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Assessing the potential for, and designing, a 'Payment for Environmental Services' scheme in Bac Kan province, Vietnam

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Abbreviations

3PAD	Pro-Poor Partnership for Agroforestry Development project
ASB	Alternatives to Slash-and-Burn program
CDF	Community Development Fund
CDM	Clean Development Mechanism
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DARD	Department for Agriculture and Rural Development
DONRE	Department of Natural Resources and Environment
DoSCT	Department of Sports, Culture and Tourism
DARD	Department of Agriculture and Rural Development
FPDF	Forest Protection and Development Fund
FPD	Forest Protection Department
GIS	Geographic Information System
Ha	Hectare
IFAD	International Fund for Agricultural Development
ICRAF	International Centre for Research into Agroforestry trading as the World Agroforestry Centre
JICA	Japan International Cooperation Agency
MARD	Ministry of Agriculture and Rural Development
PES	Payment for Environmental Services
PFES	Payment for Forest Environmental Services
RES	Rewards for Environmental Services
RaCSA	Rapid Carbon Stock Appraisal
REALU	Reducing Emissions from All Land Use
REDD	Reducing Emissions from Deforestation and Degradation
REDD+	Reducing Emissions from Deforestation and Degradation Plus Conservation
TFF	Trusted Fund for Forest
UN-REDD	United Nations Collaborative Programme on Reducing Emissions from Forest Deforestation and Degradation in Developing Countries
USD	United States dollar
VND	Vietnamese dong

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Introduction

Payment for environmental services

'Payment for environmental services' is considered by many scientists and policy makers to be an opportunity for people to increase their incomes and access to sustainable livelihoods that are additional to, or enhance, the income and livelihoods derived from forest products. As well, PES schemes ensure the full contribution of forests to economic development and growth, which is reflected in the multifaceted benefits from forests, such as buffering water flows, carbon sequestration and greenhouse gas reduction, landscape beauty, soil protection and natural disaster mitigation, such as droughts and floods. Definitions of PES are presented in Chapter 1.

PES is being piloted all over the world, including Southeast Asia, and particularly in Vietnam. The World Agroforestry Centre (ICRAF) has been active in establishing the PES concept in Vietnam since 2002. From the start, ICRAF, in partnership with the Center for International Forestry Research (CIFOR), conducted PES pre-assessment studies, interviews and meetings with stakeholders to formulate a PES action plan for Vietnam. Since then, and especially from 2004, ICRAF Vietnam has partnered with several international and national organizations to work with PES capacity building and awareness-raising, through a series of stakeholder workshops and publication of booklets and policy briefs. Research findings in the last two years have shown that PES pilots in other parts of the world as well as in Vietnam have focused on payments for water services, carbon sequestration and soil protection. There have not been enough studies conducted to test the viability of landscape beauty as an environmental service in Vietnam and Southeast Asia.

Payment for forest water services

Vietnam is the first country in Southeast Asia to pilot at the national level a policy for water service payments, which was implemented in two provinces - Lam Dong and Son La - following the Prime Minister's Decision 380/2008/QĐ-TTg dated 10/4/2008. By February 2010, after two years of implementation, Lam Dong and Son La provinces had only paid for 20.23% and 12.9% of the pilot areas, respectively (the plan was for 100% to be paid). The reasons for the slow progress were reported to be:

- Forest status, forest boundaries and watershed areas on maps and in the field were not clearly defined and there was a lack of budget for a forest survey;
- Difficulty in establishing local Forest Protection and Development Funds;
- Difficulty in determining the 'K factor' when forest quality had not been well reported;
- Collaboration at the ministry and provincial levels had not been efficient, especially regarding the budget allocation to the provinces (Government of Vietnam 2010).

Payment for forest carbon sequestration services

The meetings of countries in the United Nations Framework Convention on Climate Change (UNFCCC), held in Copenhagen in December 2009 and Mexico in December 2010, committed signatories to support Reducing Emissions from Deforestation and Degradation

Plus (REDD+) mechanisms, which include forest conservation, increasing carbon stocks, and sustainable forest management. Vietnam participated in UN-REDD Phase 1 and will continue with Phase 2 with USD 100 million funding from the Government of Norway, of which, USD 80 million will be used to support different economic sectors to protect natural forests in Vietnam.

Since 2008, ICRAF Vietnam has been continuously and actively participating in the national network and technical group called 'Reducing Emissions from Deforestation and Forest Degradation' that is coordinated by the Ministry of Agriculture and Rural Development (MARD). The most active international organizations that are recognised by MARD as leaders in this area in Vietnam include ICRAF, CIFOR, Netherlands Development Organization (SNV) and Japan International Cooperation Agency (JICA).

The Government of Vietnam considers REDD+ an opportunity to broaden the scale of the '661 Program', including the protection of both current forest quantity and quality, especially for natural forest, as well as to further support the principle that an objective of forest plantations is to reduce pressure on remaining natural forests. Lessons learnt from the 661 Program and community management programs can be used as case studies for sharing about REDD+ (Hoang et al. 2011a, Hoang et al. 2008). During UN-REDD phase 2, Bac Kan province was selected as the second province (after Lam Dong) for piloting a REDD+ payment mechanism, once the Norwegian funding is approved, possibly at the end of 2011 (Discussion with Vu Minh Duc 2010).

This report is one result of implementing a bidding package that was submitted to provide technical assistance (TA) to Bac Kan province (number 19TV) on 'Assessing the potential of payment for environmental services in Bac Kan'. This TA is one part of component 3, named 'Develop initiatives to improve the environment'. The objective of this component is to develop a system to sustainably conserve and protect sloping land taking into account social, environmental and economic aspects by encouraging people of ethnic minority groups to apply appropriate technology for these purposes. This component is in the project, 'Pro-poor partnership for agroforestry development in Bac Kan province' (3PAD). The overall objective of 3PAD is to reduce poverty sustainably and equitably and to improve livelihoods for rural poor people in Bac Kan via promoting land and forest management[1].

This report is also an output of the joint investment of two ICRAF-coordinated projects, namely, 'Rewards for, use of, and investment in pro-poor environmental services' phase 2 (RUPES 2) and 'Reducing emissions from all land uses' phase 2 (REALU 2) in Bac Kan province (for more information about these projects see the Methodology section). The TA was carried out over six months, from April to November 2011, by ICRAF Vietnam and its partners and stakeholders (Appendices 1-4). The findings contain assessments of, and methods for, determining forest environmental services, for some aspects-such as watershed protection, carbon sequestration and landscape beauty - thereby quantifying the monetary value of forest environmental services. On this basis, we have developed a detailed proposal

[1] The project contains four major components: 1) sustainable and equitable forest land management; 2) create income opportunities for the poor; 3) support initiatives and opportunities to improve the environment; and 4) project management. The people's committee in Bac Kan province received a loan from the International Fund for Agriculture Development and a non-refundable loan from the Global Environment Fund to implement the project.

on payment for forest environmental services for each forest type in three districts of the 3PAD project, namely Pac Nam, Ba Be and Na Ri.

Context of Bac Kan province

Bac Kan province is located approximately 21^{o} 48'N to 22^{o} 44' N and 105^{o} 26'E to 106^{o} 15'E. It is about 170 km to the north of Hanoi and about 200 km south of the border with China. The topography of Bac Kan province is complex, with many valleys, hills and rocky mountains with an average slope of 26°. It borders four other provinces: Lang Son (to the east), Cao Bang (to the north), Tuyen Quang (to the west) and Thai Nguyen (to the south).

The province has a population of 308 798 people, living in an area of 4868 km$^{2.}$ It has seven districts, one town and 122 communes. Most residents are poor (the poverty rate is 34%, well above the national average of 20% in 2004) and belong to ethnic minorities. Agriculture and forestry are the main sources of income for 85% of the population. Among the seven ethnic groups living in the province, the Tay form 60.4% of the total population; the Kinh 19.3%; the Dao minority 9.5%; and the Nung minority at 7.4%. Total population density is about 62.8 persons/km², with 85% of the population living in rural areas. About 65.5% are between the ages of 18 and 60 years-old and form the labour force.

