UN-REDD
PROGRAMME
VIET NAM

Final Report: Analysis of Opportunity Cost for REDD+

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List of Acronyms

AWG-LCA	Ad Hoc Working Group on Long Term Cooperative Action
CPC	Commune People's Committee
DARD	Department of Agriculture and Rural Development
DoNRE	Department of Natural Resources and Environment
DPC	District People's Committee
FLEGT	Forest Law Enforcement Governance and Trade
FPDP	Forest Protection and Development Plan
FPsD	Forest Protection sub Department
FSC	Forest Stewardship Council
GHG	Greenhouse Gas
GoV	Government of Viet Nam
IPCC	Intergovernmental Panel on Climate Change
LUP	Land-Use Plan
MARD	Ministry of Agriculture and Rural Development
MRV	Monitoring, Reporting and Verification
NAMA	Nationally Appropriate Mitigation Actions
NPV	Net Present Value
NRP	National REDD+ Program
OC	Opportunity cost
OCA	Opportunity Cost Analysis
ONRE	Office of Natural Resources and Environment
PES	Payment for Ecosystem Services
PFES	payment from Forest Environmental Services
PFMB	Protection Forest Management Board
PPC	Provincial People's Committee
REDD	Reduced Emissions from Deforestation and Forest Degradation
REDD+	Reduced Emissions from Deforestation and Forest Degradation and conservation, sustainable management of forests and enhancement of carbon stocks
REL	Reference Emission Level
RL	Reference Level
SEA	Strategic Environmental Assessment
SEDP	Socio-Economic Development Plan
sDOF	Sub Department of Forestry
SFIPI	Sub Forest Inventory and Planning Institute
SFM	Sustainable Forest Management
SIA	Strategic Impact Assessment
UNFCCC	United Nations Framework Convention on climate Change

Executive Summary

Deforestation and forest degradation are important sources of greenhouse gas emissions (GHG). Carbon emissions from land use change contribute about one fifth of current global carbon emissions. Maintaining forests has been promoted as a low cost mitigation option, which has resulted in the emergence of Reduced Emissions from Deforestation and Forest Degradation (REDD). Expanded to REDD-plus (REDD+), the role of conservation, sustainable management of forests and enhancement of forest carbon stocks are included in developing countries. The REDD+ mechanism aims to provide payments to reduce emissions from avoided deforestation and forest degradation. Apart from reducing GHG emissions, REDD+ is expected to deliver multiple benefits to developing countries that benefit the poor, improve governance, conserve biodiversity, provide other environmental services and contribute to sustainable forest management and development.

The benefit derived from REDD+ is the difference between the payments received for the emission reductions resulting from REDD+, and the costs to achieve those emission reductions. The cost of REDD+ will vary between agro-ecological, economic and social conditions, as will the effectiveness of measures to reduce deforestation. There will be areas in which REDD+ would not be viable by any realistic payment per ton of emission reduction and there will also be areas in which relatively minimal payments for avoided emissions would be attractive.

The costs of REDD+ include opportunity costs, implementation costs, transaction costs, administrative costs, stabilisation costs, as well as social costs. As the single largest cost component of REDD+, this report reviews the opportunity costs of REDD+. Opportunity costs are the foregone benefits; preserving forests under a REDD+ mechanism means foregoing the benefits that would have been generated by alternative land uses that would have replaced forests. The difference between the benefits provided by the forest and those that would have been provided by the alternative use is the opportunity cost of avoiding deforestation.

The opportunity cost approach for REDD+ is based on estimates of returns to forest and to alternative land uses, and their respective carbon stocks. Various approaches to estimate opportunity costs exist with each approach addressing different questions via distinct methodological and data assumptions, resulting in wide variation among the cost estimates obtained. The suitability of each approach is dependent upon the objective of the analysis and the true cost of REDD+ is most likely to be between the values provided by the local-empirical models (lower end) and global equilibrium models (higher end).

The theory of the opportunity cost approach is that if the land owner is compensated for the financial value which is forgone by not cutting down the forest, they will keep the forest standing. Used in this context there is currently much debate as to whether the opportunity cost approach is appropriate, as this is an over simplification of the situation. Its application to analysing the opportunity costs for REDD+ is challenging due to the political, social and economic contexts that are present in developing countries that operate outside and in conjunction with the market economy. Within REDD+ other issues such as accounting for illegal activities, actual payment levels needed to halt deforestation, the market system function, carbon prices and price setting, variation of costs over time, employment and socio-cultural and indirect off-site costs also need to be included.

The contextual issues where the opportunity cost analysis is applied will influence the adequacy and appropriateness of the opportunity cost approach to assess the real costs of REDD+ and as a proxy for payments. More rigorous and sophisticated models need to be developed which builds those overlooked costs into the bottom line of REDD+ activities. However, despite its methodological flaws, opportunity costs are useful tools for decision makers and for setting policy.

Apart from estimating the foregone economic benefits estimating opportunity costs also contributes to understanding the causes of deforestation, as well as pressures for deforestation from the magnitude of costs and hence the types of interventions needed to actually reduce deforestation and the potential need for mechanisms to avoid adverse social consequences. Opportunity costs will vary from area to area, depending on the nature of the forest, the agronomic suitability to different alternatives, the distance from markets, and many other factors, and thus must be conducted separately in different areas.

Forests with lower benefits than the potential benefits of alternative land uses are of interest to a REDD+ program. These forests would benefit from additional payments via a REDD+ program to reduce the threat of deforestation and forest degradation. Conversely, forests with high benefits are generally not at risk of deforestation and forest degradation and are of lower priority to a REDD+ program.

All costs and benefits generated by a land use should be included in the estimate of opportunity costs. The land use description should be comprehensive and include all possible on-site activities such as timber, fuel wood, non-timber forest products etc, as well as off-site benefits such as ecosystem services. If the land use is more profitable with the inclusion of co-benefits, it will reduce the opportunity costs of REDD+. This will have two distinct impacts on estimates of opportunity costs for REDD+. In cases where there are already low opportunity costs the inclusion of co-benefits will be less of a priority as REDD+ is already a viable option. In land use scenarios where high opportunity costs occur, the inclusion of co-benefits may reduce the estimated opportunity cost for REDD+. In these cases the bundled co-benefits and carbon present greater benefits and lower the estimated opportunity cost for REDD+ making the bundled land use a viable option for REDD+. Therefore the identification of potential co-benefits that can be derived from areas with high estimates of opportunity costs for REDD+ should be a high priority. As the inclusion of co-benefits may reduce the estimates of opportunity costs for REDD+ and make REDD+ with co-benefits a viable option.

From a country perspective opportunity costs should be estimated from the bottom-up empirical model approach. National-level REDD+ opportunity costs should be based on local data to obtain realistic and representative estimates of the real costs of REDD+. As opportunity costs for REDD+ will vary significantly within a country, analysis of sub-national REDD+ opportunity costs is the only approach to account for these variations as estimates are based on local information of carbon density and per-area opportunity costs which are specific to particular regions and time periods. Extrapolation of empirical estimates can result in cost-effective and accurate national level estimates of REDD+ opportunity costs.

The analysis of opportunity costs for REDD+ should be integrated into the Forest Protection and Development Plan which is carried out by the forest sector for long term strategy planning (5 year) and annual operational planning. The advantage of including this analysis into the Forest Protection and Development Plan is because this plan is specific to the forest sector and it allows a level of detail in the planning process that does not exist in the current Land-Use planning process. The results from the analysis of opportunity costs for REDD+ should be fed back to the Land-Use plan as well as the socio-economic development plan.

To ensure the accuracy and reliability of the analysis of opportunity costs for REDD+ a comprehensive capacity building program is needed. As there is limited financial and economic planning in existing forestry planning processes the skills to conduct such an analysis are limited. The key components should focus at the technical level to enhance skills to development of alternative land use scenarios that are comprehensive and include co-benefits; financial and economic analysis; carbon accounting as well as the decision making level to enhance the use of the results of the analysis of opportunity costs for REDD+.

The analysis of opportunity costs is needed to support national and international policy decisions. Although there are limitations to the methodology, the analysis of opportunity costs for REDD+ can provide the necessary information to contribute to the development a REDD+ program.

1. Introduction

This report provides guidelines on how to integrate the analysis of opportunity costs for REDD+ into sub-National (Provincial and District) level land-use planning. The options presented in this report are based upon current requirements for REDD+ and their application to district and provincial level forestry planning processes as applied in Viet Nam. This report does not aim to provide a methodology to account for all costs of REDD+ such as transaction, implementation and administration costs. The emphasis has been placed on the process of the opportunity cost analysis, how this can be successfully integrated into local level forestry planning processes, at which levels it should be integrated and the roles and responsibilities of agencies involved.

2. Context

REDD refers to a broad set of approaches and actions to reduce emissions from deforestation and forest degradation (REDD). The REDD mechanism aims to reward individuals, communities, projects and countries who reduce greenhouse gas (GHG) emissions from forests (CIFOR 2010). The Bali Action Plan formally expanded the REDD mechanism to REDD-plus (REDD+) which included the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries. With one-fifth of global emissions coming from deforestation and forest degradation, REDD+ is seen as a significant and cheap mitigation measure. Apart from reducing GHG emissions, REDD+ is expected to deliver multiple benefits to developing countries that benefit the poor, improve governance, conserve biodiversity, provide other environmental services and contribute to sustainable forest management and development (Angelsen and Wertz-Kanounnikoff 2008).

The Government of Viet Nam (GoV) considers the REDD+ mechanism to be a priority area that will contribute to better forest and forest resource management. Viet Nam has been piloting REDD+ activities such as addressing institutional capacity, establishment of the National REDD+ Program, REL development and MRV, as well as field level activities (UN-REDD Viet Nam Programme 2010b). However to participate in REDD+ it is necessary to know what will REDD+ cost. Estimated costs of REDD+ vary with the approach used and the types of costs considered. The costs of REDD+ can be classified into the following groups:

1. *Opportunity costs*: the foregone benefits that would have been generated from other forest land-use activities.
2. *Implementation costs*: the efforts required to reduce deforestation and forest degradation, including upfront costs of capacity building, governance, increased planning, land management expenses, tenure, forest protection etc.
3. *Administrative costs*: costs to administer a REDD+ programme.
4. *Transaction costs*: searching for projects and partners, connecting buyers and sellers, negotiating with partners and monitoring and regulatory approval of projects.
5. *Stabilization costs*: the costs associated with activities to prevent deforestation from moving to non-participating countries (Pagiola and Bosquet 2008).

Most estimates of REDD+ costs focus on the opportunity cost, as these are expected to form the largest portion of costs associated with REDD+. Opportunity cost is the foregone economic benefit from alternative land uses. To put it simply, if you choose one land use, then you give up the opportunity for doing other land uses and therefore you give up the benefit that could be derived from that alternative land use (Pagiola and Bosquet 2008, Gregersen et al. 2010). Apart from these direct opportunity costs there are also socio-cultural and indirect opportunity costs (Pagiola and Bosquet 2008, Boucher 2008, Gregersen et al. 2010). In the context of REDD+, analysis of opportunity cost has been used to provide insight into the drivers and causes of deforestation, to identify the likely impacts of REDD+ programs across social groups, to

estimate payment levels for forest owners to change land use practices and to improve estimates of the other REDD+ costs (Gregersen et al. 2010, Wertz-Kanounnikoff 2010, World Bank 2011).

