. Specifics are vague and, as usual, the proof will be in final design and implementation
Supports new investments or funding that is additional to on-going/planned MDB investments	P	FIP is a new investment and as such is complementary to various MDB and bilateral program investments. Further bilateral and private sector possibilities are not identified specifically and this may not be possible except during final FIP preparation.
Takes into account institutional arrangements and coordination	P	Adequate at the higher level of REDD+ and FIP administration, but it still remains to be seen if the GOL can provide the required levels of institutional cooperation and coordination (national/provincial/district) to develop and implement integrated planning at the national and local levels.
Promotes poverty reduction	P/N	While poverty reduction is always an objective of most GOL programs, many policies (i.e. land allocation and its relationship to swidden cultivators) actually exacerbate ethnic poverty. The “jury is out” on the potential effect of Project 2 on poverty alleviation because aspects of similarly proposed small-holder programs in Vietnam actually

		increased householder indebtedness and resulted in behaviour that increased C emissions and ecosystem degradation.
Considers cost effectiveness of investments	N	If, by this, it is meant whether there is consideration of cost-effectiveness in reducing C emissions (let alone in poverty alleviation and ecosystem recovery) there is simply not sufficient information to judge. One wouldn't expect this at this stage of FIB design but there should at least be some reference to the monitoring and evaluation mechanisms that might demonstrate eventual "cost-effectiveness in the final FIP.

*\*F: Fully complies; L: Largely complies; P: Partially complies; N: Does not comply*

In summary, the current document is useful step in the process of preparing a final FIP. What is necessary in subsequent iterations is a more disciplined problem analysis to identify the most critical deforestation/degradation issues, and a far more focused approach to the development of pertinent programs to address those issues

## **PART II: COMPLIANCE WITH THE INVESTMENT CRITERIA OF THE FIP**

A general assessment whether the investment plan complies with the specific criteria for FIP is as follows:

<b>Criteria</b>	<b>Score</b>	<b>Comments</b>
Climate change mitigation potential	P	Rough estimates are given for potential emission reductions due to Projects 1 and 3 "for year 1 and after year 8". Estimates for Project 2 are to be determined. The methodology for establishing baselines and estimating potential reductions is not apparent. Estimates in Sec. 1.3 showing average

		annual emissions/ha from 2012 to 2020 for swidden cultivation being 25% higher than that for commercial tree crop concessions seem hardly credible.
Demonstration potential at scale		Cannot be determined, since in this reviewer's opinion the current program proposals do not address the primary issues of emission reduction.
Cost-effectiveness	P	Cannot be determined with the information available (see above). Current financial leverage appears to come from traditional partners and donors. No significant private sector contributions are apparent as yet.
Implementation potential	P	Project 3 is an extension of the current experience in PSFM through SUFORD and other projects. Project 1 is very speculative and there is doubt whether the strong emphasis on swidden reduction is possible or desirable. Project 3 involves plantation and woodlot establishment in which there is not a body of experience in Laos, however, much can be learned from the successes and failures of the extensive plantation regimes in Vietnam.
Integrating sustainable development (co-benefits)	P	Project 3 is aimed primarily at ecologically-based participatory forest management and thus at least in intent supports sustainable development. Project 1 is aimed at protecting ecosystem services but a seeming preoccupation with eliminating swidden cultivation could have serious implications for the welfare and food security of ethnic minority peoples. Project 2 focuses on the development of smallholder and private plantations and woodlots, however, both the environmental and social benefits will

		depend on the adoption of sustainable plantation models (details not yet specified).
Safeguards -natural forest conservation	F	The FIP is clear that no forest lands will be converted to other purposes except those on which natural forest cover has been substantially reduced (<20%)

*\*F: Fully complies; L: Largely complies; P: Partially complies; N: Does not comply*

## **PART III. RECOMMENDATIONS**

### **1. BETTER DEFINITION OF DEFORESTATION/DEGRADATION**

The FIP report states that a model for developing strategies and prioritizing actions for reducing carbon emissions takes as its starting point the distribution of forest cover according to four crown density classes: - well-stocked forest (>70%); medium-stocked regenerating forest (40-70%); low-stocked forest (20-39%); and un-stocked forest (<20%) – which seems to be a proxy for estimating degrees of forest degradation. This crown density classification is not ecologically defensible when applied across all Lao forest formations. It may be appropriate for Semi-evergreen Forest (SEF) and moister Mixed Deciduous Forest (MDF) communities, but it is not applicable to drier MDF, Dry Dipterocarp (DD) or Pek Savanna communities. For example, while a 25% crown closure may imply serious degradation of a SEF forest, the same crown closure may be well within the range of natural variation (RONV) for a Dry Dipterocarp (DDF) forest. Laos has five main lowland forest formations - Semi-evergreen (SEF), Mixed deciduous (MDF), Dry Dipterocarp (DDF) and Pek Savannas; four upland forest formations - Montane hardwood (MH), Montane conifer (MC), Mixed Montane Hardwood/Conifer (MMHC); and one sub-tropical formation - Evergreen Hardwood (SEH). A crown density classification must be developed for each of these major forest formations to give proper guidance to FIP.

Rote application of the current crown density classification will result in overestimation of carbon emissions, lands requiring restoration/rehabilitation and, more seriously, of “degraded” forests that warrant conversion from natural communities to tree crop/cash crop plantations.

## **2. A MORE CONSTRUCTIVE APPROACH TO SWIDDEN CULTIVATION**

Throughout this FIP document there is a recurring theme of discrimination and bias against rotational swidden agriculture as practised by ethnic minorities outside the Mekong lowlands. This bias is illustrated by the use of phrases in the main report (though not, interestingly, in the executive summary) such as the pejorative “slash and burn” (which does not distinguish between pioneer and rotational cultivations systems), a distinction between “farmers and shifting cultivators”, and the “eradication of shifting cultivation”. Perhaps one of the most evident indications of this bias is contained in Table 2, page 3, in which it is contended that annual CO<sub>2</sub> emissions per ha over the period 2012-2020 from “shifting cultivators” are estimated to be 25% higher than those from commercial concessions and smallholder cash crops. This seems hardly credible given that swidden is cultivated on small, incompletely-cleared plots by household hand-labour with no significant petroleum-based inputs, while commercial cash crop production involves total vegetation removal (including stumps) by heavy equipment, mechanical cultivation, clean weeding, significant fertilizer and pesticide inputs, mechanical harvesting, and crop processing, marketing and transportation.

A stated goal of the GOL is to increase forest cover to 70%, and in order to achieve this it is “undertaking efforts to rationalize agriculture in the upland and mountainous regions”. These efforts also aim to improve food (rice) security and to reduce acute poverty in upland communities. At the same time, these programmes are also expected to contribute to national objectives of environmental protection and conservation of biological diversity. In order to effect these improvements, Government has initiated a land and forest allocation programme, involving the allocation of land to individuals, villages and commercial organizations.

The allocation programme is undertaken with the aim of achieving a number of national goals, such as: reducing deforestation; restoring land productivity; improving land use efficiency; enhancing rural livelihoods; diversifying agricultural production; and “reducing or eliminating shifting cultivation”. Land allocation programs were originally conceived as a way of curtailing illegal activities by giving local villages control of forest resources through a process of participatory management. Somewhere along the way this original laudable vision has become subservient to an indiscriminate preoccupation with eliminating “shifting cultivation” and promoting the "focal site" approach to rural development, which involves bringing villages to services (through village relocation and consolidation) rather than bringing services to villages.