With forest cover at 55.1%, the province appears rich in forest resources. However, rich natural forest makes up only about 9%, while poor and restoring forest (pioneer tree species) occupy more than 50%. Moreover, about 20% of the total forest land is bamboo. About 64% of the forest area is categorised as production forest, 25% is protection forest and 10% is 'special use' forest. About 124 000 ha of forest land lacks tree cover. This land could be a target of forestation and reforestation programs

The study site included the three Bac Kan districts of Pac Nam, Ba Be and Na Ri. With total natural areas of 2012 km^2 and a population of 117, 807, the three districts occupy 41% of the province and contain 38% of its population. The total forest land in the area is 164 850 ha, compared with only 19 058 ha of agricultural land. This shows the high potential for forest resources to play a role in improving local livelihoods. The limited agricultural land (0.8 ha per average five-person household) and unexploited forest resources could be the main reasons for the high level of household poverty in Pac Nam, Ba Be and Na Ri (52%, 56% and 37%, respectively).

Ba Be, Pac Nam and Na Ri districts are considered 'hot spots' of the province in terms of forest protection and development (Hoang et al. 2008). Of the three, Na Ri has the largest area of natural, plantation and special-use forests. Ba Be district has the highest protection forest area while Pac Nam has less of all kinds of forest categories (see Table 1). For all three districts, there is high potential for selling carbon from forest protection and planting as additional income for local communities. Forests in Pac Nam and Ba Be districts directly contribute to the water sources of Na Hang hydropower plant, which is subject to payments for watershed functions following the recent Government of Vietnam Decree 99[2]. Na Ri district has about 2000 ha of *B. hsienmu*, a rare timber species with very high market value. Since the end of 2005 and early 2006, deforestation has increased dramatically owing to

[2] Government of Vietnam Decree 99/ND-CP of 24 September 2010, on the Policy for Payments for Forest Environmental Services. The Decree regulates the policy in Vietnam, including types of environmental services, providers and users and their rights and responsibilities, management and use of payments.

rising prices and demand from China for *B. hsienmu* timber (Hoang et al. 2008). PES and REDD+ mechanisms are expected to contribute to protection of this valuable forest.

Table 1. Main characteristics of the study sites

Item	Ba Be	Pac Nam	Na Ri	Total
Number of rural communes	15	10	21	46
Estimated project village communities	150	100	210	460
Total households	9886	5198	8310	23 394
Population	47 748	29 080	40 979	117 807
Households classified as poor (percentage)	56.0	52.3	36.9	48.4
Average persons per household	4.8	5.6	4.9	5.0
Ethnicity (number of ethnic groups)	7	7	6	7
Agriculture area (hectare)	65 493	46 127	82 459	194 079
Cropped fields (hectare per household)	0.69	0.85	0.94	0.81
Forest area (hectare)	54 876	35 214	74 761	164 850
- Special-use forest (hectare)	9022	0	11 072	20 094
- Protection forest (hectare)	11 451	8959	7763	28 173
- Production forest (hectare)	34 403	26 255	55 912	116 570
Forest under commune management (percentage)	46	84	66	63
Production forest (hectare per household)	6.2	9.7	18.2	10.3

Source: Hoang et al. 2008 [3]

The report structure

The report includes four main chapters, together with the Introduction and Methodology sections.

Chapter 1. National and international experience of methods for determining values of forest environmental services and effective payment mechanisms in sustainable forest management and protection.

Chapter 2. Payment methods, environmental services' providers, and beneficiaries of payments for forest environmental services (PFES) in the 3PAD project's districts: Pac Nam, Ba Be and Na Ri.

Chapter 3. Proposed mechanisms for managing and using PFES fees at different levels.

Chapter 4. Proposal for PFES mechanisms to be piloted in the 3PAD project districts.

The contributors

Tran Duc Luan MSc, Thu Duc University of Agriculture and Forestry and a research group of Northwest University were responsible for analysing and writing about the experience of implementing Government Decree 380 in Son La and Lam Dong provinces.

Dam Viet Bac MSc developed the proposal for implementing Decree 99 in Bac Kan province based on the experience of Son La and Lam Dong. This is a joint result of collaboration between ICRAF's RUPES 2 project and the TA contract 19TV of the 3PAD project.

Dr Rohit Jindal, Do Trong Hoan MSc and Sweta Pokhera MSc wrote about payment for the environmental service of carbon sequestration under Clean Development and REDD+

mechanisms. This section is the joint result of ICRAF's REALU project and TA contract 19TV in Bac Kan province.

Kira de Groot MSc researched and wrote about PES for landscape beauty and the PES institutions of Ba Be district. Her work is the contribution from the University of Wageningen and the RUPES 2 project in Bac Kan.

Nguyen Van Tri Tin MSc and Dam Viet Bac MSc wrote about the proposed PES mechanisms for Ba Be and Na Ri districts.

Engineer Nguyen Duc Cuong, Swetta Pokharel MSc and Do Trong Hoan MSc wrote about the Clean Development Mechanism energy possibility in Pac Nam district.

Dr Hoang Minh Ha designed and coordinated the whole study. She is also the co-author of all chapters in this report.

The specific content of each chapter was established by the ICRAF team in consultation with the director of the 3PAD project, Mr Hoang Van Giap, and PES experts of 3PAD, including Mr Luong Chi Cong and Mr Ly Van Trong. All other staff of 3PAD and local stakeholders in the three districts were also consulted at the beginning, mid-term and final meetings in Bac Kan and Hanoi. The main results of the stakeholders' workshops at provincial level (Appendixes 1.2) and the results of consultation with experts and leaders at all levels (Appendix 4) have been integrated into this report.

Several ICRAF researchers and partners have also contributed to the report, including Dr Elisabeth Simelton, Dr Dinh Ngoc Lan, Dr. Hoang Thi Sen, Dr. Nguyen Hai Nam, Cao Ky Son MSc, Michael Dine MSc, Alba Saray Pérez Terán MSc, Ms Pham Thanh Loan, Dr Leimona Beria, Dr Meine van Noordwijk, Dr Peter Minang and Dr Delia Cantacutan. Mr Robert Finlayson, Research Communications Specialist at the ICRAF Southeast Asia office, helped edit the English version of this report.

The overall objective of this study was to research and develop methods for quantifying the value of environmental services and to propose options for piloting in the 3PAD districts. The final goal was to ensure that forest environmental values to society (water, carbon sequestration, landscape beauty and soil protection) can be quantified into monetary values, thereby enabling poor people who are working with forests to receive adequate payments for their efforts in managing and protecting the forests in the project's districts.

Methodology

The overall methodological approach involved several research steps.

- Reviewing and compiling relevant national and international experience of PES and REDD+.
- Surveying and collecting data needed to analyse and assess the ability to pay for forest environmental services of Bac Kan province.
- Developing PES schemes and mechanisms for defined environmental services in order to propose pilots in Bac Kan province (services, places, scales and piloting area).
- Developing and proposing mechanisms for managing and using environmental services' fees.
- Developing and writing reports.

In order to maximise the relevance of designing PES in Vietnam, two main research steps were conducted: 1) Reviewing experience of, and perspectives on, PES at the national level; and 2) studying the Bac Kan context in order to apply lessons creatively in the province. Applicable methods for each research step are introduced in Table 2 below.