There are three opportunity cost approach methods that have been applied to estimate the costs of REDD+:

- *Local empirical estimates*: per area costs based on detailed studies in a particular area, local data for costs and carbon density estimates.
- *Global empirical estimates*: combines local empirical estimates to give a global per-area cost of reducing deforestation, uses uniform values of carbon density to obtain a single, global estimate of opportunity costs.
- *Global partial equilibrium models*: simulates the dynamics of the world economy to estimate REDD supply curves (Boucher 2008, Kindermann et al. 2008, Wertz-Kanounnikoff 2010).

The methodology for these approaches has been reviewed by Boucher 2008, Kindermann et al. 2008 and Wertz-Kanounnikoff 2008. Each approach addresses different questions and has distinct methodological and data assumptions which therefore results in wide variation among the cost estimates obtained. The empirical models estimate opportunity costs of specific land use changes, this sub-national opportunity cost analyses reveals low opportunity costs. Boucher (2008[1]) reviewed 29 studies and found the average opportunity cost estimate to be US$2.51/tCO$_2$eq, with 18 of the 29 estimates under US$2, and all but one under $10. Estimates from global equilibrium models estimate the amount of global emission reductions at specific opportunity costs. The Stern Review (2006) reported that to reduce global deforestation by 46%, opportunity costs range from US$2.76 to US$8.28/tCO$_2$e. The IPCC reports 54% of emission reductions could be achieved for less than $20/tCO$_2$ (IPCC 2007). The global simulation models estimates are at the higher end of the cost scale and therefore provide a more conservative approach to cost estimations. However, given the nature of each approach and the assumptions used Wertz-Kanounnikoff 2008 wisely concluded that the true cost of REDD+ is most likely to be between the values provided by the local-empirical models (lower end) and global equilibrium models (higher end).

The analysis of opportunity costs is needed to support national and international policy decisions. From a country perspective opportunity costs should be estimated from the bottom-up empirical model approach. National-level REDD+ opportunity costs should be based on local data to obtain realistic and representative estimates of the real costs of REDD+. As opportunity costs for REDD+ will vary significantly within a country, analysis of sub-national REDD+ opportunity costs is the only approach to account for these variations as estimates are based on local information of carbon density and per-area opportunity costs which are specific to particular regions and time periods (Gregersen et al. 2010, Wertz-Kanounnikoff 2010). Extrapolation of empirical estimates can result in cost-effective and accurate national level estimates of REDD+ opportunity costs (Pagiola and Bosquet 2008, World Bank 2011)

A limitation to the bottom-up empirical model is that it does not account for global feedback of REDD+ across economic sectors. The impact of REDD+ will be felt across more sectors than just forestry, such as agriculture and energy, the effect of REDD+ on these sectors will influence opportunity costs. To address these complexities the partial and equilibrium models can be used. However during the early stages of REDD+ readiness, the empirical model will provide useful first approximations (Boucher 2008, Wertz-Kanounnikoff 2008).

[1] All studies were converted to common values for comparison; 2005 US$/tCO$_2$eq

The opportunity cost method has been applied to estimate how much forest owners or users would need to be paid not to deforest. These estimates focus on the landowner's perspective and assume that forest owners or users would want to be paid as much as the amount that they give up by not choosing another use option. Used in this context there is currently much debate as to whether the opportunity cost approach is appropriate (Boucher 2008; Dyer and Counsell 2010; Gregersen et al. 2010; Lang 2010; Wertz-Kanounnikoff 2008). The opportunity cost method in general has its own assumptions and limitations; however in a well functioning market economy and certain real-world conditions the opportunity cost analysis method can provide a theoretically satisfactory estimate of costs (Gregersen et al. 2010). Its application to analysing the opportunity costs for REDD+ is challenging due to the political, social and economic contexts that are present in developing countries that operate outside and in conjunction with the market economy. Gregersen et al. (2010) summarised the main contextual issues that need to be addressed in using the opportunity cost approach:

- difficult to account for illegal activities
- inadequate to account for payments needed to halt deforestation
- analysis is not carried out in a well functioning market system
- prices are likely to be set by the carbon offset markets, not the opportunity cost of various forest owners and users
- opportunity cost estimate is dependent upon approach
- opportunity costs are not static and therefore need to add a dynamic perspective

In addition to these, the World Bank (2011) highlights two major limitations:

- no account for the cost of lost employment that results from land use change
- underestimate of local opportunity cost estimates as socio-cultural and indirect off-site costs are not included

The contextual issues where the opportunity cost analysis is applied will influence the adequacy and appropriateness of the opportunity cost approach to assess the real costs of REDD+ and as a proxy for payments. Awareness of the limitations of the opportunity cost approach is essential to understand the usefulness and accuracy of the resulting estimate.

3. Requirements of the REDD+ mechanism

The REDD+ mechanism is evolving, the concept, rules and regulations are being developed and are still under negotiation. In relation to the analysis of opportunity costs, the following issues are of primary concern and are discussed within the context of Viet Nam and the National REDD+ Program (NRP). The NRP for Viet Nam is currently under development; reference to the NRP is done so based on the "*draft*" Viet Nam National REDD+ Program: Background Document. This document is currently available for stakeholder consultation and feedback as it not the final and approved NRP, it is noted that ideas presented in this draft may change as a result of further development of the program and stakeholder input, therefore reference to the NRP in relation to the analysis of opportunity costs is done so under this proviso.

3.1 IPCC tiers for reporting

A challenge to implementing the local empirical model approach to estimate opportunity costs for REDD+ will be availability of and access to data at the local level. Accuracy and precision of the opportunity cost estimates are dependent upon the data, which will have a significant effect on the carbon price received, as substantiated estimates will be likely to receive higher payments. The IPCC monitoring guidelines, define the levels used in acquiring activity data and assessing corresponding emission factors, and for assessing land use change inducing activities. The IPCC Tiers are:

> *Tier 1*: provides all relevant default values, assumptions and methods. While permitting the easiest way to calculate emissions, it contains the highest degree of uncertainty.
>
> *Tier 2*: builds on national measurement and monitoring data, such as from forest inventories and the monitoring of deforestation, and permits to combine them with IPCC default values, assumptions and methods. It offers therefore more realistic emission calculations than the application of Tier 1.
>
> *Tier 3*: builds on country-specific data, assumptions and methods. This most complex approach offers the highest degree of certainty, but is also the most costly. It requires a detailness and accuracy of data and information, which in most countries is not available as yet.

Frameworks developed by the IPCC for land use change (IPCC 2003) and national inventories for GHG (IPCC 2006) support the use of local information. The IPCC Tier 1, 2 and 3 approach defines the reporting tiers and their requirements. Tier 1 allows for basic estimations using default values when data is unavailable and has large error range. Tier 2 is the intermediate estimation using country defined estimates for specific regions and land use categories and requires data to be collected. Tier 3 is the rigorous estimation method, these reflect national characteristics which are measured and modelled repeatedly over time at the sub-national level (IPCC 2003). Analyses falling into Tier 1 will provide and initial estimate of the magnitude of opportunity costs. Improved data identification and collection can lead to Tier 2 and Tier 3 estimates that provide greater insight into the real opportunity costs of REDD+. To gain the most value from the estimate of opportunity costs, the level of precision and accuracy should be accounted for and this is dependent upon data availability and accuracy used in the calculation process.

Data required for analysis of opportunity costs include land use and land use change, financial (costs and return for land use options) and carbon levels for land uses. Currently data is available to analyse land use and land use change as well estimation of carbon levels; financial data detailing costs and returns from land uses are very limited and lack accuracy. Basic data for commodity yield, price and hence income are

mostly based on average production and market estimates. Costs associated with production activities are rarely available. The exception to this case are economic enterprises that keep detailed financial records as part of their business operation.

The usefulness of the estimate of the opportunity cost of REDD+ is dependent upon the quality and accuracy of data used in the analysis. The more reliable and accurate the data is, the more the estimate of opportunity costs will represent the true cost of REDD+. As the estimate of opportunity costs plays a key role in decision making process for REDD+, accurate estimates are required to ensure appropriate decision making and policies.

3.2 Eligibility under REDD+ policy

This sections deals with what land use qualifies within the terms of REDD+, of primary concern are the definition of a forest and REDD+ activities. Apart from definitions for forest and REDD+, in Viet Nam land use definitions and categories are equally important. At the COP16/CMP6 in Cancun, the Ad Hoc Working Group on Long Term Cooperative Action (AWG-LCA) of the UNFCCC adopted the full scope of REDD+ activities:

- reducing emissions from deforestation
- reducing emissions from forest degradation
- conservation of forest carbon stocks
- sustainable management of forests
- enhancement of forest carbon stocks

A forest by UNFCCC definition is an area of at least 0.5 ha, and country specific choice for canopy cover of 10-30% and a tree height 2-5 m. These thresholds are applied through 'expert judgement' of 'potential' to be reached *in situ,* not necessarily to the current vegetation status. Temporarily unstocked areas remain forest as long as national forest entities claim that such areas will, can or should return to tree cover conditions.

Circular 34/2009/TT-BNN describes the new classification system of forests in Viet Nam. It stipulates a forest has a minimum cover of 10%; with 5 m high trees (except new plantation forest and mangrove forest along coastal areas), bamboo that can provide timber, NTFP and value of bio-diversity, environmental protection; new planted forest with wood species and restoration forest after harvest with average 1.5 m high for slow growing species and more than 3 m high for fast growing and more than 1000 tree/ha density; and an adjoining area at least 0.5 ha. There are 5 criteria of forest classification in Viet Nam according to circular 34/2009/TTBNN-PTNT these are based on:

- purpose of forest use (Production forest, protection forest and Special Use forest);
- forest volume (rich forest, medium forest and poor forest)
- native form (Natural forest, plantation, restoration forest..)
- soil where forest growing (soil mountain forest, wet land forest …)
- tree species (needle forest, broadleaf forest)

The land and therefore forest land classification system is complex in Viet Nam and regulated by numerous laws. The land classification system is important for planning purposes, especially for land use planning. The land classification system in Viet Nam recognizes three land use categories, agricultural land,

non-agricultural land and unused land. Forest land comes under the agricultural land category and was distinguished from agricultural land on two criteria, slope grade and soil thickness. Forest land was defined as land with a slope of >25^{o} or a 47% gradient, and can have any soil thickness. This classification does not suitably define forest land in Viet Nam, as it overlooks coastal and low land forests.