The end result of the land allocation process is that in many upland areas, households have been allocated only three parcels for cultivation in which they can rotate. Thus, the fallow period is now reduced to 3-4 years, which is simply not adequate to restore fertility. Also, in many instances, the total amount of land given is less than is necessary to meet household needs regardless of the number of "rotational parcels". Sometimes this is due to the land allocation procedures of local authorities but in other cases villagers themselves fail to ask for the land they require because they are taxed for all land allocated as though it is in continuous full production. The inevitable result of the land allocation program on poorer soils will be soil degradation and a significant loss of agricultural livelihood and food security.

These land allocation programs are predicated on the lowland belief that only permanent agriculture, consisting of paddy, gardens, orchards and plantations, is appropriate and acceptable. This agricultural paradigm has become the dogma of dominant ethnic groups all over Southeast Asia who farm highly-productive soils either in alluvial floodplains or those derived from base-rich volcanic or calcareous geological formations. These people (whether Javan, Thai, Lao, Khmer, lowland Vietnamese, Han Chinese or Bumiputra Malaysians) consider those who farm poorer soils by rotational methods as "backward and primitive". In fact, just the opposite is true and peasant rotational farmers have evolved highly sophisticated and sustainable practices to deal with the reality of their environments, referred to by a prominent tropical agricultural specialist as "the single largest knowledge resource not yet mobilized in the global agricultural development enterprise".

The imposition of more sedentary agricultural practices on upland swidden farmers is being pursued without much attention to where it might be possible and desirable, especially in relation to soil productivity. Laos appears to contain a considerable array of soil types including: acidic and infertile podzols and deep sandy soils; rich and fertile volcanic soils; brown forest soils of moderate fertility in drier, northern upland areas; fertile alluvial soils; heavy clays; thin, fertile but droughty and erodible limestone soils; and even peat soils. These soils have vastly different inherent agricultural capability and capacity to respond to cultural inputs. Some are amenable to static agriculture while others are not. In particular, the dominant soils of the tropics, such as those derived from ancient, neutral to acidic sedimentary/ metamorphic rocks are not capable of supporting static agriculture, and when sedentary agriculture is imposed, serious, long-term site degradation and loss of village food security are common consequences.

Such soils have been farmed sustainably for centuries by traditional rotational agricultural systems involving a cultural period of 1 to 3 years and a fallow

period of 5 to 15 years. These systems are both ecologically sound and technically sophisticated, involving a considerable traditional knowledge of inherent soil fertility and a great diversity of crop species (up to 20 -25). Clearings are small and irregular with high retention of useful trees, stumps and roots, which minimises soil erosion and promotes rapid re-growth when the site is returned to fallow. Cropping is characterized by complexity and diversity; often involving as many as 20-25 varieties of exotic and native plants. The focus on such soils should be less on eradicating rotational cultivation and more on optimizing the length of the fallow recovery periods by improved practice, and on low-intensity perennial cropping for food, fodder, NTFPs and cash crops on land under fallow. It must be kept in mind, however, that these are very vulnerable human communities living constantly “on the edge”, who do not have the luxury of aggressive “experimentation” in their livelihoods.

### **3. EVALUATING THE ECOLOGICAL ROLE OF FIRE IN LAO FORESTS**

Like similar dry ecosystems in western North America and Australia, the composition and structure of monsoonal ecosystems (Dry Deciduous, Dry Dipterocarp and Savanna Forests) in Laos have been determined historically by regular, largely-anthropogenic fire. An important consideration in the influence of fire on ecosystem function is the relationship between fire frequency and fire intensity. Though many species in these ecosystems are fire-dependent, too-frequent fires will affect seedling survival and the spread of weed species, while longer fire intervals may lead to fuel accumulations that result in unnatural, catastrophic, high-severity fires. There is now a considerable body of information originating from Western North America and Australia that regular, low-intensity ground fires (3 to 20 year return periods) in dry ecosystems greatly enhance carbon accumulation and storage (particularly in the soil) when compared with periodic high-severity fires (40 to 70+ year return periods) resulting from fire exclusion and fuel accumulation. It is possible that ethnic communities in Laos use fire too frequently and without clear objectives, but fire is a pervasive ecological influence in much of the country and it won't go away and it can't be ignored; we must learn to use it wisely. FIP should consider joint silvicultural and fire ecology studies to determine possible approaches to holistic ecosystem management and measures to improve the resiliency and adaptation to climate change in dry forest formations. The intent of these studies would be to develop, in consultation with local communities, a “prescribed fire” code of practice to guide fire use.

#### **4. IMPROVING CONSULTATION AND ENGAGEMENT WITH ETHNIC MINORITY PEOPLES**

The Social Impact Assessment prepared for SUFORD-AF concluded that in the 6-year SUFORD project, while Lao speakers in the Mekong lowland had a reasonable understanding of, and engagement in, the project, the few ethnic minority communities on the periphery of the lowlands had no such understanding and engagement. It attributed this to “a considerable communications gap (that) exists” between MAFF staff and ethnic villagers and “a poor appreciation and understanding of the implications of ethnic diversity on the part of PAFOs and DAFOs”. Furthermore it concluded that ethnographic studies carried out under the project had “not been sufficiently incorporated into project manuals and guidelines or into the implementation strategy of the project generally”.

Clearly, the ethnic minority communities in Laos have a significant role to play in both FIP and REDD+ design and implementation. There is a real opportunity in the FIP and REDD+ programs to build on the experiences gained in SUFORD and other donor projects to:

- acquire a cadre of competent translators to facilitate constructive communication and engagement with villagers in ethnic communities in participatory forest management, the consequences of global climate change, and practical measures to reduce greenhouse gas emissions;
- compile short ethnographies on ethnic minorities (traditional livelihoods, cultural practices, relationships to their environment) to be used in a training program for government staff on ethnic group issues; and
- capture and incorporate traditional ecological knowledge (TEK) into management programs and identify measures to improve TEK practices to limit greenhouse gas emissions.

It is not clear from the current FIP Investment Program that anything like the required consultation and engagement program is contemplated.

#### **5. IMPLEMENTING AND MONITORING COMPLIANCE AND ENFORCEMENT WITH LAO'S ENVIRONMENTAL AND NAUTRAL RESOURCE LAWS AND REGULATIONS**

A recurring theme throughout this report is that management problems are not due to a lack of “legislation/regulations” but “more to the capacity to implement and enforce the policies in a developing political system”. Unfortunately, little progress has been made, so far, in developing an effective external monitoring/enforcement system. The creation of a Forest Inspection Department with a clear enforcement function provides a new opportunity for system development that could be supported by FIP.

Enforcement is a complex and highly-technical function involving a number of elements that are critical to its effectiveness:

- a regulatory regime that provides clear legal definitions of non-compliance;
- enabling legislation supporting search of property and seizure of assets in cases of suspected illegal acts;
- a senior level, “standing committee” to coordinate the activities of those involved in compliance and enforcement – DFI, DOF, police, army, state prosecutors and courts – through the establishment of formal, enforceable protocols and memoranda of understanding;
- enforcement staff trained in techniques of legal investigation and rules of evidence;
- a close and constructive relationship between enforcement investigators and legal prosecutors;
- a law-based set of flexible enforcement actions spanning a range consistent with the severity of the offense (i.e. administrative sanctions, stop-work and remediation orders, monetary penalties (by "ticketing"), and court prosecution resulting in fines and/or imprisonment); and
- a fair and transparent court system.