Table 2. Research steps and methods used to develop PES mechanisms in Bac Kan province

	Research aspects	Materials and methods
Step 1. Studying the national perspective on PES		
1	Lessons learnt from the pilot scheme for Payment for Forest Environmental Services (Decree 380a) and existing similar mechanisms	Reviewed findings from UN-REDD studies in Vietnam and carried out additional surveys of PFES piloting in Son La and Lam Dong as well as community forestry activities in Thua Thien Hue province
2	National perspective on PES and REDD+	Policy dialogues with national and provincial leaders at the MARD and Bac Kan
Step 2. Reflecting the national perspective in the context of Bac Kan province		
2.1	Issues of conservation and livelihoods at the study sites in Na Ri, Pak Nam and Ba Be districts as a basis for understanding the feasibility for REDD and PES in Bac Kan province	Reviewed scoping study report on the design of the IFAD environmental services project in Bac Kan (Hoang at al. 2008)
2.2	Reflecting PFES policy guideline and lessons learnt from Decree 380 in Son La and Lam Dong province for REDD+ and PES in Bac Kan	Obtained feedback about the pilot environmental services payment scheme from province, district and communal stakeholders at four stakeholders' workshops
2.3	Review of existing carbon-rich land use to be promoted as a part of PES at community level	Conducted rapid appraisals in Na Ri, Ba Be and Pac Nam and fed back the findings to local stakeholders in four stakeholders' workshops
2.4	Identifying livelihoods' options for the estimation of opportunity costs for PES at community level	Community surveys carried out since December 2010 using participatory rural and rapid rural appraisal methods
2.6	Piloting environmental services schemes at community level	To be carried out after the design

[(a)] Prime Minister of Vietnam Decree 380/2008-QD-TTg on Piloting Payments for Forest Environmental Services

Three main methodological approaches were applied during the research.

Multi-disciplinary research and participatory methods

A group of interdisciplinary experts with experience within and outside the country participated in the work. In order to maximise practical uses of the PES mechanisms to be developed, a comprehensive policy review (Appendix 3) and consultation with leading PES and REDD+ experts and stakeholders in the country and in Bac Kan in the field was carried out throughout the whole research process (Appendix 4). With the objective to obtain in-depth and comprehensive knowledge in order to assess suitability for PFES, as well as to propose suitable models that can be expanded at local and national levels in the future, the rapid Participatory Rural Appraisal approach (Hoang and Nguyen 2011) was applied. A series of workshops with stakeholders, organized in the project area and in Hanoi during the implementation of this bidding package (from February to October, see Appendices 1 and 2 and Figure 1) contributed not only to ensuring the suitability of the proposed PES mechanisms for local conditions, but also building local capacity for successful implementation of the proposed pilot project.

Case studies and 'filtering' within the local context

Case studies and 'filtering' within the local context were drawn on to contribute useful lessons for developing PES options for Bac Kan province. This work was conducted by ICRAF at RUPES 2 project sites since December 2010. We applied both methods to determine the nature of one case and made a comparison between case studies in order to better understand each case and to identify potential areas for applying more widely the findings of the successful case studies. Data gathered were validated to ensure accuracy of the research process. One typical approach for validation was searching for information from published documents, such as reports, proposals and statistics. Validation was also carried out through consultation with recognised experts or people with information, such as technical staff, management staff at central and provincial levels, project experts and scientists. Interviews and focus group discussions were conducted to validate the information gathered. We collected information from all sources to draw conclusions and propose recommendations. Detailed information about the sources will be presented in succeeding chapters of this report. However, we were very cautious in analysing the lessons learned since each experience and practice is unique for each community and we cannot simply apply one case to all other communities. Due diligence should be observed in determining which practices can be applied to other communities and lessons learned should be analysed based on the specific circumstances of the community to find out the dialectic rule of the causes and consequences of each phenomenon. The rules were present at different levels in Bac Kan province and opinions of the local people were sought. This is what we call the process of filtering within the local context.

Community participation in planning the PES pilot project

People in the selected communities participated in the discussion of lessons learned to select and/or design pilot projects relevant to them. We collaborated with the villages by inviting representatives from different levels (district, commune, village and community, households) to come to stakeholders' workshops so that they could directly hear about what happened in other places as well as contribute to designing a pilot PES scheme in the 3PAD project's districts (see at Appendix 1.2) for the list of participants).

The methods used in the consultations mentioned above were developed based on the findings of research conducted in Vietnam by ICRAF through several projects, as listed below.

- Project: 'Reducing emissions from all land uses' (REALU 1 and 2), funded by the Norwegian Agency for Development for 2008-2012. This is a global project coordinated by the ASB Partnership for the Tropical Forest Margins and ICRAF. Bac Kan is becoming a showcase for the methodology of REALU, together with thee other sites in Peru, Cameroon and Indonesia.
- Project: 'Rewards for, use of, and shared investment in pro-poor environmental services' (RUPES 2), coordinated by ICRAF. The RUPES 2 project is funded by the International Fund for Agriculture Development for 2008-2012). Inheriting the success and experience from RUPES 1, RUPES 2 continues to develop and disseminate mechanisms for rewards and payments for environmental services and at the same time supports integration of RES/PES into national policy in several Asian countries. Ba Be district in Bac Kan is an action research site of RUPES 2.
- Project: 'Trees in multi-use landscapes in Southeast Asia' (TULSEA). The project was coordinated by the ICRAF Southeast Asia regional office and funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) during 2007-2011. The project developed a 'tool box' to support negotiations over integrated natural resource management, which was particularly suitable for identifying and negotiating payments for environmental services' schemes. One of the project's outputs, *Lecture notes: tools for use in integrated natural resources management and payments for environmental services schemes, Vietnam.* Vol. 1 (Hoang and Nguyen 2011), highlighted two methods, the Rapid Carbon Sequestration Appraisal (RaCSA) and Reverse Auction, that were used in the work in Bac Kan.

Designing study activities were done on the basis of the findings of the three projects mentioned above and in relation to the latest changes in PES policy. The changes were reflected in Decree 99 and the possibility of piloting REDD+ mechanisms in Bac Kan province in the near future.