The Land Law (1993) defines forest land as land with natural forests, land with planted forests and land used for the purpose of forest development through measures of reforestation, natural regeneration, enrichment, planting, pilot research and experiment. The revised Land Law (2003) classified forest land according to its use, as production, protection and special use forest.

The Forest Protection and Development Law (2004 describes two types of forest land, land with forest cover and land without forest cover to be planned for afforestation. Decision 2490/QD/BNN-KL by the Minister MARD (2003) further defined and regulated forest land classification as:

- Land with forest cover:
  - Natural forest: wood forest, bamboo forest, mixed forest, swamp mangrove forest and rocky mountain forest. Further subdivided into protection, production and Special Use forest.
  - Plantation forest: plantations with potential resources, plantation without potential resources and bamboo. Further subdivided into protection, production and Special Use forest.
- Barren land and degraded hills without forest cover:
  - Grass land: Further subdivided into protection, production and Special Use forest.
  - Shrub land: Further subdivided into protection, production and Special Use forest.
  - Shrub land: with scattered and restored trees with little forest cover

From the above classifications it is clear that forest land includes land with forest as well as land without forest cover. When determining forestry activities that are eligible under REDD+ the classification of forests and forest land is an important criteria. In Viet Nam this should be based on the forest and forest land classification. The forest land classification system is important for land use planning in Viet Nam as land use planning is based on and regulated by land use category. Different land use scenarios will have different eligibility to the different REDD+ activities. An understanding of REDD+ activities and clarification on the eligibility of specific land uses is still needed. Based on the criteria of forest and REDD+ policy, the following table presents suggested eligibility and priority REDD+ activities for forests in Viet Nam (Table1).

Eligibility of land uses under REDD+ is important for the analysis of opportunity costs of REDD+. The basis of the opportunity cost for REDD+ approach is to compare the net returns from and carbon levels from forest and alternative land use options. If the options compared in the analysis of opportunity costs are not eligible under REDD+ policy, then it will adversely influence the analysis resulting in appropriate decision making and invalid payments under the REDD+ mechanisms for emissions reductions achieved. To avoid this problem land use options should be assessed for their eligibility under REDD+ policy.

Table 1: Eligibility and priority for REDD+ activities

REDD activity	Reducing emissions from deforestation	Reducing emissions from forest degradation	Conservation of forest carbon stocks	Sustainable management of forests	Enhancement of forest carbon stocks
Forest Volume					
> 300 m3/ha			X	X	
201-300 m3/ha			X	X	
101-200 m3/ha		X			X
10-100 m3/ha	X				X

Source: Van Laake pers comm.. 2011

3.3 Accounting stance

The accounting stance is the viewpoint from which costs and benefits are calculated which can be at the National, government, group or individual level. Who pays the costs and receives the benefits is relevant to and determined by the National REDD+ Program and specific to each level. Of particular concern are what costs and benefits are to be included in calculations of opportunity costs and which are specific to each level; how costs and benefits are calculated, incorporating policy distortions; and the discount rate used to assess future costs and benefits (World Bank 2011). The current UNFCCC negotiations are indicating that the measuring, reporting and rewarding of net emission reductions from the five REDD+ activities, will occur on a national level, against a single national reference emission level (REL) or reference level (RL).

Opportunity costs are calculated from the Net Present Value (NPV) of the profits from each land use. The NPV has two defining criteria, the discount rate and time frame of activities over which profits are calculated. The discount rate used for the opportunity cost calculation should reflect the social rate of the government or the market rate (Wertz-Kanounnikoff 2008). At the local level the discount rate should be reflective of local loans available. Within Viet Nam there are two main banks that provide loans for agriculture and forestry development, the Viet Nam Bank for Agriculture and Rural Development and the Social Bank of Viet Nam. The current interest rate applied by these banks for forestry and agriculture development loans is 4% p.a. It is recommended for the analysis of opportunity costs that a constant rate be applied across the country.

The difference between accounting stances is which costs and benefits are included, how they are calculated and the discount rate used in the analysis of opportunity costs of REDD+. Costs and benefits at one level may not be the same for another level, furthermore one group's costs may be another group's benefits. Therefore it is important to understand the different cost categories for each level to ensure accurate estimates of opportunity costs for REDD+ (Pagiola and Bosquet 2009).

3.4 Reference levels

The Reference Level (RL) is the future emission level which is determined by each country that it commits to reduce to. RLs apply to enhancement of forest carbon stock in particular and possibly to conservation and sustainable management as well. The Reference Emission Level (REL) applies to situations where emissions can be reduced such as reducing deforestation and reducing forest degradation.

Although there is no agreement on the REDD+ mechanisms and rules, the negotiations are indicating that a single national RL and REL are preferred for communicating with the UNFCCC. As such, the Cancun Agreements requested countries currently participating in and developing REDD+ activities to develop a national forest REL and RL. Stakeholders in Viet Nam have agreed to develop RELs/RLs for all carbon related activities, where the national RL and REL will be an aggregation of sub-national RELs/RLs based on stratification of the national territory in eco-regions (UN REDD Viet Nam Program 2011).

The reference emission level should be based on carbon prices and opportunity costs; if a country knows how many emission reductions can be achieved and at what carbon price, then it can negotiate a realistic REL. For the assessment of opportunity costs use should be made of these sub-national RELs/RLs in order to accurately represent the local conditions, in particular the potential revenue to be generated from the REDD+ activities. This is important to maximise REDD+ revenues; to ensure all possible emission reductions opportunities are included and at the right cost (Angelsen 2008).

3.5 Nationally Appropriate Mitigation Actions

Nationally Appropriate Mitigation Actions (NAMAs) are specific country based policies and actions to achieve GHG emission reductions. A part of the NAMA is a commitment to reduce emissions relative to business as usual scenario within certain time frames. Viet Nam is in the process of developing its NAMA, in which commitments should be given. Determination of country specific emission reductions from REDD+ will be a significant contributor to the commitment level.

The NAMAs have an in-direct relationship to the analysis of opportunity costs for REDD+, as it the results and output (the actions and policies developed) that will influence the opportunity costs for REDD+.

3.6 Strategic Environment and Social Assessment and Social Safeguards

The Strategic Impact Assessment (SIA) and Strategic Environmental and Social Assessment (SESA) are approaches for exploring the combined economic, environmental and social impacts of a range of proposed policies, programmes, strategies and action plans. Such assessments assist decision making and strategic planning and include cross-cutting, intangible and long-term considerations (OECD 2008; 2010).

Principles and standards of the SESA include sustainability (short-term, long-term and spatial impact), stakeholder involvement, inclusion of non-monetary aspects (environmental, social and other non-market considerations), governance, transparency and accountability, coordination and capacity (OECD 2010). These should be applied to key issues of concern for REDD+ that are, equitable sharing, land tenure and land use rights, equitable governance, transparency, participation, resettlement, indigenous peoples, natural habitats, disputed areas.

These mechanisms are part of the REDD+ readiness phase and help to identify likely impacts, risks and opportunities of a REDD+ National Program, contributing to more informed decision making and selection of appropriate strategic options. Opportunity costs should be a key component of this assessment process to contribute to more informed decision making. These mechanisms have an in-direct relationship to the analysis of opportunity costs for REDD+, as it the results and output (the strategic options) from these mechanisms that will influence the opportunity costs for REDD+.

4. REDD+ Co-benefits

The REDD+ concept foresees compensation to individuals or entities who undertake measures that achieve emission reductions or enhanced removals through any of the five categories identified as eligible under REDD+. Deforestation and forest degradation result in more than just emissions, they are accompanied by the loss of numerous vital ecosystem services that provide a variety of income possibilities, material welfare, livelihoods, security, resiliency, social relations, health, and freedom of choices and actions. The importance of biodiversity and livelihood aspects within the design of REDD+ has been recognized at many levels (CBD and GIZ 2011). REDD+ is expected to bring multiple benefits apart from emission reductions and the corresponding payments; developing countries have the potential to achieve significant co-benefits, including pro-poor development, improved governance, biodiversity conservation, other environmental services and contribute to sustainable forest management and development (Angelsen and Wertz-Kanounnikoff 2008). A comprehensive list of co-benefits that can be achieved from forests is presented in Annex 1, this summarises the multiple social, economic, mitigation, adaptation and biodiversity benefits that can be gained.

In addition to the carbon, other benefits can be had from proper forest management. These benefits are highly dependent on the condition of the forest and the eligible REDD+ activity that is applied to the forest and they therefore have to be determined locally. Table 2 presents additional benefits and income options that could be bundled with REDD+ activities.

The identification and inclusion of co-benefits has important implications for the estimation of opportunity costs. The analysis of opportunity costs is based on two core criteria, estimates of net returns to forest and alternative land uses, and the carbon stock levels of these land uses. The net returns for each land use is cumulative, therefore all cost and benefits from each activity needs to be included in the estimation. Exclusion of land use activities as well as costs and benefits associated with these activities will lead to inaccurate results from the estimate of opportunity costs. The following sections discuss potential REDD+ co-benefits and their significance in relation to the analysis of opportunity costs.

Table 2: REDD+ activities and benefits.

Activity	Carbon assessment	Additional benefits	Income options
Reducing emissions from deforestation	Follow IPCC methodology on the basis of deforestation rates over larger areas (e.g. ecological zone)	Not likely. Potential negative impacts from loss of harvested timber.	Payments from reduced deforestation. Since this activity is a decision (an event, rather than a process) for a forest owner, a quick transition to another activity may be feasible.
Reducing emissions from forest degradation	Uncertain. Viet Nam may elect to not implement this activity.	Not likely.	Payments from reduced forest degradation. Since this activity is a decision (an event, rather than a process) for a forest owner, a quick transition to another activity may be feasible.
Enhancement of forest carbon stock	Follow IPCC methodology. Data can come from National Forest Inventory and Participatory Carbon Monitoring	If the forest land is unstocked or the forest of poor volume initially there are not likely to be any additional benefits. After some years however it may be possible to extract minor timber or NTFPs without negatively impacting the carbon balance.	This activity may last up to 20 years or longer with different levels of additional benefits depending on the condition of the forest. The assessment of benefits should take this whole period into consideration.
Sustainable management of forest	Carbon balance is neutral	NTFPs in natural forests. In plantation forests there are not likely any additional benefits.	Uncertain how the international community will provide positive incentives for this activity. The main source of income for the forest owner, however, will be the sustainable extraction of timber, using low impact harvesting techniques, and any additional benefits that may be available.
Conservation of forest carbon stocks	Carbon balance is neutral	Eco-tourism, PFES, government programs for PAMBs, etc.	Uncertain how the international community will provide positive incentives for this activity. It may be expected, however, that this activity is primarily applied to institutional forest owners with a specific government mandate (e.g. National Parks).