These elements clearly represent an "ideal" that can be achieved only incrementally, however, there must at least be the intent to introduce them if the enforcement function is to have a chance at effectiveness and comprehensive compliance monitoring is to be considered. Around the world, the single biggest constraint to the effectiveness of compliance monitoring and enforcement systems, and the moral and dedication of the staff who run them, is the political will to enforce the law and its regulations. In the absence of that political will, such systems quickly become unsustainable.

GOL regulations appear to suggest that the political will for law enforcement exists. If so, a well-conceived compliance monitoring and enforcement system should lead to improved enforcement of regulatory compliance, better forest practices and enhanced revenue collection. Standardized reporting, recording and analysis will allow law enforcement authorities to track the status of investigations of unauthorized or illegal activities, and thus to conduct better structured, more systematic, and more efficient enforcement actions. Enhanced recording systems will enable timely and meaningful compilation of reports on compliance and enforcement for political decision-makers and the public. This, in turn, may result in greater transparency and awareness of compliance with forest law and, ultimately, in stronger political and public support for forest law enforcement

A competent compliance program will also support continued FSC certification, with associated "chain-of-custody" and independent performance auditing requirements. Certification should lead to achievement of internationally-accepted standards of sustainable forest management and to substantially higher prices and market shares for logs and wood products. Since certification will be based on regulatory compliance and on independent auditing (paid out of management funds and higher product prices) it should result in a decreased regulatory and administrative burden to government.

## **6. ECOLOGICALLY-BASED FOREST RESTORATION AND SUSTAINABLE PLANTATIONS**

### **Natural forest restoration**

Artificial regeneration on any significant scale is a very expensive proposition involving significant plant propagation facilities, invariably employs limited genetic stock, is seldom very successful, and is always inferior in results to natural regeneration from well-conceived silvicultural prescriptions. So-called "enrichment plantings" have also resulted in some jurisdictions, such as Malaysia, in significant distortions of natural stand composition and loss of biodiversity. Any attempts at artificial regeneration activities must:

- have clearly established objectives;
- be limited to areas of significantly degraded forest where natural regeneration is unlikely, as determined by well-designed regeneration surveys; and
- utilize the widest possible range of species and genetic materials native to the particular area.

Natural regeneration should be confirmed as the preferred method of achieving adequate stocking on PFAs. Artificial regeneration should be employed **only** where it can be demonstrated that natural regeneration is not possible and where it can be justified both economically and ecologically.

### **Industrial and Small-holder Commercial Tree Crop Plantations**

Commercial tree crop plantations are not forests and their establishment should not be considered reforestation or forest restoration. They are much more like agricultural systems and have many of the same risks, vulnerabilities, uncertainties and carbon consequences. Plantations can be made more like natural systems to improve the ecological stability and resilience that limits the risk of plantation failure and reduces the necessity for artificial inputs to these simplified ecosystems by:

- incorporating diversity (of genetic materials, species, age classes, rotation lengths, and spatial structure at the landscape-level); and
- aggressive protection of organic matter in all cultural operations from establishment to harvesting.

Vietnam, because of serious past deforestation (now <20 % forest cover) resulting from the American War, has embarked on an extensive government, industry and small-holder wood plantation program. Initial plantation programs focused on intensive short-rotation plantations – 6-8 year Eucalyptus/Acacia pulpwood - with little or no control over plantation practices. There are now serious doubts whether these plantations are sustainable even in the medium-term. Most of the areas presently under consideration for inclusion in the Vietnamese program contain very poor degraded soils (like Laos) - (Ultisols (grey, yellow and red podzols). Chemical properties are very poor and include: low pH; aluminum toxicity; and significant nutrient deficiencies (nitrogen, phosphorus, potassium, calcium, magnesium, sulphur, zinc and many micro-nutrients). Most of these site nutrients would have been lost during initial forest clearing, and the sites have probably been subsequently degraded during a period of unregulated agricultural exploitation. Cation exchange capacity (the ability of the soil to hold nutrients) is very low for most nutrients and thus the benefits of fertilization are often very transitory. Conversely, the high acidity and presence of iron and aluminum tends to immobilize phosphorus, which often becomes the major limiting macro-nutrient on such soils. Phosphate fertilization is not usually effective unless accompanied by heavy liming, which adds substantially to management costs.

A general principle of soil science is that in temperate ecosystems the main reservoir of nutrients is the soil, whereas, in tropical ecosystems the main reservoir of nutrients is above and below ground, living and dead vegetation. Because of their extreme age and the high degree of leaching under the prevailing climate, the upland soils of Southeast Asia would have been unproductive even under the original natural forest cover, and the majority of site nutrients would have been continually recycled within the vegetation and humus layer – tropical moist forests are amongst the world's most efficient recyclers. Once nutrients are lost they can be replaced only at great expense, if at all.

In the Vietnam program, production for current plantations was expected to be 100-120 m<sup>3</sup>/ha on a 7-year rotation, or 14 to 17 m<sup>3</sup>/ha/annum. Such yields may be achievable on better sites in the first rotation but on poorer sites and in subsequent rotations, the removal of such a large biomass, and attendant site disturbance every 7 years, will most probably lead to nutrient depletion, with serious consequences for long-term site quality and yield in subsequent

rotations, and increasing carbon emissions. There is little question that trees can be grown on these sites, however, there are real doubts that current growth expectations can be sustained for very long. Present plantation establishment is far in advance of the scientific information necessary to demonstrate sustainability and financial viability (a lesson for Laos).

One way in which plantation risks (economic and ecological) can be estimated and mitigated is through simple simulation models of nutrient status/nutrient flow for selected plantation sites and silvicultural models. Simulation models can be used to develop plantation guidelines and prescriptions (species mixes, rotation ages, site selection criteria, site preparation techniques, practical fertilization regimes, thinning regimes, weeding, and harvesting prescriptions) that are sustainable over the long-term. The ecosystem simulation group in the Faculty of Forestry at the University of British Columbia (UBC), Vancouver, Canada has developed a simulation model (FORECAST) that has already been calibrated and applied to similar plantation situations in Thailand and tropical and sub-tropical China. The appendix below provides details of a proposed program to apply this model to plantation management in Vietnam. This program would aim to train government staff in the application and operation of the FORECAST model (which is in the Canadian public domain and thus UBC charges no patent fees as the developer) for ongoing use in assessing the site and species suitability of different plantation models.

## **APPENDIX**

### **Application of the FORECAST model to evaluate sustainable production in *Acacia mangium* plantations in Vietnam**

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## **MODEL OVERVIEW**

The stand-level, ecosystem-based, forest growth model FORECAST (Kimmins et al. 1999) was developed to evaluate the long-term implications of alternative forest management strategies on a variety of biophysical indicators of sustainable forest management. It has been applied in a number of studies to examine the impact of short rotation management on long-term site productivity (e.g. Morris et al. 1997, Bi et al., 2007, Seely et al, in review). The model employs a mass balance approach to evaluate the effects of management on site nutrient capital and availability, which is directly linked to stand productivity.

Growth in FORECAST is presently limited to consideration of nutrient and light availability, however a new version with climate change capabilities is under development.