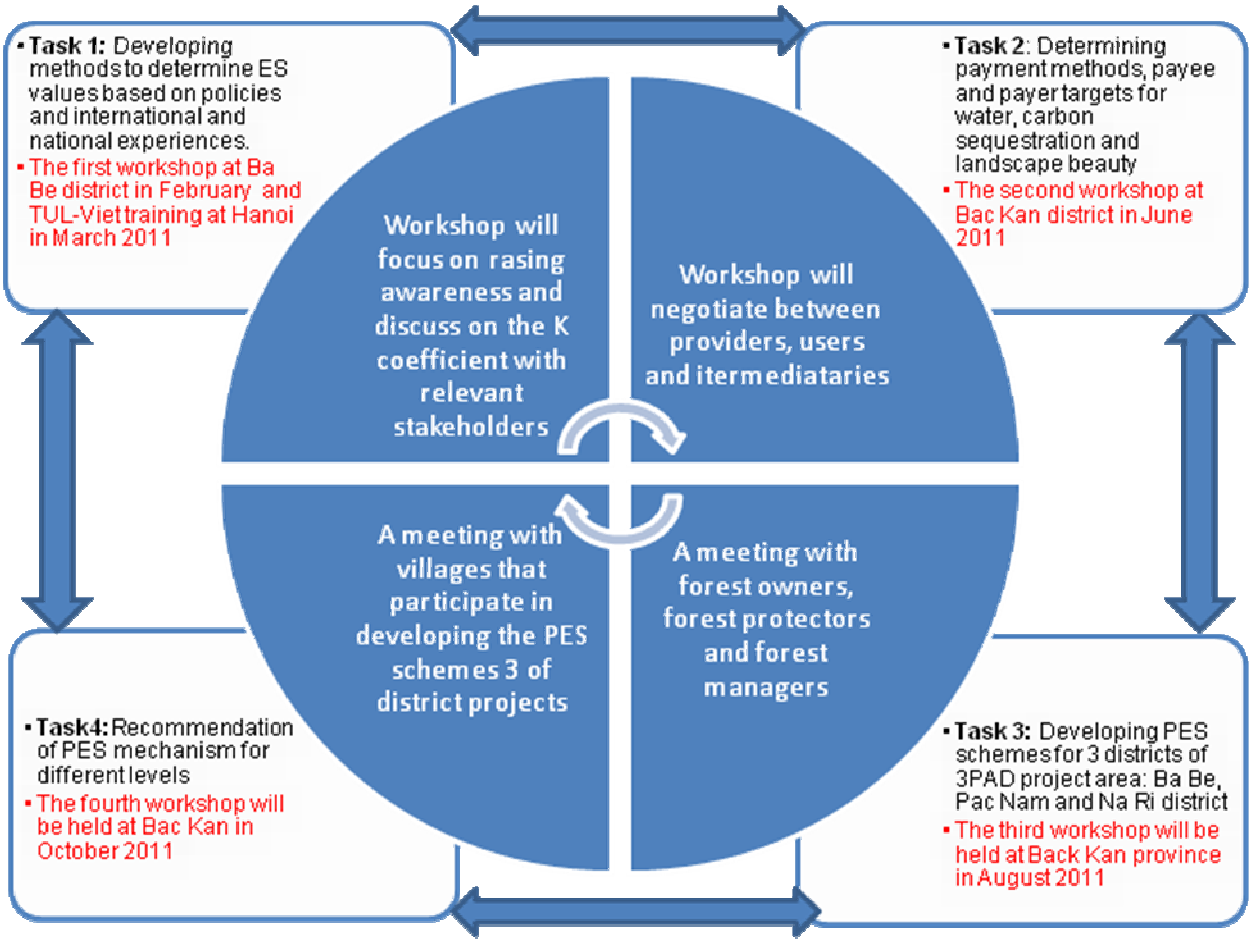

Figure 1. Stakeholder consultation workshops during the process of ascertaining PES potential and design in Bac Kan province

Chapter 1: National and international experience on methods for determining the value of forest environmental services and effective payment mechanisms in sustainable forest management and protection

Hoang Minh Ha, Kira de Groot, Dam Viet Bac, Tran Duc Luan, Rohit Jindal, Do Trong Hoan, Sweta Pokharel

1.1 Bases for the development of environmental services estimation and payment mechanisms

PES has attracted increasing interest from both policy makers and researchers as a mechanism to translate external, non-market values of the environment into financial incentives for local actors to provide environmental services. Such schemes can be described as a voluntary transaction where a well-defined environmental service is bought by a buyer (that is, people who benefit from its provision) if, and only if, the provider (that is, local landholders or residents) ensures the provision of the service (Wunder, 2008).

1.1.1 Four principles

Van Noordwijk and Leimona (2010) introduced four principles for the development of rewards or payment mechanisms.

1) *Realistic*: payment is linked to measurable change in environmental services' levels.
2) *Conditional*: payment is based on performance and, if possible, outcomes.
3) *Voluntary*: payment is based on the free, prior, informed consent of all parties.
4) *Pro-poor* (or at least not increasing inequity).

1.1.2 Methods for determining payment amount

Following the four above-mentioned principles, the amounts of payments for environmental services are usually determined based on the options available to buyers and sellers, considering supply and demand issues, equity concerns, financial availability and cost-effectiveness. Perspectives on 'realistic' relations between land-use practices and the provision of environmental services differ between stakeholders and the three main ecological knowledge systems: local; public/policy; and scientific modellers'. In the development of PES schemes it is important that all key stakeholders agree that the anticipated output (for example, improved water quality, increased water quantity, carbon sequestration, protected biodiversity) through a PES mechanism is realistic and achievable.

In reality, a key issue for implementing PES schemes is identifying a reward level or contract price that reflects the value of conservation while also compensating landowners for the cost of their foregone opportunity to exploit the resource. If the sum is too low, many potential suppliers may not participate because the income from changing the land use would be more than the sum they were offered. If the payment is too high, the conservation budget would exhaust quickly and the project would fail to deliver an adequate level of environmental services. Further, in long-term projects such as forestry-based carbon sequestration

activities, a correct estimate of the payment is needed in the beginning because changing prices in the middle of the project can send the wrong signal to community members. Moreover, it is difficult to directly transfer cost estimates from one project to another since the cost of implementing a new land-use practice can be specific to the site and farmer, with differences that are unobservable to outsiders. Instead, a more reliable method is required to estimate payments that incorporates both the hidden variables as well as heterogeneity across the farmers and/or groups of farmers.

Reverse auction in PES

Reverse auctions are a potential solution to these issues. Farmers who wish to be enrolled in a PES scheme offer bids of how much money they are willing to accept in return for implementing the recommended land use in order to supply a certain level of environmental service. Competition among bidders ensures that these bids represent farmers' best estimates of their true opportunity costs while selection of the lowest-cost providers helps to set both a price for the PES activity as well as to distribute the PES contracts in a transparent and objective way. In conventional auctions, bidders bid for the maximum amount of money they are willing to pay for an object on sale. The winner is the one with the highest bid. In reverse auctions, the role of the buyers and the sellers is reversed: the sellers (the farmers) provide the service buyer with an environmental service at a minimum price that they, the farmers, are willing to accept. The winner is the one with the lowest bid.

A good example of such reverse auctions can be found in the US Conservation Reserve Program, which offers annual payments to farmers for protecting ecologically vulnerable land from soil erosion and for conserving other valuable natural resources. Farmers engage in an auction in which their bids are weighted on the basis of an environmental index that scores parcels of land for the environmental benefits they provide. Parcels with the highest score are enrolled first, followed by parcels with a lower score and so on until the enrolment targets are met. Nationwide, several million hectare of land has been enrolled under the program through such auctions. Similarly, the Bushtender program in Australia used conservation auctions to promote native vegetation and biodiversity protection on private land (Rohit 2011b).

Payment methods

While the concept of 'payments' for environmental services is focused on monetary and direct payments, 'rewards' for environmental services is broader, involving also in-kind and in-direct payments.

Direct payments for environmental services are those where contracts stipulate land and/or resource-use restrictions or environmental outcomes for a pre-agreed number of land units. They are made to landowners or groups who manage ecosystems. Some programs to date have used flat-rate schemes or the minimum amount that farmers are willing to accept. The reverse auction approach has been used to maximise cost-effectiveness by setting price levels closer to what farmers would willingly accept. The lesson learned so far is that pricing schemes should be contextual and agreed on by stakeholders. By doing so, contractual agreements are based on freedom of choice of everyone involved. This is called 'voluntary' in a RES scheme.

To improve the pro-poor element of PES, a scheme should be closely interlinked with poverty reduction targets and goals, and should also incorporate or involve landless individuals. Furthermore, payments must be sufficient to interest poor providers and help

alleviate poverty, so a margin over and above provision costs may need to be paid. This may lead to low efficiency in PES.

Indirect payments for environmental services, on the other hand, are those payments made for ecosystem conservation to the stewards and do not necessarily involve contracts with landowners. Examples of indirect payment can be found in some schemes of the RUPES project in Southeast Asia. In these examples payments are made to communities in the form of social support, such as building a road, a new school or health centre, giving access rights or other royalties. However, this undermines the conditionality of payments as these cannot be taken away when environmental services are not supplied. Low conditionality is often a characteristic of government-led PES prototypes, which have the advantage of lower start-up costs and administrative cost efficiency. Many PES initiatives are loosely monitored or not at all, payments are up-front instead of periodic, and they are made on the bases of good faith rather than being truly contingent on monitored service provision and that, generally, the business-like feature of contingent conservation payments often raises some resistance.

1.2 Some common PES mechanisms in the world

1.2.1 Payment for watershed function and landscape beauty

PES for water is a payment mechanism for watershed function in which the users downtream pay for forest owners upstream to protect forests, prevent erosion and reduce the risk of flooding. PES mechanisms for landscape beauty often include paying entrance fees to protected areas to create conservation funds and encouraging community-based tourism.