4.1 Forest Ecosystem Services

While REDD+ payments are a type of payment for ecosystem services (PES), forests generate a range of environmental services, more than carbon and includes biodiversity and water. The four basic types (provisioning, regulating, cultural and supporting) of forest ecosystem services are defined in table 3. Tangible and direct benefits come from supporting and provisioning services, while cultural and social services are indirect and therefore harder to value. Ecosystem services are interrelated, with the amount and type of ecosystem services related to and dependent upon other ecosystem services. This interrelationship affects the benefits and the costs associated with ecosystems. It is therefore important to identify which ecosystem services are relevant and to assess what the costs and benefits for each are. Valuing ecosystem services is necessary to enable direct comparison and for inclusion in the analysis of opportunity cost.

Table 3: Forest ecosystem services (based on the Millennium Ecosystem Assessment)

Ecosystem services	Examples for forest ecosystems
Provisioning	**The goods or products obtained from ecosystems**
Food	Non-timber forest products (NTFPs) such as fruits, berries, and bush meat
Fresh water	An estimated 4.6 billion people depend on forests for all or some of their water supplies
Wood and fibre	Timber, cotton, hemp, silk, rubber
Fuel	Fuel wood
Regulating	**The benefits obtained from an ecosystem's control of natural processes**
Climate regulation	The regulation of the global carbon cycle through carbon storage and sequestration, in addition to local and regional climate regulation (albedo effects, regional rainfall etc)
Flood regulation	The reduction and slow down of surface water run-off
Disease regulation	Intact forests reduce the occurrence of standing water, reducing the breeding area for some disease vectors and transmission of diseases such as malaria
Water regulation	Forest systems are associated with the regulation of 57% of total water runoff, and play a large role in the hydrological cycle
Cultural	**The nonmaterial benefits obtained from ecosystems**
Aesthetic	The scenery and landscapes provided by forest
Spiritual	Indigenous peoples and others attach spiritual significance to forests
Educational	Forest resources (genetic etc)
Recreational	Tourism to rainforest areas
Supporting	**The natural processes that maintain the other ecosystem services**
Nutrient cycling	Forests are extremely efficient at maintaining nutrient flows through atmosphere, plants and soils
Soil formation	Forests on slopes hold soil in place and can prevent degradation
Primary production	Forests are highly productive

Source: UN-REDD 2009

Payment for Environmental Services (PES) in Viet Nam is regulated by two laws, the Forest Protection and Development Law (2004) regulating payments for environmental services and Decree 99/2010/ND-CP regulating policy for payment from forest environmental services (PFES). Forest environmental services that are recognised by Decree 99/2010/ND-CP include:

- soil protection, reduction of erosion and sedimentation of reservoirs, rivers and streams
- regulation and maintenance of water sources for production and living activities of the society
- forest carbon sequestration and retention, reduction of emissions of GHG through measures for preventing forest degradation and loss of forest area, and for forest sustainable development
- protection of natural landscape and conservation of biodiversity of forest ecosystems for tourism services
- provision of spawning grounds, sources of feeds, and natural seeds, use of water from forest for aquaculture

Benefits may be derived from multiple environmental services, with Decree 99 clearly stating that a forest supplying many forest environmental services is entitled to the payments for all such forest environmental services. Payment levels for PFES have been set for hydropower facilities (20 dong/1kWH of electricity generated), clean water production and supply (40 dong/m^3) and for eco-tourism (1-2% of revenue in a certain period of time). For ES that are yet to have payment levels defined, the payment mechanism is to be determined by the Ministry for Agriculture and Rural Development (MARD). As the lead agency for PFES, it is responsible to collaborate with relevant ministries to develop the target of application, payment level and payment modality, for implementation in line with the regulations in this decree.

Revenue generated from PFES are deposited into the Forest Protection and Development Fund, which is responsible for making payments to FES providers. Current payment levels for forest environmental services are calculated from the K co-efficient which is determined by the PPC and is based on four criteria:

- Forest status (the capacity to generate forest environmental services)
- Type of forest (Special Use Forest, protection forest, production forest)
- Origin of the forest (natural or planted)
- The level of difficulty or easiness in forest management (social and geographic factors)

There are two payment mechanisms; payments to forest owners and payments for forest protection contracts. Payment to forest owners is based on the total Environmental Service revenues, minus costs (administrative, verification, monitoring) for the total area of a particular forest, divided by the total number of hectares of the total area multiplied by the K-coefficient. Contracted households providing forest protection services are paid by the number of hectares contracted to them for protection times the payment per hectare times the K-coefficient.

The selection of PFES project is carried out by Provincial DARD who submits projects to the PPC for approval. These PFES projects are included in the Land Use and the Forest Protection and Development Planning schemes, to ensure the stability of areas and functions of forests supplying FES.

Analysis of the potential to bundle PFES should be added to the activity to develop alternative land use scenarios, as part of the analysis of opportunity costs for REDD+. The analysis should identify potential ES that can be bundled with REDD+ and priority areas that can be valued and linked to REDD+ activities. The process to identify and estimate the co-benefits from ES may include:

Identify the Ecosystem Services that are provided: Within Viet Nam the Decree 99 recognises five different FES, however only water and natural beauty have had user payment levels determined. Payment

levels for the other FES are still pending. Biodiversity should also be considered as a viable FES that should be bundled with REDD+.

Prioritise areas with high level of Ecosystem Services benefits: Identify and map FES to identify areas with high levels of Ecosystem Services benefits. This step will identify and prioritise areas with high biodiversity, catchments and watershed areas.

Value Ecosystem Services: Estimating the value of the ES for comparison and inclusion in the estimation of opportunity costs.

Mapping Ecosystem Services and REDD+ priority areas: To help identify priority areas for ES and REDD+.

4.2 Market linkages

Payments from REDD+ are expected to benefit those people living in and around the forests who rely on the forest resources for their livelihood and sustenance. In addition to these REDD+ payments, the forest sector should focus on economic development to increase income levels, as such activities to promote forest and non-forest product livelihoods should be a priority.

Economic development of the forest sector should link to and be integrated with national and international initiatives to ensure sustainability for long lasting benefits. National programs of relevance include, the management of shifting cultivation program; the National program for combating desertification; the capacity building on forest fire prevention; The Pilot program on community forestry; Promotion of afforestation and greening of barren hills towards closing the entrance to natural forests; national food security program; the perennial industrial crop program; Program 134 and Program 135. International commitments of importance include Sustainable Forest Management (SFM), Forest Stewardship Council for forest certification (FSC), and Forest Law Enforcement Governance and Trade (FLEGT).

Economic development of the forest sector, particularly for forest and non-forest products will influence the profitability of land use options. Within current land use planning practices there is no economic or financial assessment of current land use options or recommendations for forest and non-forest product development. Within the framework for analysis of opportunity costs the activity to develop alternative land use scenarios, should include the financial analysis of land use options that are considered and recommended. This should include, but not limited to:

- assess forest land use options based on site suitability and forest owner requirements
- assessing the total value of current and new forest land uses, potential for raw material production and processed products
- assessing value chains for forest and non-forest product industries
- identify forest and non-forest product value chains that should be developed

Financial and economic viability of recommended land use options should be a core component of the assessment. This assessment is an important component required to develop feasible land use alternative for inclusion in the analysis of opportunity costs for REDD+. These assessments should be part of the Forest Protection and Development Plan as well as link to the socio-economic develop plan.

4.3 Co-benefits and opportunity costs

The mechanism for including ecosystem service co-benefits such as water and biodiversity is still under negotiation, with no clear mechanisms for their inclusion yet defined. Although no mechanism, the bundling of co-benefits with REDD+ is expected to bring extra benefits. Revenues and costs from ecosystem services or forest and non-forest products market development will influence the profitability and long term viability of land use options. This will have a direct influence on the estimate of opportunity costs for REDD+, as these estimates are partly based on the profitability of land use options.

The inclusion of co-benefits in the estimate of opportunity costs for REDD+ will need the same unit of analysis. Benefits from co-benefits will require conversion of $/ha estimates to $/t$CO_2$, by dividing by the associated tCO_2 of each land use. If the land use is more profitable with the inclusion of co-benefits, it will reduce the opportunity costs of REDD+. This will have two distinct impacts on estimates of opportunity costs for REDD+. In cases where there are already low opportunity costs the inclusion of co-benefits will be less of a priority as REDD+ is already a viable option. In land use scenarios where high opportunity costs occur, the inclusion of co-benefits may reduce the estimated opportunity cost for REDD+. In these cases the bundled co-benefits and carbon present greater benefits and lower the estimated opportunity cost for REDD+ making the bundled land use a viable option for REDD+. Therefore the identification of potential co-benefits that can be derived from areas with high estimates of opportunity costs for REDD+ should be a high priority. As the inclusion of co-benefits may reduce the estimates of opportunity costs for REDD+ and make REDD+ with co-benefits a viable option.

The inclusion of co-benefits may result in higher profitability from land use options, which will affect the opportunity cost estimate for REDD+. However it should be done with caution as the other costs, such as administration and transactions costs associated with the co-benefits, which are not included in the opportunity cost estimate may outweigh the benefits. This will result in the estimate of opportunity costs being considerably lower than the real costs associated with the bundling co-benefits and REDD+.

The inclusion of other benefits may enable the REDD+ mechanism to act as a catalyst for forest sector development, however forest sector development should not be dependent upon REDD+. Economic development of the forest sector through improved forest and non-forest value chains, biodiversity conservation and provision of ecosystem services should not be reliant upon or limited to areas eligible for REDD+. The economic development of the forest sector should be promoted with and without the REDD+ mechanism to ensure sustainable and equitable development.

Achieving these multiple benefits will require new levels of collaboration among different actors at national and international levels. At the National level REDD+ needs to be integrated into existing national forestry programs and activities (SFM, certification, economic development of the forest sector through forest and non-forest products and value chain promotion) as well as international commitments such as Forest Law Enforcement Governance and Trade (FLEGT) and the bundling various environmental services.

5. The process for analyzing opportunity costs for REDD+

The series of activities in estimating opportunity costs are represented in figure 1. Opportunity cost analysis is based on estimates of net returns to forest and alternative land uses, and their respective carbon stocks. The methods and approach used for each activity should meet the REDD+ requirements and criteria outlined by the IPCC. The methods used in the approach presented here were obtained from the Good Practice Guidance from the IPCC (2006) and the GOFC-GOLD (2009) "Reducing Greenhouse gas emissions from deforestation and degradation in developing countries: A sourcebook of methods and procedures for monitoring, measuring and reporting".