## **EXPERIENCE IN CHINA**

The University of British Columbia research team has recently begun a joint research project with Dr. Hong Jiang and others at Zhejiang Forestry University in Hang Zhou. The objective of this project, jointly funded by the Canadian and Chinese governments, is to bring modeling technology developed in Canada to China to help support evaluations of sustainability in a variety of forest plantation ecosystems. Specifically, the FORECAST model is being calibrated to examine the sustainability of management alternatives in Chinese fir (*Cunninghamia lanceolata*), bamboo (various species) and Mason pine (*Pinus massoniana*) plantations in southeastern China. An initial training and planning workshop was held at Zhejiang Forestry University in September of 2008. Follow-up training and model development will occur at both the University of British Columbia and locations in China in the future.

## **POTENTIAL FOR APPLICATION TO VIETNAM PLANTATION SYSTEMS**

The design of FORECAST allows for its application to many different forest stand types and conditions, and the model is well suited for an analysis of the long-term implications of alternative short-rotation plantation management systems.

This paper describes the basic data needed to calibrate and operate the model for Vietnamese coastal ecosystems, and provides an estimation of resource requirements for initial data collection and to train staff of the Vietnam Forest Science Institute in model application.

### **Data Requirements**

The modular structure of FORECAST allows it to be run at different levels of complexity. Data requirements will increase with higher levels of ecosystem diversity and complexity. For example, a more detailed calibration data set is required to run the model for natural forest communities with multiple species / vegetation types than for fibre plantations where the number of species is usually small and stands are simple in structure. The basic data requirements for vegetation and soils to be represented in the model are presented in Tables 1 and 2, respectively. For the highest level of model accuracy, data should be based on site-specific measurements, however, estimates from published values from representative sites will suffice for general evaluations. As indicated in



Table 1, growth data are required for each plant or tree species to be represented in the model. In addition, to represent site quality change, data must be provided for a minimum to two nutritional site qualities.

Table 1. Primary vegetation data requirements to calibrate FORECAST. These data will be required for each tree species to be included in the analysis.

<b>Category</b>	<b>Description</b>	<b>Potential sources</b>
Stem biomass	For an age sequence on at least two site qualities	Derived from growth and yield data
Branch biomass	For an age sequence on at least two site qualities	Derived from allometric relationships
Foliage biomass	For an age sequence on at least two site qualities	From published values and allometric relationships
Coarse root biomass	For an age sequence on at least two site qualities	From published values and allometric relationships
Fine root biomass	For an age sequence on at least two site qualities	From published values and allometric relationships
Live tissue nutrient conc.	For each biomass type listed above. Range for site qualities (%N, %P)	Sampling, published values
Dead tissue nutrient conc.	For each biomass type listed above. Range for site qualities (%N, %P)	Sampling, published values
Litterfall rates	Annual estimates (% of live)	Sampling, published values
Top Height	Height /age curves on at least two site qualities	Published values
Stem density	Stem density pattern for an age sequence in un-thinned stands	Published values
Litter decay rates	Mass loss (%) for each biomass type listed above.	Published values, climate based estimates
Canopy shading	For an age sequence on at least two site qualities	Sampling, published values

Table 2. Soil data requirements to calibrate FORECAST. These data will be required for each general soil type/condition to be represented as a starting point in the model.

<b>Soil Characteristic</b>	<b>Description</b>	<b>Potential sources</b>
General soil type	For selecting soil calibration data base	Regional soil maps or site sampling
Soil depth	Rooting zone	Regional soil maps or site sampling
pH	Either by layer or avg. for rooting zone	Sampling, published values
%N	Either by layer or avg. for rooting zone	Sampling, published values
% org C	Either by layer or avg. for rooting zone	Sampling, published values
% P	Total P by layer or avg. for rooting zone	Sampling, published values
Textural description	% clay content and description of clay types	Sampling, published values
Bulk density	g cm <sup>3</sup>	Sampling, published values
Coarse fragment content	% for rooting zone	Sampling, published values
Exchangeable cations: (c mol kg <sup>-1</sup> soil)	Including K, Ca, Mg	Sampling, published values
SOM decomp. rate	Mass loss (%) per year for humus (range)	Published values, climate based estimates

The program proposed for Vietnam could occur in two phases, depending on the needs of the FSDP:

### **Phase 1**

- Calibrate FORECAST for short-rotation *Acacia mangium* plantations (models 1/2) and variable-rotation mixed plantations (model 4) of *Acacia mangium* and selected native species (e.g. *Hopea*, *Homalium*, *Dipterocarpus*, *Cinnamomum*, *Erythrophleum*).
- Include 2-3 site qualities depending on data availability
- Assemble preliminary soil data for 2-3 representative soil types

- Conduct initial scenario analysis of rotation lengths on long term-site productivity with focus on biomass production, site nutrient capital and soil indicators
- Organize introductory training workshop in Vietnam (Vietnam Forest Science Institute)
- Evaluate Models 1/2 and 4
- Preparation of final report
- Provide model and calibration data to partners at the Forest Science Institute of Vietnam.
- Continued support for model application via email
- Additional workshop/s as needed

**Project length:** 24 months

**Resource requirements:** \$65,000 – \$80,000 (CDN) depending on choices

**Phase 2 (if required)**

- Calibrate FORECAST for additional selected exotic plantation species in Model 1/2 (e.g. *Acacia auriculiformis*, *A. mangium* x *auriculiformis*, *A. crassicarpa* and *Eucalyptus urophylla*)
- Improve soil data from regional sampling depending on availability
- Add calibration data for key minor vegetation species
- Conduct more detailed analyses of mixtures with underplanting and or shelterwood systems in Model 4.
- Preparation of final report
- Provide model and calibration data to partners at the Forest Science Institute of Vietnam.
- Continued support for model application via email
- Additional workshop/s as needed
- Development of a spreadsheet-based decision-support tool to allow users explore output from a range of previously modeled management scenarios in FORECAST

**Project length:** 18-24 months

**Resource requirements:** \$60,000 – \$80,000 (CDN) depending on choices

**Independent Technical Reviews**  
**Forest Investment Program of Lao PDR**

1. Title of the investment plan: Forest Investment Program-Lao Investment Plan
2. Name of the reviewers: Mr. Khamphet Sengchanh Oudom and John Howard Dick
3. Date of submission: 04/10/2011

**Part I: General criteria.**

The investment plan fully complies with the principles, objectives and criteria of the relevant program and takes into account the country capacity, experiences to implement the plan.

The IP has been developed on the basis of sound technical assessments and comprehensively demonstrates how it will initiate transformative impact.

The IP has provided, prioritization of investments, stakeholder consultation and engagement, and adequate capturing and dissemination of lessons learned and has adequately addressed social and environmental issues, including gender

**Comments:**

1. IP has already provided a result framework, but the implementing agencies and frequency of results monitoring needed to be defined.
2. The institutional Arrangement for implementation of IP needs to be defined.