In one example from Costa Rica, several hotels have taken part in a PES scheme for watershed protection. For watershed services there is a close link between payment and service delivery and obviously the tourism sector depends on a high quality and quantity of water. Since 2005 several hotels annually pay USD 45 per hectare to local landholders and 7% of the scheme´s administrative costs. It is worth noting that, also in Costa Rica, 'no generally accepted payment mechanism based on benefits people obtain from the provision of scenic beauty and biodiversity conservation had been developed' (Rohit 2011a).

Community-based tourism is another form of PES-like mechanism. A recent case study examines a program in Tanzania which was intentionally set up as a PES arrangement, where a consortium of five tourism companies have signed a contract with a local pastoralist village to conserve a key wildlife area in exchange for annual financial payments (Rohit 2011a).

1.2.2 PES for carbon sequestration services

Climate change has been a significant environmental and regulatory topic for over two decades. In order to address it, the Kyoto Protocol was adopted on 11 December 1997 and entered into force on 16 February 2005[3]. It is an international agreement linked to the UNFCCC[4] whose major feature is that it sets binding targets for 37 industrialised countries and the European Union for reducing greenhouse gas emissions[5]. These amount to an

[3] http://unfccc.int/kyoto_protocol/items/2830.php
[4] http://unfccc.int/kyoto_protocol/items/2830.php
[5] http://unfccc.int/kyoto_protocol/items/2830.php

average of 5% against 1990 levels over the period 2008-2012[6].The Protocol lays down various market-based mechanisms to help participating countries contribute to the emission reduction efforts.

- Emissions trading (carbon market)
- Clean Development Mechanism (CDM)
- Joint Implementation (JI)

A decision on REDD was adopted at the Thirteenth Conference of Parties (COP 13) in December 2007. At the COP 15 in December 2009 in Copenhagen, a development on REDD, known as 'REDD+', was emphasised because it recognised the importance of promoting the sustainable management of forests and the co-benefits this provided, such as biodiversity. After COP 16, REDD+ had developed to a point where it was understood as the most innovative and cost-effective mechanism aimed at five key issues: 1) reducing emissions from deforestation; 2) reducing emissions from forest degradation; 3) conservation of forest carbon-stock; 4) sustainable management of forests; and 5) enhancement of forest carbon-stock.

CDM, JI and REDD+ are the relevant mechanisms that feed the carbon market. JI enables industrialised countries to carry out projects with other developed countries, while the CDM involves investment in sustainable development projects that reduce emissions in developing countries. At the international level, REDD+ involves creating mechanisms to make payments to developing countries for reducing emissions from deforestation and forest degradation.

The CDM allows emission reduction projects in developing countries to earn certified emission reductions (CERs), each equivalent to one tonne of carbon dioxide (CO_2)[7]. These CERs can be traded and sold, and used by industrialised countries to meet a part of their emission reduction targets under the Kyoto Protocol[8]. Together with the objective of emission reductions for industrialised countries, the CDM also helps accelerate sustainable development in developing countries through the transfer of knowledge of cleaner energy sources and more efficient industrial methods.

CERs are either purchased from a primary market, directly from the party that generates the CERs or the secondary marketplace where CERs are traded. Secondary markets are an exchange platform (like stock exchanges for financial trading) for carbon. They can be purchased by governments or private entities.

The CDM process prescribes procedures and methodologies to determine the amount of CER generated by a project. As part of project preparation, a feasibility study needs to be conducted to determine the viability of the project by the project participants. The process involves the screening of CDM applicability and reviewing suitable methodologies according to the scale and scope of the project and aims to establish the baseline and monitoring methodologies for validation and verification.

The voluntary carbon market generally applies to environmentally conscious companies and individuals who are not subject to mandatory obligations to reduce greenhouse gas emissions. They voluntarily opt to purchase the verified emission reductions to help fund

[6] http://unfccc.int/kyoto_protocol/items/2830.php
[7] http://cdm.unfccc.int/about/index.html
[8] http://cdm.unfccc.int/about/index.html

cleaner projects to offset their own energy consumption and emissions due to their day-to-day business activities. This market is small compared to the regulated CDM market but is growing fast. However, it is unregulated, without universally accepted standards. In order to create a healthy market to convince buyers of real emissions reductions, standards like the Voluntary Gold Standard and Voluntary Carbon Standard and other certification processes and emissions registry services, such as the GHG Protocol for Project Accounting and the Climate, Community and Biodiversity Project Design Standards, were introduced[9].

In 2010, a total volume of 131 million tonne of carbon dioxide ($MtCo_2$) was transacted in the global voluntary carbon markets, worth USD 424 million, compared to the 98 $MtCo_2$ transacted in 2009 that was worth USD 415 million[10]. There was an increase of 34% in the volume without a significant increase in its dollar value. A report from Bloomberg New Energy Finance predicted substantial growth in 2011 equivalent to a market size of 213 million tonne. The report also expected the market to rapidly increase post-2015, reaching the 1.6 billion tonne mark by 2020. This projected rise post-2015 is based on an expectation that a new network of compliance-based schemes and semi-compliant regional markets will arise, which will further bolster the voluntary market (Pokharel 2011).

1.3 Experience with PES in Vietnam

Vietnam has made payments to farmers for forest planting and protection from the mid-1990s under Government program '327', followed by Program '661' from 1998 until 2010. Lessons learnt from the forestry sector in Vietnam during the last two decades (327[11] and 661[12] programs) show that the same payment to forest owners seemed to be successful in forest planting but did not lead to changes in forest protection and uses. Deforestation and degradation is still occurring, particularly in natural forest (Hoang et al. 2010). Therefore, 'good practice' in forest protection seems to depend on many more factors than only the payment rate.

1.3.1 Payment for Forest Environmental Services according to Decree 99

In 2008, the Government started a pilot program (under Decision 380 QD-TTg) for PFES. The full implementation of PES in the whole country started in January 2011 with the issuing of Government Decree 99.

Decree 99 lays the legal foundations for provinces to ask hydropower plants, water companies and tourism businesses to pay a certain percentage of their income to relevant environmental services' providers, that is, landowners and forest protectors. Services explicitly recognised by the policy are 'water provision', 'aesthetic landscape', 'forest products', 'genetic resources', 'biodiversity' and 'prevention of erosion and flooding'. The cost

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[9] Green Markets International. 2007. *The voluntary carbon market: status & potential to advance sustainable energy activities*. Slideshow. Massachusetts, USA: Green Markets International. Available from http://www.green-markets.org/Downloads/vCarbon.pdf.

[10] Zwick S. 2011. Voluntary carbon market surges to record year on CSR, forestry. *Ecosystem Marketplace* 2 June. Available from http://www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=8352&section=news_articles&eod=1.

[11] The 327 Program is named after Chairman of the Council of Ministers of Vietnam's Decree 327/ CT dated 15/9/1992 on Policies on the Use of Bare Land and Denuded Hills, Forest, Coastal Sedimentary Deposit Areas and Water Bodies.

[12] The 661 Program is named after Prime Minister of Vietnam's Decree 661/QDTTg on Objectives, Tasks, Policies and Organization for the Establishment of Five Million Hectare of New Forest.

norms were set out at VND 20/KWh for commercial electricity companies; VND 40/m^3 for commercial water companies; and between 1-2% of tourism revenue from 'beneficiaries of forests or the ones that impact on forests' (Government of Vietnam 2010: 23). The exact rate is to be decided by each provincial government, that is, the relevant provincial people's committees.

The following types of forest are eligible for PFES: protection, special-use, and production. The formula for estimating payment to forest owners is set out below.

Total amount paid to a PFES provider/year (VND)	=	Average cost norm of payment per one ha of forest (VND/ha)	X	Area of forests managed or protected by the PFES provider (ha)	X	K factor

A key concept in PFES is the so-called 'K factor', which differentiates the amount of payments to forest owners according to forest status, types of forests, origins of the forests and level of difficulty of forest management. The K factor is to be decided by provincial people's committees and in accordance with local conditions. The two provinces of Son La and Lam Dong were selected for piloting PFES from 2008 to 2010 under Decree 380. Lessons learnt from these two pilot sites have been used as a basis to develop PFES mechanisms that will be suitable for Bac Kan province.