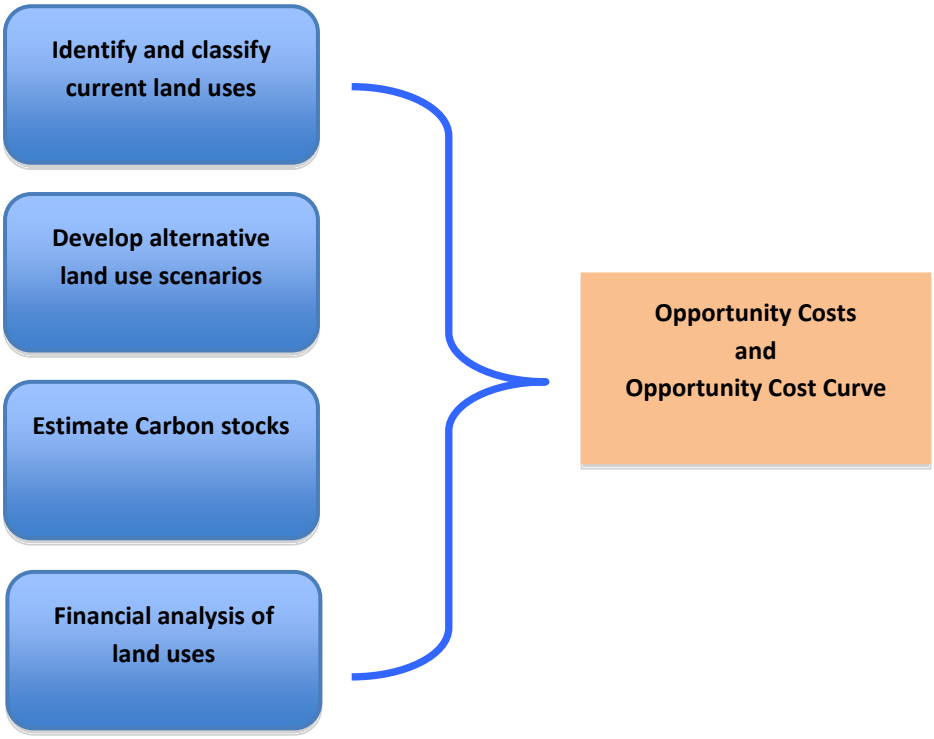

Figure 1: Activities to estimate opportunity costs of REDD+

5.1 Identifying and classifying current land uses

Estimating land use system changes are one of the four bases for REDD+ opportunity cost analysis. The term land use is inclusive of the type land use such as forestry or agriculture etc as well as possible co-benefits such as water and biodiversity. To be able to compare the estimate of various opportunity costs the same unit of measurement and analysis is required. Therefore land uses need to be inclusive of all activities to ensure all benefits and costs are included in the calculation of net benefits ($/ha) This will then allow the conversion of estimates to $/tCO$_2$, by dividing by the associated tCO$_2$ of each land use which includes co-benefits.

There are two key tasks in this activity, to identify current land uses and create a land use map and to predict and explain land use change and create a land use change map. Apart from relevance to the estimation of opportunity costs, land use change and projected land use change are an important component in estimating baseline and reference emission levels and deciding upon relevant REDD+ policies which in turn affect the priorities for participating in REDD+ programs.

The basic skills required to complete this activity include how to assess land use change, how to classify land uses, how to estimate land use change, how to explain land use change and data management, and GIS skills. This activity has a high demand for data, primarily for current land uses and forest quality and status; past land use and planned forest land use and land use change. These data are required to make informed analyse current land use, predictions about future land uses and to analyse past levels of deforestation. Output from this activity include land use categories and maps, land use change matrices, understanding of drivers of deforestation, land use transitions, predictions of land use change. Methodologies for this activity should comply with IPCC requirements.

5.2 Develop alternative land use scenarios

Alternative land use scenarios are realistic options for how the land could be used in addition to its current land use and includes potential co-benefits . Alternative land use scenarios should consider a diverse range of options that account for a variety of possibilities and uncertainties and assess potential consequences of current land use decisions. Apart from technical (topography, hydrology, ecology and climate etc.) market and ecosystem services requirements, scenarios should also include direct and in-direct influences such as national land use policy, property rights, world commodity markets, and domestic prices.

To develop realistic and diverse scenarios a deep understanding of the driving factors behind land use change and their potential impact are required. Once the scenarios are developed a description of the changes in carbon and profits from each scenario is required, so as the opportunity cost can be estimated for each land use scenario. A land use scenario map may be helpful to visualise options and highlight priority areas at risk of deforestation and forest degradation.

Scenarios for alternative land uses also helps to assess trade-offs and complementary activities. To involve in REDD+ activities may mean that the ability to employ alternative land use options is forfeited. REDD+ is a trade-off from carbon and profits within different land uses. In some scenarios the options may be complementary with a positive mix between carbon, biodiversity, water and employment. Assessment of the losses and gains from each scenario can help to identify ideal situations.

5.3 Estimating carbon stocks for each of the land uses

For the analysis of opportunity costs the carbon levels for each land use scenario is needed. Approaches and the monitoring system should provide estimates that are transparent, consistent accurate and complete and reduce uncertainties. The system for carbon accounting should be compliant with the IPCC methodologies and standards for REDD+. The IPCC Good Practice Guidance and the Draft document defining the Viet Nam National REDD+ Program (2011) outlines the requirements of the national inventory and monitoring system on GHG emissions and removals.

The IPCC (2003; 2006) monitoring guidelines differentiate between the levels of complexity, Tiers 1,2 and 3, for assessing land use change and corresponding emissions. Forest inventory data available currently in Viet Nam will allow for Tier 2 level reporting. Tier 2, builds on national measurement data, such as forest inventories and the monitoring of deforestation, and permits to combine them with IPCC default values, assumptions and methods. As the Viet Nam REDD+ program develops it will build capacity and improve the level of reporting to Tier 3, which builds on country specific data, assumptions and methods, offering the highest degree of certainty through detail and accuracy of data used for the calculation of opportunity costs (UN-REDD Viet Nam Programme 2011).

5.4 Financial analysis of the land uses

An estimate of the profits from each land use is needed to calculate opportunity costs. It is important at this stage to include all costs and benefits derived from each land use. The profits derived from each land use are cumulative of all activities (such as forestry and co-benefits) occurring within that land use option. The financial analysis may include the gross return per land use, net present value per land use and the cost/benefit ratio per land use. Challenges and complexities likely to be encountered during calculation include:

- Valuing inputs, no monetary value for many products, such as family labour and household consumption of products.
- Lack of kept data, historical and current.
- Price variations across locations and time within a country.
- Variable market prices and yields across commodities, location and time.
- Net present value: discount rate applied and timeframe of activities

5.5 Estimating opportunity costs

This step integrates all the information generated from the previous steps. Opportunity costs for REDD+ gives a money-based figure calculated as $\$/CO_2e$, it is the trade-off between carbon and profits. The results from the opportunity cost calculations are combined to create the opportunity cost curve. This is a graphical representation of the opportunity costs for each land use and quantity of potential emissions reductions per type of land use change.

The cost curve is constructed from the calculation of on-site opportunity costs and excludes other costs such as transition, implementation and administration costs. The cost curve is an underestimate of the total costs of REDD+, actual costs will be higher when all costs are included (Dyer 2010). Although it has limitations, the cost curve can help to identify which emission reduction options are attractive and at what price. Furthermore, analysis of the spatial distribution of opportunity costs when linked to land use transition maps can also help to determine starting points and priority areas for REDD+ activities and initiatives.

6. Integrating analysis of opportunity costs for REDD+ into planning systems

6.1 Analysis of opportunity costs for REDD+

The analysis of opportunity costs will involve agencies at the national and sub-national levels. At both levels there will be two groups involved in the analysis, those who carry out the studies and those who interpret and use the results for decision making and policy development. Forestry planning experts will need to be able to carry out the analysis, and need to be able to interpret and apply the results obtained from the analysis to develop REDD+ activity and policy recommendations. Decision makers and policy developers need a basic understanding of the process to carry out the analysis and need to be able to interpret and apply the results obtained from the analysis to develop REDD+ national and sub-national plans and policies as well as for international negotiations.

6.2 Forestry planning processes

6.2.1 Current forestry planning processes

The three main plans that involve the forestry sector are the Socio-Economic Development Plan (SEDP), the Land-Use Plan (LUP) and the Forest Protection and Development Plan (FPDP). The LUP describes the current land use for the three types of forest (protection, production and special-use) and describes the intended forest use based on classification in the following year as well as the proposed budget to support forestry activities. The FPDP is a detailed activity plan that describes how each forest land use class, as described in the LUP, will be managed, developed and protected. The SEDP is the economic development plan covers all sectors and is the plan for economic stimulation and monitoring; sector plans such as the LUP and FPDP are integrated into the SEDP.

Planning is carried out at two major levels, the central level by the relevant Ministry and at the Provincial level by the Provincial People's Committee (PPC). The Ministry develops the overall long term strategy, usually for a 20 year period, which is then used as the basis for the PPC long term strategy for each plan. Planning approaches are both top-down and bottom-up. The top down approach is applied for long term strategies, starting at the central level followed by regional, provincial, district and commune. The bottom-up approach is used for short term planning (annual and 5 year planning cycles), where plans from the lower level are incorporated into higher level plans, commune plans are aggregated into district plans and district plans are aggregated to form the provincial plan which is then incorporated into national level plans (MARD).

Organizations at the Provincial level involved in the planning processes and the relationship between these organizations are shown in figure 2. The relationship between the Provincial People's Committee (PPC), District People's Committee (DPC) and Commune People's Committee (CPC) is a vertical relation within the state management system of Viet Nam. This system manages all economic sectors in terms of planning, implementation and monitoring of sectors within the province. Relation between units within DARD such as Sub-Department for forest protection (FPsD) and sub-department for forestry (sDOF) and Protection Forest Management Board is an internal relation within agriculture and rural development

management system of the province. Thereby, FPsD and sDOF are state management units that carry out management tasks; and Forest Management Boards and Forest companies are administrative and professional units, operating forest protection and development activities.