**Part II: Compliance with the investment criteria or business model of the relevant program.**

In principle, the investment plan has fully complied with the criteria specific for the relevant program

- **Climate change mitigation potential:**

*The IP has already provided details for this criteria .*

- IP will help the country to adapt to climate change impact, e.g. by pursuing climate resilient development as a co-benefit
- GOL recognizes its international obligation to reduce emissions from deforestation and forest degradation in Lao PDR, as well as to conserve biodiversity and other resources in its forests, sustainably manage its forests, and enhance carbon stocks, thereby contributing to global efforts to mitigate climate change
- Proposed projects-PSM-CFA, village forestry (VF), and smallholder forestry (SHF) in pilot sites will result in avoided deforestation and degradation, in turn resulting in reduced GHG emissions of CO<sub>2</sub>e and carbon stock enhancement CO<sub>2</sub>e

- **Demonstration potential at scale:**

*The IP has projected a possibilities for this criteria*

- PSM-PFA has demonstrated scaling up to 18 PFAs in 2008-2011 from 9 PFAs in 2003-2008 of pilot application in 2 PFAs in 1996-2001 showing further scaling to cover all 51 PFAs in the next 7 years is possible. VF and SHF will be piloted at a scale to be determined during project preparation, with potential for large scale-up covering more than half a million ha possible by 2020
- A wide range of stakeholders will be involved and activities will also vary in scale from small local community based activities to larger government, donor, and private sector sponsored activities
- No comment

- **Cost-effectiveness:**

*The IP has already provided details for this criteria .*

IP estimated Cost effectiveness by

- FIP budget in WPFAs and CFAs: USD X/t CO<sub>2</sub>e
- Leveraged budget in PFAs: USD X/t CO<sub>2</sub>e
- FIP budget in pilot WPFAs, VFs, SHFs: USD X/t CO<sub>2</sub>e
- Leveraged budget in pilot WPFAs, VFs, SHFs: USD X/t CO<sub>2</sub>e

*Comments: cost-effectiveness should be determined.*

- **Co-benefits:**

*The IP has already provided details for this criteria .*

- IP Will enhancement of co-benefits, such as biodiversity conservation, poverty reduction, and soil conservation
- IP will be brought to bear on the core objective of 'reduced GHG emissions from deforestation and forest degradation, which can be brought about by sustainable management of forests and conservation and enhancement of forest carbon stocks'
- IP in Lao PDR is combination of reducing GHG emissions, but also to help the country to adapt to climate change impact, e.g. by pursuing climate resilient development as a co-benefit
- Other co-benefits from IP
  - **REDD+ in PFAs:** Poverty reduction through increased incomes in forest landscape-based livelihoods; biodiversity conservation; enhancement of forest ecosystems services
  - **REDD+ in CFAs:** Biodiversity conservation; enhancement of forest ecosystems services; poverty reduction through increased incomes in forest landscape-based livelihoods
  - **REDD+ in WPFAs:** Enhancement of forest ecosystems services; poverty reduction through increased incomes in forest landscape-based livelihoods; biodiversity conservation
  - **Smallholder and Private Enterprise Partnership:** Poverty reduction through increased incomes in forest landscape-based livelihoods; enhancement of forest ecosystems services

- **Implementation potential:**

*The IP has already provided details for this criteria .*

IP will be implemented in combination with the existing projects implemented by DOF at national level, PFO at provincial level, and DFO in partnership with VFOs at FMU level:

1. REDD+ in Production Forest Projects
2. REDD+ in Conservation Forest Projects
3. REDD+ in Protection Forest Projects
4. Smallholder and Private Enterprise Partnership Project

Risks are perceived to be manageable and are brought about by the need to work with villages of all ethnicities under variable local conditions, as well as the risk associated with carbon markets that have not yet been realized in Lao PDR and whose working mechanisms are still under development

**Comment:** Institutional Arrangements, key implement agencies for implementation of IP Need to be defined.

- **Natural forests:**

*The IP has already provided details for this criteria .*

- Lao PDR has considerable natural resources in forests and this is significant for cultural development, environment protection, and economic development at the national and local levels
- IP Projects will reduce pressures in Natural Forest
- Result of IP will Change in hectares of natural forest cover in state and outside state forest areas

**Part III: Recommendations.**

*Some recommendations that could enhance the quality of the investment plan.*

**Comment:**

- Figure 2: Logic model of the FIP Lao Investment Plan need to be outlined
- Map of targeted areas/projects location need to be provided
- Table of contents need editing.

Independent Review Comments		Team Response	
<b>Introduction</b>			
<p>The proposal can be strengthened in three fundamental ways:</p> <ul style="list-style-type: none"> <li>• better definition of what constitutes deforestation and degradation in different natural forest formations</li> <li>• prioritization of the main elements of deforestation / degradation that should be addressed in the short- to medium-term for emission reductions: 1) unregulated agricultural/tree-crop expansion; 2) uncontrolled clearing for infrastructure and large-scale industrial development; 3) pioneering shifting cultivation (always to be differentiated from rotational swidden); and 4) illegal exploitation and international trade in forest/biodiversity products; and</li> <li>• down-sizing, rationalization and technical improvement to the Lao timber processing industry</li> </ul>		<p>During project preparation the suggested priorities will be considered for support from FIP. There are significant overlaps between the priorities listed by the Reviewer and the program of support SUFORD is currently implementing. For example under SUFORD MOIC has received technical assistance to identify opportunities to scale-back timber processing capacity at provincial level to match sustainable timber supply. Other priorities listed by the reviewer are referenced in the following sections.</p>	
<b>Part I: General Criteria</b>			
Criteria	Score <sup>1</sup>	Comments <sup>2</sup>	Team Response
Complies with the principles, objectives and criteria (P,O & C) of the FIP specified in the design documents and programming modalities	P  F	<b>Reviewer 1.</b> P, O & C of the FIP are taken into account but priority activities are not well thought out and thus some investment project priorities are questionable. <b>Reviewer 2.</b> The IP fully complies with the P, O & C of the relevant program.	It is stated in Section 6.2 that FIP investment will be channeled through existing and planned MDB projects “in order to achieve cost effectiveness, ensure rapid implementation and minimize the need for diverting scarce staff with management experience from other important tasks.” These considerations helped shape the investment priorities. Questions that Reviewer 1 has raised with regard to decreasing areas under swidden agriculture and increasing areas under plantations are addressed below.
Takes into account the country capacity to implement the plan	N	<b>Reviewer 1.</b> Overly-ambitious and unfocussed given national capacity and	In recognition of the limited country capacity to implement an ambitious program of activities the proposed projects are building on ongoing MDB projects and programs. This will help address the

<sup>1</sup> Fully meets criteria (F); Largely (L); Partially (P); criteria Not met (N)

<sup>2</sup> Reviewer’s comments refer to “Project “1 - Protecting Forests for Sustainable Ecosystem Services to be supported by ADB; “Project 2” - Smallholder Plantations to be supported by IFC and “Project 3” - Up-scaling of PSFM to be supported by WB.