Experience of Son La and Lam Dong provinces in the implementation of Decision 380

In the implementation of Decision 380, Lam Dong province received support from Winrock International through its Asia Region Biodiversity Conservation Program. Son La province received support from GTZ. Several central and provincial institutions participated, including the Legal Department and Department of Forestry at MARD, Government Office, the Ministry of Finance, the Provincial People's Committee and the Department of Agriculture and Rural Development (DARD).

PES BENEFICIARIES AND PAYMENTS

In both provinces, beneficiaries who were to pay were identified as the water supply and hydroelectric companies. The total cash payment over two years was VND 60.84 billion (96.7% disbursed), while in Lam Dong province it was VND 107.81 billion (74% disbursed). Additionally, nine travel companies were considered as payers for PFES.

PES PROVIDERS AND PES PILOT AREAS

Households were the main forest owners, PES providers and PES payment receivers in both provinces. In Son La, the total number of households was 52 000 and in the pilot area each household owned an average of 7.54 ha. The pilot area occupied 66% of the total forest area of Son La province. In Lam Dong, besides the households, forest management boards, national parks and forestry companies were also forest owners. These forest owners designed the plan for forest-land allocation and created forest-management contracts for householders. Total households in the pilot area was 9870, with an average of 21.24 ha of forest per household. The pilot area occupied 34.83% of the total forest area of Lam Dong province.

PES INTERMEDIARY

Both provinces had established Forest Protection and Development Funds (FPDF) and monitoring boards. Many related departments in the province participated in the process (Appendices 1.1 and 1.2).

PES PAYMENTS MANAGEMENT

Lam Dong applied a form of indirect payment. The PES beneficiaries paid into the FPDF. The FPDF then transferred money to forest owners who further transferred it to the contracted households. The payment rate in Lam Dong varied from watershed to watershed. In 2009, the payment rate varied from VND 10 000 to VND 290 000 per hectare per year. In 2010, the amount increased by an additional VND 40 000-130 000 per hectare per year. Son La Province applied a form of direct payment in 2009 but in 2010 shifted to an indirect payment, with the beneficiaries paying directly to the FPDF, the FPDF transferring to the Social Policy Bank, which then paid direct to the forest owners.

IMPACTS OF PES PAYMENTS

Results from surveys at Lieng Bong village (Lam Dong), Khua village (Son La) and discussions with stakeholders showed that the PES helped to significantly increase people's awareness of forest and forest environmental services. Income from forest management of the contracted households in Lam Dong province increased 3-4 times compared to before the scheme, but in Son La income increased very little. Violations of forest protection tended to decrease compared with before the scheme. PES brought a new financial source (State budget alternative) for socialization of forest development.

ISSUES AND LIMITATIONS IN THE TWO PROVINCES

There were some problems when implementing the pilot schemes. In three watersheds - Da Nhim, Dai Ninh and Dong Nai - in Lam Dong, households received different amounts of payment despite providing similar environmental services. The application of the K coefficient equal 1 failed to take into account variations in forest development. The contracted households were not entitled to choose which forest to manage. Therefore, the households who protected the nearer forest had much more of an advantage compared to households who protected remote forest. The latter had to spend more travel time and costs to protect the allocated forest.

Meanwhile, in Son La province, payment had yet to be received from Suoi Sap Hydroelectric Plant. In 2010, the application of K coefficient equal to 1 did not motivate forest owners to improve the quality of the forest they protected.

DEVELOPMENT OF THE K FACTOR IN SON LA AND LAM DONG PROVINCES

In the pilot phase, K-factor development in Son La province was based on (i) origin of the forest (natural, plantation); and (ii) type of forest (protection, production, special use). With the ranking according to (i) and (ii) mentioned above, four values were applied, varying from 0.5 for production forest to 1 for protection and special-use forest (Table 3). In Lam Dong province, in addition to the two criteria above, magnitudes of impacts on forest were employed in K-factor estimation (Table 4).

Table 3: K factor decided by forest origin and type in Son La province

Forest type	Kmdsd	Forest origin	Kttr	Accumulation	K factor (K)
Protection and special use	1.0	Natural forest	1.0	1.00	1.0
Protection and special use	1.0	Planted forest	0.9	0.90	0.9
Production	0.6	Natural forest	1.0	0.60	0.6
Production	0.6	Planted forest	0.9	0.54	0.5

Source: Decision 3133/QD-UBND of provincial people's committee of Son La province

Table 4: Defining the K factor following different criteria in Lam Dong province

Forest type	K_{LR}	Forest status	K_{CLR}	Forest origin	K_{NGR}	Magnitude of impact	$K_{TĐ}$
Protection and special use	1.0	Rich	1.0	Natural forest	1.0	Impact level 1	1.0
Production	0.9	Medium	0.95	Planted forest	0.9	Impact level 2	0.9
		Poor and Rehabilitated	0.9				
$K = (K_{LR} + K_{CLR} + K_{NGR} + K_{TĐ}) / 4$							

Legend: K_{LR}: according to results of forest planning (reviewed) in the period 2008-2010, issued by Decision 450/QD-UBND of Lam Dong PPC dated 19 February 2008. K_{CLR}: according to quality of services (water supply, anti-sedimentation in the reservoir) provided by different types of forest. K_{NGR}: according to forest origins. $K_{TĐ}$: according to magnitude of impact on the forest (Level 1: serious impact (applied to forest plots close to traffic roads, big rivers, residential areas and core zones of national parks). Level 2: less serious impact (applied to forests in remote areas far from residential areas and traffic roads))
Source: Decision 2753/QD-UBND of Provincial People's Committee of Lam Dong province

The complexity of defining the K factor, together with existing incomplete forest data, led to no consensus on the K factor in both of the pilot provinces. The high cost of monitoring the forest and landowners' boundaries, which are the basis for direct payments, kept transaction costs high. Furthermore, lack of funding for defining the boundaries of different land parcels slowed the land-allocation process and payments to participants.

I.3.2 Payment for carbon services

Vietnam ratified the Kyoto Protocol in September 2002 because it is one of the nations most vulnerable to climate change. It then set up the Clean Development Mechanism National Authority under the Ministry of Natural Resources and Environment (MONRE). The Government has tried to promote afforestation/reforestation (AR) CDM as a way to regreen some of the nation's 5.6 million ha of bare land as well as a sustainable development option for poor rural communities in Vietnam.

The Cao Phong Reforestation Project became the first CDM project in Vietnam after its approval by the Executive Board of the CDM in 2009. The project is located in the two communes of Xuan Phong and Bac Phong in the Cao Phong district of Hoa Binh province, about 100 km west of Hanoi. Under this project, carbon offsets are being generated by planting 365 ha of severely degraded area with *Acacia mangium* and *Acacia auriculiformis* plantations on a 15-year rotation. The project will produce carbon offsets of 2665 tCO_2 per annum and is registered as a small-scale AR CDM project. The project was initially funded by JICA and is being implemented in cooperation with Vietnam Forestry University, Research

Center for Forest Ecology and Environment, and Department of Forestry under the Ministry of Agriculture and Rural Development (UNFCCC 2011 in Rohit 2011b).

The Government is fully committed to REDD+ and is currently coordinating the design of a comprehensive benefit-distribution system. The Government's ambition is to convert certified net emission reductions into REDD+ revenue and distribute it to local partners, especially to the ultimate beneficiaries, in a transparent, equitable and cost-effective manner. Vietnam was recently accepted by the World Bank as a member of the Forest Carbon Partnership Facility. Vietnam REDD plans to prioritise REDD capacity-building and awareness-raising activities during the first phase. Phase 2, planned to start in 2013, will focus on piloting a REDD+ mechanism at sub-national level. The visit (3-5 June 2011) to Bac Kan province of the Deputy Minister of Agriculture and Rural Development, representative of the director of the UN-REDD program in Vietnam, highlighted that Bac Kan province could be one of five or six provinces that would be selected as a pilot for phase 2 of the UN-REDD program. The REDD+ mechanism at sub-national level was initially designed in Bac Kan province, particularly in Na Ri district, with support from ICRAF Vietnam. The findings are presented in Chapters 3 and 4 of this report.