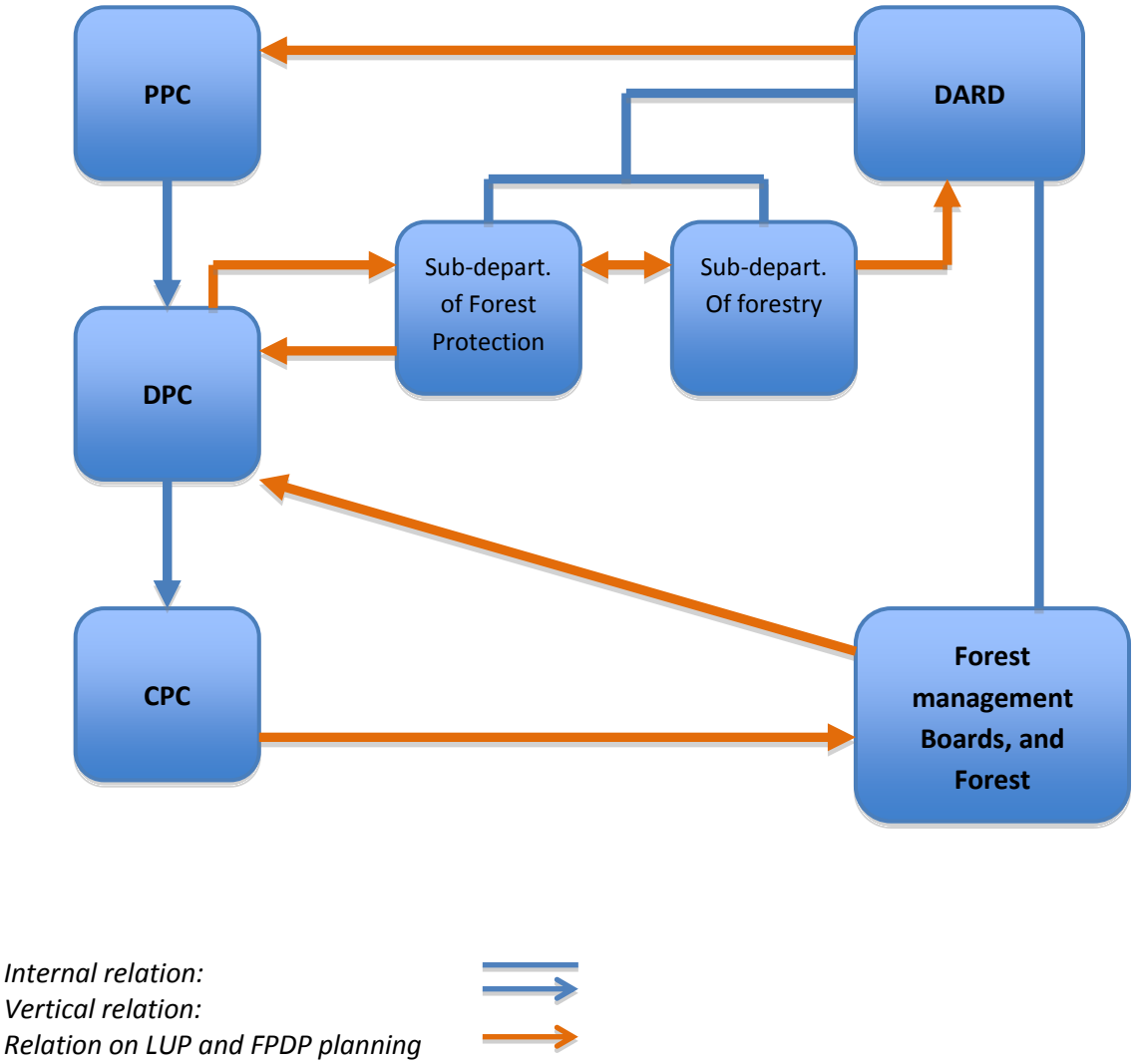

Figure 2: Organization flow chart showing the relationship between Province and District level agencies for land use and forest protection and development planning.

The main function of each agency, as well as their roles and responsibilities in relation to LUP and FPDP are listed in Table 4.

Table 4: Agencies and their roles and responsibilities involved in land use and FPDP planning.

Level	Organization	Major role/function	Responsibilities for LUP and FPDP
Provincial	**PPC**	Provincial People's Committee As a government authority at provincial level, is responsible to carry out state management tasks including forestry sector in the province	To approve provincial LUP, forest strategy and FPDP submitted by DARD
	DoNRE	Department of Natural Resources and Environment DONRE belong to PPC , to assist PPC in management of Natural Resources and environmental sector	Support PPC in approval of land use plan including forest land.
	DARD	Department of Agriculture and Rural Development The management unit on agriculture and rural development including forest sector.	Coordinate LUP and FPDP processes; submit LUP and FPDP to PPC for approval.
	Sub-DoF	Sub-department of Forestry is a department of DARD, has a mandate to carry out management tasks on forestry sector in within the province	Assist DARD in preparing provincial LUP and FPDP Support forest owners to prepare their own FPDP
	Sub-FPD	Sub-department of Forest Protection is a department of DARD, has a mandate to carry out forest management and protection tasks	Together with sub-department of forestry to prepare Provincial LUP and FPDP particularly to provide data/information on annual forest changes and forest land use for planning.
	Forest Consulting Company	Forestry Consulting Company is a stock company, work as service provider on forest inventory and planning in the province area.	Provide technical service and data, information to forest owners (Forest Management Board, Forest Companies) for LUP and FPDP
District	**DPC**	District People's Committee The government authority at district level, is responsible to carry out state management tasks including forestry sector in the district area	Coordinate district LUP and FPDP planning Submit district LUP and FPDP to District People's Council for approval
	ONRE	Office of Natural Resources and Environment This is a unit of the DPC, to assist DPC in district land use planning and managing land use including forest land	Together with forest protection station for district forest land use planning
	Forest protection station	Agency for Forest Protection, and part of subFPD To manage and protect forest, participate in forest development and forestry extension in the district area	Participate in LUP and FPDP planning: cooperate with forest owners within district to prepare LUP and FPDP which to be integrated in district SEDP
	Forest Company	This is a forest owner to do business on forest and forest land allocated by the Government. May be a State, Joint or non-state company	Prepare their forest business plan including LUP and FPDP; partly plan (forest development and protection component) to be integrated to district FPDP.

Level	Organization	Major role/function	Responsibilities for LUP and FPDP
	Forest Management Board	As a State agency and forest owner who has been allocated forest and forest land for management and protection	Prepare their own FPDP for allocated area, submit to DARD for getting budget from Government programs (661, 30A programs) or submit to district PC to include in district FPDP
Commune	**CPC**	Commune People's Committee As a government authority at commune level, is responsible to carry out state management tasks including forestry sector in the commune	Prepare commune LUP and FPDP and submit to DPC to include in the district LUP and FPDP

6.2.2 Forestry sector planning for REDD+

There is an important distinction that must be made between the LUP and the FPDP as carried out in Viet Nam. The LUP is responsible for assigning and classifying land use types; this plan describes what land can be used for according to the classification system for Viet Nam. Forest land in Viet Nam is classified as protection, production and special-use, the LUP therefore defines the areas for each the three types of forest. The FPDP uses the LUP to describe how the forest land (protection, production and special-use) is to be managed and used; it is a detailed activity plan for forest protection and development purposes.

Planning for REDD+ should be integrated into both of these forestry sector plans. The LUP is important as this plan defines what areas are forest lands and what type of forest land which is a key component and relevant to REDD+. The FPDP which describes forest management and use activities will be an important as to allow the forest land to be used and managed in a way that not only allows for forest sector development but also, which includes and identifies relevant REDD+ activities and to meet emission reduction targets. Currently there are no financial or economic analyses carried out in the LUP or FPDP forestry planning processes, both plans are based on technical data and issues and include a budget for proposed activities.

REDD+ needs to link with current forestry sector agencies, roles and activities, and assign responsibilities and tasks to specific agencies and departments based on their current responsibilities. After consultation with Lam Dong Provincial planning agencies from MARD and MoNRE, the conclusion was to integrate the analysis of opportunity costs for REDD+ into the FPDP at the provincial level. This recommendation was based on the fact that the FPDP is specific to the forestry sector and therefore allows a more detailed focus for REDD+ and forestry. Planning for REDD+ is highly relevant to LUP, and the results from the FPDP should be linked to the LUP with annual recommendations, especially in relation to recommendations for changes to the current and projected land use. This will be enabled, by the fact that the agencies responsible for the FPDP and the LUP are the same. As the FPDP is linked to the SEDP it will assist the inclusion of REDD+ in the SEDP.

6.3 Analysis of opportunity costs for REDD+ and forestry planning

The FPDP has five major planning steps. The planning steps and activities, the agencies involved and levels for preparing the FPDP are described in table 5. There are three primary agencies involved in

developing the FPDP, the Forestry Consultancy Company, who has the lead in steps 1-3 to carry out the technical analysis and the Forest sub-Department and Forest Protection Sub-Department which carry out step 4 and 5 to develop the plans for the three types of forest.

Table 5: The steps, roles and responsibilities of the Provincial Forest Protection and Development Planning process.

Steps	Planning process	Where	Who	Activity
1	Preparation	Province and district	Forest consultancy company, provincial DOF and Department of Forest protection	Collect secondary data/information
2	Survey to collect data/information	Sample survey in the field	Forest consultancy company	Forest inventory to have data on volume of forest
3	Assess current land use	At stakeholder level (forest company, forest management board)	Forest consultancy company, provincial DOF and Department of Forest protection	Analyze volume of forest
4	Forest planning for 3 type of forests	Provincial level	DOF and DFP	Base on technical data collected and current land use situation to prepare plan (annual forest protection plan)
5	Writing reports	Provincial level	DARD (DOF and DFP)	Base on data and information analyzed to prepare report that to be submitted to PPC

The process to analyse opportunity costs for REDD+ has been described in section 5 of this report, and includes the following five steps:

- Identifying and classifying current land uses
- Developing alternative land use scenarios
- Estimating carbon stocks for each of the land uses
- Financial analysis of the land uses
- Estimating opportunity costs

The analysis of opportunity costs should be integrated into steps 2-4 of the FPDP planning process, Table 6) integrates the two planning processes. The first step of the opportunity cost analysis process can be integrated into the existing step 3 of the FPDP, and is an extension of current activities already undertaken for the FPDP. The remaining four steps of the analysis of opportunity costs for REDD+ are new activities that will require specific capacity building for agencies involved in the planning process.

Table 6: Integrating the analysis of opportunity costs for REDD+ and co-benefits into the Provincial Forest Protection and Development Planning process.

Steps	Current planning process	Opportunity cost process	Agency involved	Expertise and requirements
1	Preparation		Forest consultancy company, provincial DOF and Department of Forest protection	Forestry, economics, policy Methodology for analysing opportunity costs Specify ES to be examined and the scale (landscape, ES, Community)
2	Survey to collect data/information	Identify and collect data required for OCA	Forest consultancy company	Forestry, economics, geography/remote sensing List of required data and source
3	Assess current land use	Identifying and classifying current land uses	Forest consultancy company, provincial DOF and Department of Forest protection	Forestry, geography/remote sensing, ES, policy Current forest land use, planned forest land-use and forest land-use changes, predicted and unplanned forest land-use and forest land-use changes. Past level deforestation rates. Land use and land use change maps Forest type, area and quality. Forest owner and tenure Locate areas with high levels of co-benefits and ES; identify ES hotspots (biodiversity, catchments) Spatial analysis of ES, map priority ES
		Developing alternative land use scenarios that include co-benefits	Forest consultancy company, provincial DOF and Department of Forest protection	Forestry, geography/remote sensing, ES, policy, carbon measure, economics Estimate expansion of land use categories Hypothetical land use scenarios for expanding land use categories including options for bundling PES and forest and non-forest commodity development plans Prioritise co-benefits to be quantified and valued
		Estimating carbon stocks for		Forest Inventory, Biomass measurement, C estimation

Steps	Current planning process	Opportunity cost process	Agency involved	Expertise and requirements
		each of the land uses including co-benefits		Follow IPCC methodology
		Financial analysis of the land uses including co-benefits		Gross return per land use (Area for each land use, yields, commodity market prices, input costs total production value (Price*yield) Value ES, benefit schemes and co-benefits Cost/Benefit ratios per land use Net Present Value per land use (discount rate and time frame)
		Estimating opportunity costs for land uses including co-benefits		Opportunity costs per ton of carbon dioxide and CO_2e
		Spatial distribution and REDD supply curves		Mapping of opportunity cost estimates, PES and land use REDD cost curves
4	Forest planning for 3 type of forests	Planning for REDD+ activities	DOF and DFP	Forestry, geography/remote sensing, PES, policy, economics Identify eligible REDD+ activities for each forest type and area Prioritise activities and sites for REDD+, ES, co-benefits and forest and non-forest commodity development Develop REDD+ compliant activities to support forest owners to achieve emission reductions
5	Writing reports		DARD (DOF and DFP)	Forestry, policy, economics. Dissemination of report, link to LUP and SEDP

There are two FPDP at the Provincial level: the 5 year strategy plan and the annual plan. Analysis of opportunity costs should be integrated into the 5 year FPDP strategy plan. The annual FPDP should focus on developing activity plans that deliver the emission reductions as well as ensuring forest sector development and forest protection. Opportunity costs vary with time; this reflects changes in land use, technologies, management practices, carbon estimates and prices. The accuracy of the opportunity cost estimates are important for decision making, planning and policy development. The estimates should be updated periodically to account for variation in time and activities. A monitoring framework can help to assess the relevance of opportunity cost estimates. Monitoring of emission reductions achievements and forestry sector developments can help to assess the accuracy and relevance of the estimates of the opportunity costs for REDD+. If the five year time frame of the strategy planning process is too long and leads to high variation in estimates, the time frame should be reviewed.