	F	<p>competing development programs. Needs rigorous refocus and prioritization.</p> <p><b>Reviewer 2.</b> The IP takes into account the country capacity and experience to implement the plan</p>	<p>reviewers concerns and minimize transaction costs. Activities that are not yet ready for full-scale implementation are to be piloted during the initial period of FIP implementation. The scale of FIP financed pilots (in participatory land use planning, village forest allocation and titling, smallholder private sector partnerships, and others) will be defined during the project preparation phase.</p>
<p>Developed on the basis of sound technical assessments</p>	P	<p><b>Reviewer 1.</b> Projects 1 and 2 are much more speculative and less convincing in their technical assessment and design. Project 3 is well conceived and documented, based on 12 years of past PSFM experience.</p> <p><b>Reviewer 2.</b> The IP has been developed on the basis of sound technical assessments.</p>	<p>In view of the responses above and the experience already gained in Lao PDR the proposed projects are considered to be based on sound technical, social, environmental and economic assessments and will be undertaken on appropriate scales given the current state of knowledge. The suggestion to incorporate experience from Vietnam in Project 2 will be considered during the project preparation phase.</p>
<p>Demonstrates how it will initiate transformative impact</p>	P	<p><b>Reviewer 1.</b> Project 1 is innovative and potentially transformative but is totally untested. Project 2 is not innovative or transformative and could benefit from the experiences (positive and negative) of similar GOV/WB/KfW projects in Vietnam. Project 3 continues to be one of the most innovative and transformative projects in Asia (despite continuing problems associated with revenue-sharing and ethnic</p>	<p>Regarding project 1 the approach has been successfully piloted for the past three years, and it is the first project to give attention to Protection Forest with the multiple benefits that can be secured through improved management of this type of forest. Regarding the comments on Project 2, clearly the reviewer is not aware of the highly innovative nature and success of candidate partners for the proposed project. The proposed project has not been described in detail in the IP, pending a decision as to which private sector partner should be selected. The various options for partnering this project are proposing to use a different approach from that adopted in Vietnam.</p>



		community engagement). <b>Reviewer 2.</b> The IP comprehensively demonstrates how it will initiate transformative impact.	
Provides for prioritization of investments, stakeholder consultation and engagement, adequate capturing and dissemination of lessons learned, and monitoring and evaluation and links to the results framework	P	<b>Reviewer 1.</b> Prioritization of investments is constrained by the previously-mentioned lack of “focus and prioritization” in FIP concept. Consultation / engagement, dissemination of lessons learned, and monitoring / evaluation have been chronic weaknesses in Laos and will require a renewed focus in FIP. <b>Reviewer 2.</b> The IP has provided prioritization of investments	The question of priorities has been responded to above. Regarding the consultation process, it is well recognized in Lao PDR that this is difficult because of the widespread distribution of the population and the existence of many ethnic groups who often do not have Lao language as mother tongue. Steps have been taken to address this by bringing the Lao National Front (responsible for ethnic group affairs) and the Lao Women’s Union into the REDD+ Task Force, and the R-PP has set out a detailed plan for stakeholder participation and consultation, that will apply to FIP investments.
Adequately addresses social and environmental issues, including gender	P	<b>Reviewer 1.</b> The 3 project statements pay the usual attention to social, environmental and gender issues. Specifics are vague and, as usual, the proof will be in final design and implementation. <b>Reviewer 2.</b> The IP has provided stakeholder consultation and engagement and adequate	The three MDBs will follow their respective safeguard policies and will be responsible for ensuring compliance.

		capturing and dissemination of lessons learnt and has adequately addressed social and environmental issues, including gender.	
Supports new investments or funding that is additional to on-going/planned MDB investments	P	FIP is a new investment and as such is complementary to various MDB and bilateral program investments. Further bilateral and private sector possibilities are not identified specifically and this may not be possible except during final FIP preparation.	In the IP reference is made to the proposed projects being additional or complementary to on-going MDB investments enabling the government to address Climate Change and REDD+ related issues in a complementary and incremental manner. Reference is also made to cooperation and coordination with other donors working on various aspects of REDD+ implementation.
Takes into account institutional arrangements and coordination	P	<b>Reviewer 1.</b> Adequate at the higher level of REDD+ and FIP administration, but it still remains to be seen if the GOL can provide the required levels of institutional cooperation and coordination (national/provincial/district) to develop and implement integrated planning at the national and local levels. <b>Reviewer 2.</b> The IP has already provided a result framework but the implementing agencies and frequency of results	It is acknowledged that REDD+ institutional arrangements are still weak at sub-national level, and each of the projects will include substantial capacity building. The existing and new projects that will receive incremental FIP investments have established institutional linkages in the Provinces where they are operating and these linkages will facilitate the development of appropriate capacity at sub-national level.

		monitoring need to be defined	
Promotes poverty reduction	P/N	<b>Reviewer 1.</b> While poverty reduction is always an objective of most GOL programs, many policies (i.e. land allocation and its relationship to swidden cultivators) actually exacerbate ethnic poverty. The “jury is out” on the potential effect of Project 2 on poverty alleviation because aspects of similarly proposed small-holder programs in Vietnam actually increased householder indebtedness and resulted in behaviour that increased C emissions and ecosystem degradation.	While it is recognized that land allocation efforts in Lao PDR have not always had the intended consequences, the Government has recently published a new and very comprehensive Participatory Land-use Planning (PLUP) Manual prepared jointly by MAF and the National Land Management Authority, which gives clear guidelines on how the process should be conducted. The projects supported by FIP investments will follow the new PLUP Manual. One of the candidate private sector partners for Project 2 has been implementing guidelines very similar to those in the PLUP Manual for 3 years with small ethnic group communities and has built strong support for the process because of the tangible reduction in poverty that has been achieved.
Considers cost effectiveness of investments	N	<b>Reviewer 1.</b> If, by this, it is meant whether there is consideration of cost-effectiveness in reducing C emissions (let alone in poverty alleviation and ecosystem recovery) there is simply not sufficient information to judge. One wouldn’t expect this at this stage of FIP design but there should at least be some reference to the monitoring	The IP has been revised to include additional information for Projects 1 and 3, for which more information is available, indicating that the cost per ton of net CO <sub>2</sub> emission reductions is substantially below the current market price, assumed to be around US\$ 5 per ton. This does not take account of the transaction costs nor the cost and long-term benefits of capacity building, which will need to be examined in more detail during project preparation. It is anticipated that the cost effectiveness of the projects will be developed in more detail during project design.

		and evaluation mechanisms that might demonstrate eventual “cost-effectiveness in the final FIP.	
<b>Part II: compliance with the investment criteria of the FIP</b>			
<b>Criteria</b>	<b>Score</b>	<b>Comments</b>	<b>Team Response</b>
Climate change mitigation potential	P	<b>Reviewer 1.</b> Rough estimates are given for potential emission reductions due to Projects 1 and 3 “for year 1 and after year 8. Estimate for Project 2 is to be determined. The methodology for establishing baselines and estimating potential reductions is not apparent. Estimates in Sec. 1.3 showing average annual emissions/ha from 2012 to 2020 for swidden cultivation being 25% higher than for commercial tree crop concessions seem hardly credible.	The details of the overall national estimates of current emissions are given in the R-PP. The methodology is explained in some detail there, and it is pointed out that it is based on many assumptions. One of the most critical assumptions is the proportion of forest of different crown density classes that is converted. In the case of swidden cultivation there is some data on the proportion of primary forest that is converted and there is also data on the area cleared annually, and there is a carbon sequestration model for regrowth of secondary forest following swidden cultivation developed by the Japanese Forest Research Institute, so that the estimates for emissions from swidden cultivation are likely to be the more accurate. The data for concessions assumes that the land used for concessions contains forest and potential forest in the same proportions as occurs nationally; thus most of the land converted to concessions is assumed to be on low density or degrade forest and hence the lower emissions. The estimates will be revised when more detailed data is available on the forest that is being converted.
Demonstration potential at scale		<b>Reviewer 1.</b> Cannot be determined, since in this reviewer’s opinion the current program proposals do not address the primary issues of emission reduction.	Each of the projects has been developed to deal with one or more of the drivers of deforestation and degradation and the latest version of the IP gives estimates of the emission reductions which the reviewer mentions above.
Cost-effectiveness	P	<b>Reviewer 1.</b> Cannot be determined with the information available (see	See response to cost effectiveness above