1.3.3 Payment for landscape beauty

Payments for environmental services from tourism are new not only to Vietnam but also the world. Therefore, there is still little experience about the type of businesses that are to pay and which need not. However, Article 7 from Decree 99 states that 'organizations and individuals doing tourism services that benefit from forest environmental services have to pay for services for protection of natural landscape and conservation of biodiversity of forest ecosystems serving tourism purposes'. Furthermore, Article 11 stipulates that 'Provincial People's Committees are assigned to determine those having to pay including organizations and individuals doing travel tourism and accommodation tourism businesses in provinces and cities under the national government.' The Decree thus clearly regulates who must pay for benefiting from forest environmental services but it does not give concrete criteria for how this decision is to be made. It stands to reason, though, that those companies involved in ecotourism can be asked to pay.

Some observations from national and international experience

Perspectives on the provision of environmental services from forest categories and land-use practices differ between stakeholders. In addition, the effective monitoring and evaluation of payment mechanisms also has limitations for various reasons, for instance, methods employed are too complex with a high budget, leading to high costs and low efficiency. That is why the K factor developed in Son La and Lam Dong was not accepted, despite it seemingly being developed from scientists' and policy-makers' perspectives. This is a clear example of the importance of understanding and combining the three main ecological knowledge systems - local, public/policy and scientific modelling - in the development of mechanisms for PES. It is important that all key stakeholders agree that the anticipated output (environmental service, for example, water quality and quantity, carbon sequestration, biodiversity protection) through the PES mechanism is realistic or achievable.

Furthermore, experience from the RUPES and REALU projects of ICRAF suggests two more approaches in pricing environmental services, namely, 'compensating for opportunities skipped' and the 'co-investment' paradigms, where the variation in opportunity costs combines with balancing the need for monetary and non-monetary incentives.

All lessons were applied when the PES scheme was developed in Bac Kan (Chapter 3) and Na Ri and Ba Be districts (Chapter 4).

Chapter 2: Proposed payment methods and determination of environmental services' providers and beneficiaries

Dam Viet Bac, Do Trong Hoan, Kira de Groot, Hoang Minh Ha, Rohit Jindal

Since 2008, as part of ICRAF's various projects in Vietnam, a series of rapid assessment methods was applied in the study areas in order to define environmental services. Three potential environmental services of forests were recommended, including: 1) water quality and quantity; 2) carbon sequestration; and 3) landscape beauty. The first two services had potential relevance in all three project districts: Pac Nam, Ba Be and Na Ri. In addition, landscape beauty was especially the strength of Ba Be district. The environmental services' providers and beneficiaries were defined for each district (Table 5).

Table 5. Potential for PFES in 3PAD project area, Bac Kan province

District	Environmental services	Environmental services' providers	ES users
Ba Be	Water, carbon, landscape beauty	Forest owners (households, communities, organizations), contracted forest protectors, Ba Be national park	Na Hang hydropower plants Ba Be national park (tourist entrance fee), boat cooperatives
Pac Nam	Water, carbon	Forest owners (households, communities, organizations), contracted forest protectors	Na Hang hydropower plants, international and national companies or industrial zones/factories
Na Ri	Carbon	Forest owners (households, communities, organizations), contracted forest protectors	International and national companies or industrial zones/factories

2.1 Proposed method for PES payments

In accordance with the national perspective and local context, local stakeholders in Bac Kan agreed that environmental services' payments from the national down to commune level could follow governmental guidelines as set out in Decree 99, that is, applying K factors (to differentiate the impact of different forest categories on water provision) and three different forest categories (protection, production and special use).

The proposed R coefficient[13] (to differentiate REDD+ distribution levels) could differ from the K factor in calculation method, given that an equation should be applied for the carbon-sequestration levels of different forest categories. The year to be used for the reference emission level also needed to be taken into account. In order to apply a uniform benefit-distribution system across provinces, the R coefficient had to be guided by the national REDD+ committee. But at the community level, more appropriate modes of payments, rewards or co-investments were needed.

The fees for environmental services such as water, carbon sequestration and landscape beauty were to be paid into the Bac Kan provincial FPDF. Through the Fund, payments could then be allocated to the intermediaries and providers for forest protection and development (Figure 2).

[13] The R coefficient has been mentioned in national REDD+ documents in Vietnam but no specific definition was given.

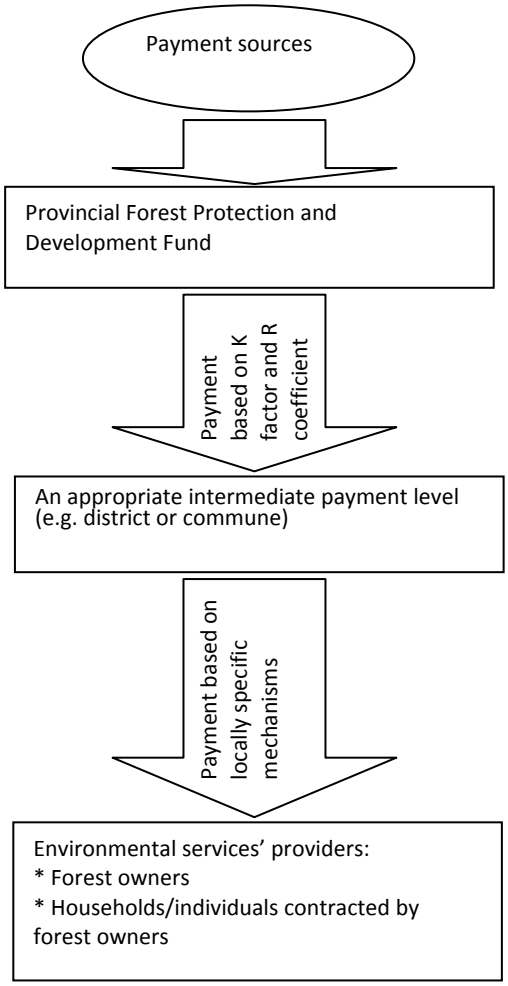

Figure 2. Benefit-distribution system to be piloted in Bac Kan province
Source: Ba Be stakeholders' consultation workshop and policy dialogues, 2011

The K factor was used according to Decision 380, aiming to differentiate forests' capacities to generate environmental services. The basis for defining K factors was forest types, forest status, forest origin and difficulty of management.

2.1.1 Proposed K factor for PES payments from province to the appropriate intermediate payment level

The K factor was a coefficient used to adjust payment rates for forest plots in accordance with environmental value. According to Decree 99/ND-CP there are four criteria applied to determine the K factor, including forest quality (rich, average, poor), forest types (production, protection, special use), forest origin (natural and plantation), and difficulty and advantage level in protection of forests. However, it depends on the circumstances of each locality whether the K factor can be calculated based on one, two, three or all four of these criteria.

The studies by Winrock International (Winrock International 2008), Vu Tan Phuong (2009) and Vuong Van Quynh (2011) indicated that both special-use and protection forests were often located on high, steep and inaccessible terrain. Therefore, these two forest types were combined into one group. In addition, the studies also showed that there was no significant difference in water conservation between protection and production forests. However, there was a big difference in soil conservation between these two forest types. Furthermore, the

values of carbon sequestration and landscape beauty of natural forests was higher than other forest types. This is the basis of the K factors proposed for the whole country and shown in Table 6 (fifth draft of Circular 99 dated 16 June 2011 on determining the K factor of one hectare of forests and exempted payment of PFES).