The timeframe for analysis for opportunity costs will also be influenced by the process methodology, capacity of those doing the analysis and availability and quality of data. The opportunity cost estimates should be updated when new and more accurate data and skills are available. Improvement in opportunity cost estimates will influence policy and decision making, as well being able to reach higher the reporting levels of Tier 1, 2 or 3.

6.4 Technical requirements

The types of expertise and requirements of the analysis of opportunity cost process are shown in Table 5. The types of expertise required include forestry, policy, remote sensing / geography, carbon measuring, economics and PES. These are the types of skills that are available at the provincial level planning agencies; therefore the staff have the basic skill set of requirements. However specific capacity building is required to gain expertise to enable staff to analyze opportunity costs for REDD+.

There are three core data requirements for the analysis of opportunity costs for REDD+; land uses, profits of land uses and the carbon stock of each land use. Data availability and quality will influence the accuracy of the estimates of opportunity costs for REDD+. The different development phases for REDD+ programs will likely have varying levels and standards of data. Early preparation phases may benefit from Tier 1 or 2 reporting requirements, and as the REDD+ program develops Tier 3 levels may be reached.

Data collection is a priority activity; the data required its availability and accuracy as well as which agency has the data should be defined. Currently there is a lack of reliable and accurate data for the analysis of opportunity costs for REDD+. The Commune and District authorities collect the basic socio-economic data, however these are based on average figure calculations. Forestry data is quite well developed in Viet Nam, however at the Provincial, District, Commune, Forest Company and Forest Protection Management Board levels, access to up-to-date is the major constraint. Knowledge of and the ability to establish the carbon level of land uses is also a major challenge. The National REDD+ Program is addressing the last two issues with considerable effort and activities to provide up-to-date and accurate forestry and carbon information. To support these activities a process to collect actual socio-economic data to determine land use profitability should be implemented. Although time consuming and costly a survey to collect data (at the very least input costs and income) from forest owners is required.

To aid the use and sharing of this data a process for data storage and sharing should be developed and approved by the relevant authorities. The system for data collection, storage and use should be integrated with current forestry initiatives. The REDD+ program will require a monitoring, reporting and verification system (MRV) which apart from reporting will provide the GoV with basic information to implement its National REDD+ Program effectively, and to plan and implement other priorities related to forests and forest owners (UN-REDD Viet Nam ProgrammeProgramme 2011). The National REDD+ Program background document indicated that the MRV system will provide guidance to the provincial authorities for developing forestry sector elements of new SEDP and their annual updates, as well as in analyzing the progress and evaluating the performance of the implementation of the SEDP in the forestry sector. Other forestry sector initiatives include the National Forest Inventory (NFI) and the Forest Management Information System (FORMIS), which will provide high quality information on forest resources and conditions, management, operations and production and processing of timber to forest managers and state authorities. These systems will benefit the collection and use of data for the analysis of opportunity costs for REDD+.

6.5 Institutional arrangements

The forestry sector planning processes are regulated and approved by the MARD. Planning regulations provide clear direction on the tasks, roles and responsibilities of agencies, the planning process and the output and results to be obtained. Any amendment to the forestry planning process must be approved by the MARD. Amendment to planning process at the provincial level is assessed by the Department of Planning and Investment and approved by the PPC.

The inclusion of the analysis of opportunity costs for REDD+ into FPDP planning must be approved by MARD who will release approved guidelines outlining the tasks, roles and responsibilities for the modified planning process. The MARD are reviewing the forestry planning processes this year, providing an opportunity to add the analysis of opportunity costs for REDD+ into the planning process. This will requires clearly defined steps of the process, agencies identified and clear roles assigned to be developed which will need to be presented for stakeholder feedback. To aid this process, piloting of the process to analyze opportunity costs is required to test the methodology.

7. Capacity requirements to analyze opportunity costs for REDD+

7.1 Description of capacity requirements

Capacity building requirements for the analysis of opportunity costs for REDD+ should focus at two levels. Capacity building for those directly involved in the calculation of opportunity cost estimates for REDD+ and for those who use the estimates for planning, decision and policy making. The capacity required depends on the agency involved and their role in forest sector planning. The suggested role and function of agencies involved in forestry planning and the analysis of opportunity costs for REDD+ are listed in Table 7. The specific capacity requirements for the analysis of opportunity costs for REDD+ include:

What is REDD+: To adequately plan for REDD+ forestry agencies and decision makers need an understanding of what REDD+ is, its activities, eligibility, policies and mechanism. Emphasis should be placed on National REDD+ activities and policies and how these link to forestry policy and sector development and protection strategies.

Introduction to opportunity costs for REDD+: What is an opportunity cost, what are the opportunity costs for REDD+, the opportunity cost process, what the estimates of opportunity costs for REDD+ can be useful for.

Process to analyze opportunity costs for REDD+: In-depth training for each of the five opportunity cost activities; Identifying and classifying land use; alternative land use scenarios; estimating carbon stocks for land use; profitability of land use; estimating opportunity costs.

Forestry planning and policies for REDD+: How to use the opportunity cost estimates for forestry planning and development of supporting policies to implement REDD+ and achieve emission reductions.

7.2 Capacity requirements for the process to analyse opportunity cost for REDD+

Capacity building efforts for the opportunity costs for REDD+ process should emphasize the following issues and skills for each activity:

Identifying and classifying land use: Identifying and analyzing causes of deforestation and forest degradation; assessment of projected land use changes predicted and planned; use of satellite imagery; data availability and up-to-date data; land classification system.

Developing alternative land use scenarios: Assessment to identify potential ecosystem services that can be bundled with REDD+; value chain analysis for forest and non-forest sector commodities; value chain promotion plans for forest and non-forest sector commodities; knowledge of REDD+ activities and eligibility.

Estimating carbon stocks for land use: Carbon stock measurement process, linking to national REDD+ activities for measuring carbon; data access and up-to-date data.

Table 7: Capacity and expertise requirements for organizations to participate in the analysis of opportunity costs for REDD+

	Organization	Forestry planning role and function	Capacity required
Provincial	**PPC** **DoNRE** **DARD**	Policy and decision makers	Basic understanding of REDD+ Introduction to opportunity costs for REDD+ Basic understanding of forestry planning and policies for REDD+
	Sub-DoF	Carry out management tasks on forestry sector in within the province, including LUP and FPDP	Good understanding of REDD+ activities, eligibility and its mechanisms. Introduction to opportunity costs for REDD+ Opportunity costs for REDD+ process Forestry planning and policies for REDD+
	Sub-FPD	Carry out forest management and protection tasks, including LUP and FPDP	Good understanding of REDD+ activities, eligibility and its mechanisms. Introduction to opportunity costs for REDD+ Opportunity costs for REDD+ process Forestry planning and policies for REDD+
	Consulting Company	Consulting company that provides technical expertise for the LUP and FPDP processes	Good understanding of REDD+ activities, eligibility and its mechanisms. Introduction to opportunity costs for REDD+ Opportunity costs for REDD+ process Forestry planning and policies for REDD+
District	**DPC**	District People's Committee Coordinate district LUP and FPDP planning	Basic understanding of REDD+ Introduction to opportunity costs for REDD+ Basic understanding of forestry planning and policies for REDD+
	ONRE	LUP	Basic understanding of REDD+ Introduction to opportunity costs for REDD+ Basic understanding of forestry planning and policies for REDD+
	Forest protection station	Cooperate with forest owners within district to prepare LUP and FPDP which to be integrated in district SEDP	Good understanding of REDD+ activities. Basic understanding of forestry planning and policies for REDD+
	Forest Company	Prepare their forest business plan including LUP and FPDP (to be integrated to district FPDP)	Good understanding of REDD+ activities, eligibility and its mechanisms. Introduction to opportunity costs for REDD+ Opportunity costs for REDD+ process Forestry planning and policies for REDD+
	Forest Management Board	State agency and forest owner, prepare their own FPDP for allocated area	Good understanding of REDD+ activities, eligibility and its mechanisms. Introduction to opportunity costs for REDD+ Opportunity costs for REDD+ process Forestry planning and policies for REDD+
Commune	**CPC**	Commune People's Committee Forestry sector management in the commune	Knowledge of REDD+ and REDD+ activities Forest sector activities for forestry development and protection

Profitability of land use: Accuracy of and up-to-date data; data collection; data storage and sharing; financial and economic analysis of land use scenarios; discount rate and timeframe of analysis used for Net Present Value calculations of land use profitability.

Estimating opportunity costs: Creating the opportunity cost curve; use of spatial tools for mapping opportunity costs, potential ecosystem services, land use changes, deforestation and forest degradation etc.; using the estimates of opportunity costs for forestry planning.

8. Conclusion

The analysis of opportunity costs for REDD+ provides information to develop a REDD+ program by helping to understand the actual cost to supply emission reductions. There are however limitations to this approach in that it does not estimate the full cost of REDD+, excludes transaction, implementation, administration and social costs, as well as the costs of necessary legislative and institutional reform and consultation.

Despite its methodological flaws, opportunity costs are useful for decision makers and for setting policy. Opportunity costs should be used in the decision making process when there is full understanding of the limitations of the approach and the contextual issues under which the analysis was applied. To increase our understanding of the costs of REDD+ and how these shape and influence a REDD+ program more rigorous and sophisticated models should be developed which builds upon the limitations of the opportunity costs approach and includes those overlooked costs and contexts into the bottom line of REDD+ activity costs.