		above). Current financial leverage appears to come from traditional partners and donors. No significant private sector contributions are apparent as yet.	
Co-benefits		<p><b>Reviewer 1.</b> Project 3 is aimed primarily at ecologically-based participatory forest management and thus at least in intent supports sustainable development. Project 1 is aimed at protecting ecosystem services but a seeming preoccupation with eliminating swidden cultivation could have serious implications for the welfare and food security of ethnic minority peoples. Project 2 focuses on the development of smallholder and private plantations and woodlots, however both the environmental and social benefits will depend on the adoption of sustainable plantation models (details not yet specified).</p>	<p>All three projects focus on participation of local communities in various aspects of forest management, and Projects 1 and 3 both support village development funds that ensure that benefits from forest management are available to villagers for a wide range of small-scale investments. Project 1 focuses on mountainous terrain, which has been designated as protection forest because of the importance of the rivers for potable water, irrigation and hydro-power and the high risk of floods. This type of terrain is also where the ethnic groups dwell and the primary form of agriculture is swidden cultivation; hence the project's focus on working with the communities concerned to protect all the remaining forest, restore forest cover wherever possible and provide incentives to try and adopt alternative livelihood systems that include agroforestry. Apart from poverty reduction and increased incomes there are benefits to water, soil and biodiversity conservation that were evaluated during the preparation of the BCC project through which FIP funds will be channeled.</p> <p>Project 2 has examined a number of options for partners and has focused on those that have demonstrated viable and sustainable approaches that bring measurable improvements in incomes and livelihoods for participating households.</p>
Implementation potential	P	<b>Reviewer 1.</b> Project 3 is an	Please see responses to country capacity, technical assessments,

		<p>extension of the current experience in PSFM through SUFORD and other projects. Project 1 is very speculative and there is doubt whether the strong emphasis on swidden reduction is possible or desirable. Project 2 involves plantation and woodlot establishment in which there is not a body of experience in Laos, however, much can be learned from the successes and failures of the extensive plantation regimes in Vietnam.</p>	<p>transformative impact, institutional arrangements and coordination above.</p>
Natural forests	F	<p><b>Reviewer 1.</b> The FIP is clear that no forest lands will be converted to other purposes except those on which natural forest cover has been substantially reduced (&lt;20%)</p>	
<p><b>Part III: Reviewer Recommendations</b></p>			<p><b>Team Response</b></p>
<p><b>Reviewer 1.</b> The FIP report states that a model for developing strategies and prioritizing actions for reducing carbon emissions takes as its starting point the distribution of forest cover according to four crown density classes: - well-stocked forest (&gt;70%); medium-stocked regenerating forest (40-70%); low-stocked forest (20-39%); and un-stocked forest (&lt;20%) – which seems to be a proxy for estimating degrees of forest degradation. This crown density classification is not ecologically defensible when applied across all Lao forest formations. It may be appropriate for Semi-</p>			<p>While the discourse on the ecology of Lao forests is appreciated, the reality is that the only available inventory data is based on crown density classes. The SUFORD project has a very large number of TSPs (around 45,000) that cover the main forest types and give very good data on the range of growing stock volumes and the proportions of the plots with different stocking densities. This data has been used in conjunction with a number of national forest inventories and PSP data to estimate the total national carbon stock and the apparent change in carbon stock over time. As mentioned</p>

<p>evergreen Forest (SEF) and moister Mixed Deciduous Forest (MDF) communities, but it is not applicable to drier MDF, Dry Dipterocarp (DD) or Pek Savanna communities. For example, while a 25% crown closure may imply serious degradation of a SEF forest, the same crown closure may be well within the range of natural variation (RONV) for a Dry Dipterocarp (DDF) forest. Laos has five main lowland forest formations - Semi-evergreen (SEF), Mixed deciduous (MDF), Dry Dipterocarp (DDF) and Pek Savannas; four upland forest formations - Montane hardwood (MH), Montane conifer (MC), Mixed Montane Hardwood/Conifer (MMHC); and one sub-tropical formation - Evergreen Hardwood (SEH). A crown density classification must be developed for each of these major forest formations to give proper guidance to FIP.</p> <p><b>Reviewer 1.</b> Rote application of the current crown density classification will result in overestimation of carbon emissions, lands requiring restoration/rehabilitation and, more seriously, of “degraded” forests that warrant conversion from natural communities to tree crop/cash crop plantations.</p>	<p>above the distribution of these changes in carbon stock between the different drivers of DD is subject to the assumptions made, but the total is considered to be a reasonably good estimate, although the variety and quality of data used do not allow a standard error to be calculated.</p>
<p><b>Reviewer 1.</b> Throughout this FIP document there is a recurring theme of discrimination and bias against rotational swidden agriculture as practised by ethnic minorities outside the Mekong lowlands. This bias is illustrated by the use of phrases in the main report (though not, interestingly, in the executive summary) such as the pejorative “slash and burn” (which does not distinguish between pioneer and rotational cultivations systems), a distinction between “farmers and shifting cultivators”, and the “eradication of shifting cultivation”. Perhaps one of the most evident indications of this bias is contained in Table 2, page 3, in which it is contended that annual CO<sub>2</sub> emissions <u>per ha</u> over the period 2012-2020 from “shifting cultivators” are estimated to be 25% higher than those from commercial concessions and smallholder cash crops. This seems hardly credible given that swidden is cultivated on small,</p>	<p>While Reviewer 1 is clearly is in favor of swidden cultivation one must acknowledge the fact that swidden results in degradation of the forest and substantial emissions of CO<sub>2</sub>. In some parts of Lao PDR “outsiders” are persuading ethnic communities to grow cash crops on a permanent basis and this is resulting in increasing soil erosion, and many areas of former swidden cultivation have degraded to grassland. One of the private sector companies that is a candidate for Project 2 has demonstrated that one form of agroforestry is extremely effective in raising yields of hill rice and it is being adopted by an increasing number of ethnic group communities. There have been a number of other very successful agroforestry schemes supported by private sector and NGOs using such crops as red tea, benzoin (<i>Styrax</i> sp) rattan and bamboo, that can provide more profitable and sustainable livelihoods and FIP</p>

<p>incompletely-cleared plots by household hand-labour with no significant petroleum-based inputs, while commercial cash crop production involves total vegetation removal (including stumps) by heavy equipment, mechanical cultivation, clean weeding, significant fertilizer and pesticide inputs, mechanical harvesting, and crop processing, marketing and transportation.</p>	<p>investment provide a good opportunity to pilot this approach in parts of the country that have not yet benefited from them.</p>
<p><b>Reviewer 1.</b> The end result of the land allocation process is that in many upland areas, households have been allocated only three parcels for cultivation in which they can rotate. Thus, the fallow period is now reduced to 3-4 years, which is simply not adequate to restore fertility. Also, in many instances, the total amount of land given is less than that is necessary to meet household needs regardless of the number of "rotational parcels". Sometimes this is due to the land allocation procedures of local authorities but in other cases villagers themselves fail to ask for the land they require because they are taxed for all land allocated as though it is in continuous full production. The inevitable result of the land allocation program on poorer soils will be soil degradation and a significant loss of agricultural livelihood and food security.</p>	<p>See response in relation to poverty reduction above.</p>
<p><b>Reviewer 1.</b> Like similar dry ecosystems in western North America and Australia, the composition and structure of monsoonal ecosystems (Dry Deciduous, Dry Dipterocarp and Savanna Forests) in Laos have been determined historically by regular, largely-anthropogenic fire. An important consideration in the influence of fire on ecosystem function is the relationship between fire frequency and fire intensity. Though many species in these ecosystems are fire-dependent, too-frequent fires will affect seedling survival and the spread of weed species, while longer fire intervals may lead to fuel accumulations that result in unnatural, catastrophic, high-severity fires. There is now a considerable body of information originating from Western North America and Australia that regular, low-intensity ground fires (3 to 20 year</p>	<p>The Dry Dipterocarp forests in Lao PDR are associated with soils with a hard pan that results in seasonal extremes in moisture in the upper horizon of the soil. Fires at present are not a major factor in the parts of Lao PDR where these forests occur. This issue raised by the reviewer and implications of future climate change on forest fire frequency in Lao PDR will be reviewed as part of project preparation.</p>



<p>return periods) in dry ecosystems greatly enhance carbon accumulation and storage (particularly in the soil) when compared with periodic high-severity fires (40 to 70+ year return periods) resulting from fire exclusion and fuel accumulation. It is possible that ethnic communities in Laos use fire too frequently and without clear objectives, but fire is a pervasive ecological influence in much of the country and it won't go away and it can't be ignored; we must learn to use it wisely. FIP should consider joint silvicultural and fire ecology studies to determine possible management approaches to holistic ecosystem management and measures to improve the resiliency and adaptation to climate change in dry forest formations.</p>	
<p><b>Reviewer 1.</b> The Social Impact Assessment prepared for SUFORD-AF concluded that in the 6-year SUFORD project, while Lao speakers in the Mekong lowland had a reasonable understanding of, and engagement in, the project, the few ethnic minority communities on the periphery of the lowlands had no such understanding and engagement. It attributed this to “a considerable communications gap (that) exists” between MAFF staff and ethnic villagers and “a poor appreciation and understanding of the implications of ethnic diversity on the part of PAFOs and DAFOs”. Furthermore it concluded that ethnographic studies carried out under the project had “not been sufficiently incorporated into project manuals and guidelines or into the implementation strategy of the project generally”.</p> <p>Clearly, the ethnic minority communities in Laos have a significant role to play in both FIP and REDD+ design and implementation. There is a real opportunity in the FIP and REDD+ programs to build on the experiences gained in SUFORD and other donor projects...</p> <p>It is not clear from the current FIP Investment Program that anything like the required consultation and engagement program is</p>	<p>These are valid points and have been addressed explicitly in the R-PP stakeholder participation and consultation plan. Some edits have been introduced to the latest draft of the IP to provide more detail and reflect particularly the importance of developing a cadre of individuals to facilitate communication with villagers in ethnic communities.</p> <p>Agreed.</p> <p>The Team would direct attention to the R-PP stakeholder participation and consultation plan mentioned above and to the</p>

<p>contemplated.</p>	<p>annex on the Dedicated Grant Mechanism.</p>
<p><b>Reviewer 1.</b> A recurring theme throughout this report is that management problems are not due to a lack of “legislation / regulations” but “more to the capacity to implement and enforce the policies in a developing political system”. Unfortunately, little progress has been made, so far, in developing an effective external monitoring/enforcement system.</p> <p><b>Reviewer 1.</b> GOL regulations appear to suggest that the political will for law enforcement exists. If so, a well-conceived compliance monitoring and enforcement system <u>should</u> lead to improved enforcement of regulatory compliance, better forest practices and enhanced revenue collection. Standardized reporting, recording and analysis will allow law enforcement authorities to track the status of investigations of unauthorized or illegal activities, and thus to conduct better structured, more systematic, and more efficient enforcement actions. Enhanced recording systems will enable timely and meaningful compilation of reports on compliance and enforcement for political decision-makers and the public. This, in turn, may result in greater transparency and awareness of compliance with forest law and, ultimately, in stronger political and public support for forest law enforcement.</p> <p><b>Reviewer 1.</b> A competent compliance program will also support continued FSC certification, with associated "chain-of-custody" and independent performance auditing requirements. Certification should lead to achievement of internationally-accepted standards of sustainable forest management and to substantially higher prices and market shares for logs and wood products. Since certification will be based on regulatory compliance and on independent auditing (paid out of management funds and higher product prices)</p>	<p>The team acknowledges in the main text of the IP that since its formation DOFI has been hampered by inadequate allocation of funds in relation to the magnitude of tasks and by lack of experienced staff to implement the measures, especially at Province and District level. The team directs attention to the Department of Forestry Inspection (DOFI) of Lao PDR Strategic Plan to 2020 which lays out a comprehensive program for capacity development. See also section 3.1 (para 46) 6.8 (para 79) in the IP main text.</p> <p>Agreed.</p> <p>The SUFORD project has already achieved certification for around 80,000 of natural production forest. Work is ongoing to pilot chain-of-custody in Lao PDR and there is scope for expanding both certification and chain of custody in Lao PDR with FIP support. The text reflects this potential.</p>

<p>it should result in a decreased regulatory and administrative burden to government.</p>	
<p><b>Reviewer 1.</b>  <u><b>Natural forest restoration</b></u>  Artificial regeneration on any significant scale is a very expensive proposition involving significant plant propagation facilities, invariably employs limited genetic stock, is seldom very successful, and is always inferior in results to natural regeneration from well-conceived silvicultural prescriptions. So-called “enrichment plantings” have also resulted in some jurisdictions, such as Malaysia, in significant distortions of natural stand composition and loss of biodiversity.</p> <p>Natural regeneration should be confirmed as the preferred method of achieving adequate stocking on PFAs. Artificial regeneration should be employed <b>only</b> where it can be demonstrated that natural regeneration is not possible and where it can be justified both economically and ecologically.</p> <p><u><b>Industrial and Small-holder Commercial Tree Crop Plantations</b></u>  Commercial tree crop plantations are not forests and their establishment should not be considered reforestation or forest restoration. They are much more like agricultural systems and have many of the same risks, vulnerabilities, uncertainties and carbon consequences. Plantations can be made more like natural systems to improve the ecological stability and resilience that limits the risk of plantation failure and reduces the necessity for artificial inputs...</p> <p>One way in which plantation risks (economic and ecological) can be estimated and mitigated is through simple simulation models of nutrient status/nutrient flow for selected plantation sites and silvicultural models. Simulation models can be used to develop plantation guidelines and prescriptions (species mixes, rotation</p>	<p>Agreed.</p> <p>Agreed, but while commercial plantations maybe should not be considered as forest cover, they still contribute to carbon sequestration dependent on the species used the end-use of the wood, the growing rotation etc.</p> <p>Agreed.</p>

<p>ages, site selection criteria, site preparation techniques, practical fertilization regimes, thinning regimes, weeding, and harvesting prescriptions) that are sustainable over the long-term.</p>	
<p><b>Reviewer 2.</b> Recommended that</p> <p>Institutional Arrangements, key implement agencies for implementation of IP need to be defined.</p> <p>Figure 2: Logic model of the FIP Lao Investment Plan should be outlined;</p> <p>Map of targeted areas/projects location need to be provided; and</p> <p>Table of contents needed editing.</p>	<p>The team has added specific references in the text. See especially section A4.5 on REDD+ Strategy Implementation Framework beginning on page 85</p> <p>This has been included see section 6.3 para 65 onwards.</p> <p>Target areas will be selected as part of project preparation.</p> <p>Table of contents has been edited and order of projects presented has been made consistent throughout the document.</p>