The analysis of opportunity costs for REDD+ should pay attention to and address the following issues:

- From a country perspective opportunity costs should be estimated from the bottom-up empirical model approach. National-level REDD+ opportunity costs should be based on local data to obtain realistic and representative estimates of the real costs of REDD+. Extrapolation of empirical estimates can result in cost-effective and accurate national level estimates of REDD+ opportunity costs.

- Analysis should be carried out as accurately and objectively as possible.
  - Overestimating the costs would make REDD+ less attractive and result in a loss of money and missing out on co-benefits that would have been generated by avoiding deforestation.
  - Underestimating REDD+ costs would make avoiding deforestation appear more attractive in result in possible loss to provide emission reductions.
  - Data availability and accuracy: To calculate the financial return the methodology uses net values, as the use gross values overstates opportunity costs. Currently data has limited availability and accuracy; it is a high priority to collect accurate field level data.

- The full cost of REDD+ needs to be estimated this should include transaction and implementation costs, as well the costs of necessary legislative and institutional reform and consultation which will be part of any REDD+ program design.
  - Determine what actions are needed on the policy and legal fronts as well as strengthening compliance with existing laws to improve forest governance.
  - Develop alternative cross sectoral strategies and approaches to make REDD+ work;
  - Investments in other non-PES policies can directly result in reduced emissions and function as a direct instrument for REDD+.
  - However it should be emphasised that the economic rationale is only one factor that should guide decision making.

- The adequacy and appropriateness of opportunity costs approach as:
  - A proxy for payments to halt deforestation and forest degradation. Land users are likely to be paid a uniform price, not differentiated according to their opportunity costs. The price of carbon is likely to be determined by the markets and not the various opportunity costs of the various forest owners or potential users of the forest.
  - Difficult to estimate opportunity costs where the market system is not functioning well. This has implications for accurate cost estimates for shifting cultivation and subsistence land use activities.

- As opportunity costs for REDD+ will vary significantly within a country:
  - Analysis of sub-national REDD+ opportunity costs is the only approach to account for these variations.
  - Opportunity cost estimates need to be determined at the highest level of spatial detail possible. Geographic Information Systems provide a valuable tool to organise available information and undertake the analysis.

- Opportunity costs vary over time; variations cannot always be predicted as it changes as market forces change, as technology improves and as new technologies emerge.
  - Analysis of opportunity costs should be done on a regular basis as part of the 5 year strategy plan of the Forest Protection and Development Plan.

- Inclusion of co-benefits:
  - Omitting the value of co-benefits makes opportunity costs appear higher than the actual cost, however valuing co-benefits is difficult.
  - The identification and valuation of potential co-benefits that can be derived from areas with high estimates of opportunity costs for REDD+ should be a high priority.

- Enabling implementation at the sub-national level:
  - Capacity building for forestry agencies to undertake the analysis. The priorities are financial and economic analysis, developing comprehensive alternative land use options that include co-benefits, estimating carbon stocks for each land use and how to effectively use the results of the analysis for decision making.
  - Legalise the inclusion of the analysis of opportunity costs into the Forest protection and Development Plan, as well as enabling linkages to use the results for Land-Use Planning and Socio-Economic Development Planning.

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Annex 1

Multiple benefits: the adaptive, social and cultural, economic, biodiversity and mitigation benefits that can be achieved from ecosystems.

		Additional benefits			
Adaptation measure	**Adaptive function**	**Social and cultural**	**Economic**	**Biodiversity**	**Mitigation**
Mangrove conservation	► Protection against storm surges, sea-level rise and coastal inundation	► Provision of employment options (fisheries and prawn cultivation) ► Contribution to food security	► Generation of income to local communities through marketing of mangrove products (fish, dyes, medicines)	► Conservation of species that live or breed in mangroves	► Conservation of carbon stocks, both above and below-ground
Forest conservation and sustainable forest management	► Maintenance of nutrient and water flow ► Prevention of land slides	Opportunities for ► Recreation ► Culture ► Protection of indigenous peoples and local communities	Potential generation of income through: ► Ecotourism, ► Recreation ► Sustainable logging	► Conservation of habitat for forest plant and animal species	► Conservation of carbon stocks ► Reduction of emissions from deforestation degradation
Restoration of degraded wetlands	► Maintenance of nutrient and water flow, quality, storage and capacity ► Protection against floods or storm inundation	Sustained provision of: ► Livelihood ► Recreation ► Employment opportunities	Increased: ► Livelihood generation ► Potential revenue from recreational activities ► Sustainable use ► Sustainable logging of planted trees	► Conservation of wetland flora and fauna through maintenance of breeding grounds and stop over sites for migratory species	► Reduced emissions from soil carbon mineralization
Establishment of diverse agroforestry systems in agricultural land	► Diversification of agricultural production to cope with changed climatic conditions	► Contribution to food and fuel wood security.	► Generation of income from sale of timber, firewood and other products	► Conservation of biodiversity in agricultural landscape	► Carbon storage in both above and below-ground biomass and soils
Conservation of agrobiodiversity	► Provision of specific gene pools for crop and livestock adaptation to climatic variability	► Enhanced food security ► Diversification of food products, ► Conservation of local and traditional knowledge and practices	► Possibility of agricultural income in difficult environments ► Environmental services such as bees for pollination of cultivated crops	► Conservation of genetic diversity of crop varieties and livestock breeds	
Conservation of medicinal plants used by local and indigenous communities	► Local medicines available for health problems resulting from climate change or habitat degradation, (e.g., malaria, diarrhea, cardiovascular problems).	► Local communities have an independent and sustainable source of medicines ► Maintenance of local knowledge and traditions	► Potential sources of income for local people	► Enhanced medicinal plant conservation ► Local and traditional knowledge recognized and protected.	► Environmental services such as bees for pollination of cultivated crops
Sustainable management of grassland	► Protection against flood ► Storage of nutrients ► Maintenance of soil structure	► Recreation and tourism	► Generate income for local communities through products from grass (e.g., broom)	► Forage for grazing animals ► Provide diverse habitats for animals that are predators and prey	► Maintenance of soil carbon storage of soil carbon

Source: CBD 2009

Annex 2

List of activities undertaken:

Date	Activities	Place
3/12/2010	Meeting with UN-REDD Viet Nam Program PMU	Hanoi
8/12/2010	Meeting with Forest sub Department	Da Lat city
8/12/2010	Meeting with Forest Protection sub Department	Da Lat city
8/12/2010	Meeting with Forest protection and Development Fund	Da Lat city
9/12/2010	Meeting with Di Linh District Peoples Committee	Di Linh District
9/12/2010	Meeting with Planning and Financial Division of DPC	Di Linh District
9/12/2010	Meeting with Forest Protection Station of Di Linh district	Di Linh District
9/12/2010	Meeting with Office of Natural Resources and environment	Di Linh District
10/12/2010	Meeting with Di Linh Forest Company	Di Linh District
10/12/2010	Meeting with Agriculture and Rural Development Division of DPC	Di Linh District
13/12/2010	Meeting with District People's Committee	Lam Ha District
13/12/2010	Meeting with Forest Protection Station	Lam Ha District
13/12/2010	Meeting with Planning and Financial Division of DPC	Lam Ha District
14/12/2010	Meeting with Agriculture and Rural Development Division of DPC	Lam Ha District
14/12/2010	Meeting with Office of Natural Resources and environment	Lam Ha District
15/12/2010	Meeting with Administration Office	Lam Ha District
15/12/2010	Meeting Lam Ban Forest Protection Management Board	Lam Ha District
5/1/2011	Meeting UN-REDD PMU and MARD	Hanoi
6-11/1/2011 21/1/2011	Stakeholder meetings: SNV, IUCN, PACT, CSEED, JICA, SRD, RECOFTC, IPSARD, MARD and MoNRE (Department of meteorology, hydrology and climate change) Documents collected from ICRAF	Hanoi
18/1/2011	OCA workshop	Da Lat
From 19/1/2011	Preparation of OCA training program/materials	Hanoi, Hue
22-23/2/2011	Training on OCA for REDD+ for participants from provincial level	Da Lat
24-25/2/2011	Training on OCA for REDD+ for participants from Di Linh and Lam Ha Districts	Hue, Hanoi
From 28/2/2011	Report Preparation	Hue, Hanoi

Annex 3

List of people interviewed:

Name/position	Organization
Dr Patrick Van Laake – Senior Technical Officer Ms. Nguyen Thi Thu Huyen – Program Manager	UN-REDD Viet Nam Program PMU
Lam Dong Province	
Mr. Bui Thanh Phong - Vice director Mr. Le Hoang Nam - specialist	Forest sub Department
Mr. Tran Thanh Binh - Director Mr. Nguyen Khang Thien - Vice director Ms. Trinh Thi Truyen - Head division of Forest Conservation Mr. Le Van Chuyen - Head of forest protection Mr. Hoang Hoai Nam - Vice Head of administration	Forest Protection sub Department
Mr. Vo Dinh Tho – Director Mr. Pham Thai Hung - Head of Technical Division Mr. Tran Thanh Tung - Head of Financial Division	Forest protection and Development Fund
Di Linh District	
Mr. Le Van Phu - Vice chairmen Mr. Nguyen Phuc Hung - Specialist of DPC	District Peoples Committee
Ms. Vu Thi Ngoc - Division Head	Planning and Financial Division of DPC
Mr. Tran Duc Cong - staff	Forest Protection Station
Mr. Nguyen Van Thoi - Vice Head	Office of Natural Resources and environment
	Meetings:
Mr. Pham Dang Dinh Quang - Director Mr. Nguyen Van Tam - Vice Director	Di Linh Forest Company
Mr. Tran Nhat Thi - Vice Head	Agriculture and Rural Development Division of DPC
Lam Ha District	
Mr. Tran Van Tu – Chainman	District People's Committee
Mr. Do Van Thuy – Division Head Mr. Nguyen tai thong- Staff	Forest Protection Station
Mr. Vu Ba Yen – Vice Head Division	Planning and Financial Division of DPC
	Meetings:

Name/position	Organization
Mr. Nguyen Van Hanh- Staff Mr. Truong Quang Trung – Staff	Agriculture and Rural Development Division of DPC
Mr. Nguyen Huu Thong - Division Head	Office of Natural Resources and environment
Mr Nguyen Tien Thanh - Director	Administration Office
Mr Le Hong Nhan – Director	Lam Ban Forest Protection Management Board
Stakeholder meetings	
Mr. Adrian Enright	SNV
Dr. Nguyen Quang Tan – Director Mr. Nguyen Duc Tam - Officer	RECOFTC
Dr. Nguyen Khac Hieu – Deputy Director General of Department of meteorology, hydrology and climate change	MoNRE
Mr. Nguyen Duc Thinh Mr. Tran Van Hai	IPSARD Forest Department, MARD
Mr. Eiji Egashira – Project Officer Mr. Noriyoshi Kitamura – Forestry Officer	JICA
Mr. Jake Brunner – Country Programme Coordinator	IUCN
Mrs. Nguyen Thi Hop - Director	SRD
Mr. Gabriel Levitt	PACT
Ms. Than Thi Chung	CSEED