Table 6. Proposed K factors for PFES

Project location	K1		K2			K3			K4		
	NtF	PtF	RF	MF	PF	PrF	SpF	PdF	VD	D	LD
Son La	1.00	0.88				1.00	1.00	0.61			
Dak Lak	1.00	0.75	1.00	0.93	0.91	1.00	1.00	0.90			
Other 4 agro-ecological zones	1.00	0.8	1.00	0.95	0.90						
Average	1.00	0.81	1.00	0.94	0.91	1.00	1.00	0.75			
Proposed K	1.00	0.80	1.00	0.95	0.90	1.00	1.00	0.90	1.00	0.95	0.90

Notes: K1 adjusts according to origin of forests. K2 adjusts according to quality of forests. K3 adjusts according to types of forests. K4 adjusts according to level of difficulty in forest protection. NtF: natural forest. PtF: planted forest. RF: rich forest. MF: medium forest. PF: poor forest. PrF: protection forest; SpF: special-use forest. PdF: production forest. VD: very difficult. D: difficult. LD: less difficult. According to the second stakeholder workshop in Bac Kan province, most participant suggested that payment rates should not be different in terms of forest quality such as rich, medium and poor, owing to limitations of data, funding and measurement methods. Therefore, the K factors suggested for Bac Kan are only different in terms of forest types and origin of forests (Table 7).

Table 7. Proposal of some values of the K factors for Bac Kan

Forest types	**K_{LR}**	**Origin of forests**	**K_{NGR}**	**K factors**
(1)	(2)	(3)	(4)	(5)= (2) x (4)
Special-use, protection	1.0	Natural forest	1.0	1.00
Special-use, protection	1.0	Planted forest	0.8	0.80
Production	0.9	Natural forest	1.0	0.90
Production	0.9	Plantedforest	0.8	0.72

K_{LR}: K according to origin of forests. K_{NGR}: K according to types of forests

Source: Second stakeholders' workshop, 30 June 2011

At several national workshops on PFES, most policy makers and stakeholders suggested that the K factor should be equal to 1 during the pilot phase and be adjusted later. Therefore, we suggest that the K factor = 1 be applied during the pilot phase, 2012-2013. The limitation of this is the so-called 'unfairness' among forest types, that may provide different environmental services' levels.

2.1.2 Methods determining payment levels at implementation

Our initial results showed that the main threats to Bac Kan's forest have been shifting cultivation and over-logging in the past few decades. The main causes were poor land-use management and planning in the province. To date, there are still over 17 000 ha under shifting cultivation in the province, mostly on production (15 545 ha) but also on protection forest land (1548 ha) (Hoang 2011b). These should be the sites where piloting of PES should start.

For implementation, payment levels should be designed to fit with the local context in order to ensure effectiveness, sustainability and fairness. In particular, payment levels and how payments should be made should be based on the following criteria: 1) the quality of forests (rich, poor, average); 2) the level of investment required for protecting different types of forests; 3) the contribution of PES to poverty reduction and improving the livelihoods of local

people; 4) the wishes of local people in obtaining income from forests (for example, according to our survey in Nam Mau village, Quang Khe commune, Ba Be district, local people wanted an income from forests of VND 3-4 million/household/year); and 5) the lessons learned from locally successful (and not so successful) forest management approaches.

The quality of forests (rich, medium, poor) can be determined through available statistical data. Currently, the financial support/payment levels for forest planting and forest protection to local people living in different districts and communes are different. This depends on forest area, forest types, social policies, different projects supporting forest protection and development as well as the priorities of each locality.

For example, according to local policies in Ba Be district, benefits gained from the forest differ for different types of forest.

- Individuals or households contracted to protect special-use forest receive VND 200 000/ha/year but are not allowed to collect non-timber forest products.
- For protection forest, local farmers receive VND 100 000/ha/year for forest care, plus the right to exploit non-timber forest products and low quality timber.
- Those contracted for planting in production forests receive approximately VND 4 million/ha/3 years (in both cash and kind such as seedlings). This is for forest planting and management following the regulations of the '147' and '30A' programs. Forest owners are allowed to use 100% of planted forest products, including all timber and non-timber forest products, with the permission of the authorities.

Total average income from forest protection, forest regeneration and forest planting for each household was VND 200,000-300,000. This seems to be around the same level as the income of poor households found in the study villages. The average income for 'rich' groups in the study villages starts from VND 300 000 /ha/person. The total income for a family of five would reach about VND 1,500,000 /ha/year. Even the highest payment for forest protection and planting mentioned above is still far lower than the expected income from forest of local farmers, which ranges through VND 3-6 million/ha/year/household (according to the local stakeholders' consultation workshop).

We can conclude that current monetary incentives for forest protection and plantation care are not sufficient for effective forest protection and development and that non-cash incentives should be given more attention, especially considering local budget constraints. Ideally, local farmers would be supported to shift from current unstainable practices to carbon-rich land uses that can provide both PES payments for carbon and water as well as a good income from land-use products.

The reverse auction method (see above) is considered by ICRAF and 3PAD project staff as the most promising method for defining reasonable PES payment levels. The basis of the method is the real opportunity cost of local people to provide environmental services required by beneficiaries.

Lessons from the case studies in Vietnam, in general, and in Bac Kan, in particular, show that most of the existing community forest management in Bac Kan province is not successful owing to the lack of a clear benefit-sharing mechanism. There is no regulation or guidelines on the right to take timber and other commercial products. Furthermore, it has also been reported that when a community obtained land with a use-right certificate (known

as a Red Book[14]), as in Na Muc, Khuay Lieng, To Dooc, and Ban San villages in Na Ri district, local forest has been more effectively protected compared to other community forests. Therefore, rewards such as securing land-use rights should be of interest as part of the PES scheme.

2.2 PES beneficiaries and providers in the project areas

2.2.1 Payment for watershed function

A number of sub-watersheds were identified as having potential for PES development for watershed function within the project areas.

- *The Nang River* rises in Pac Nam district in the northwest of Bac Kan province and runs through Ba Be Lake (Ba Be district) before feeding into the Na Hang hydropower dam in Tuyen Quang province**.** The Nang watershed includes about 38 communes in Pac Nam, Ba Be, Ngan Son and Cho Don districts. The average water flow through Na Hang hydropower plant is 318 m^3/second[15]. The flow measured at Dau Dang Falls (4 km from Ba Be Lake) is only 40-50m^3/second[10], which means that Ba Be contributes about 15% of the water to Na Hang. This shows the potential for Bac Kan to adopt lessons from Son La in estimating the payment from Na Hang hydropower plant to the service providers in Bac Kan.
- *The Leng River*, upstream of Ba Be Lake, flows through the Quang Khe and Dong Phuc communes. The river basin is located within Ba Be district, with two communes in the core zone (Nam Mau commune) and the buffer zone (Quang Khe commune). Within Dong Phuc commune, the Ta Lang hydropower plant is under construction and due to come online within the next few years. Construction may increase sediment flows into Ba Be Lake. The Ta Lang hydropower dam will cover 38 km^2 and provide 4.5 Mw/h, which is small compared with Na Hang's 342 Mw/h[16] .

These two hydropower companies and tourists to Ba Be Lake should be the potential buyers of water-related environmental services provided by landowners in the Ba Be and Pac Nam areas. Ba Be National Park depends on the quality of the water flowing into the lake and may want to negotiate agreements with upstream agricultural areas on pollution control and guarantees of water quality based on community monitoring.

[14] Issuing a Red Book to a community (village or group of households) has been piloted in 30 communes in Vietnam, following Decree 106/2008/QD-BNNPTNT of the Ministry of Agriculture and Rural and Development in 2008.
[15] Figure provided by Vietnam Electricity -Power Engineering Consulting Joint Stock Company I
[16] Figure provided by Vietnam Electricity -Power Engineering Consulting Joint Stock Company I

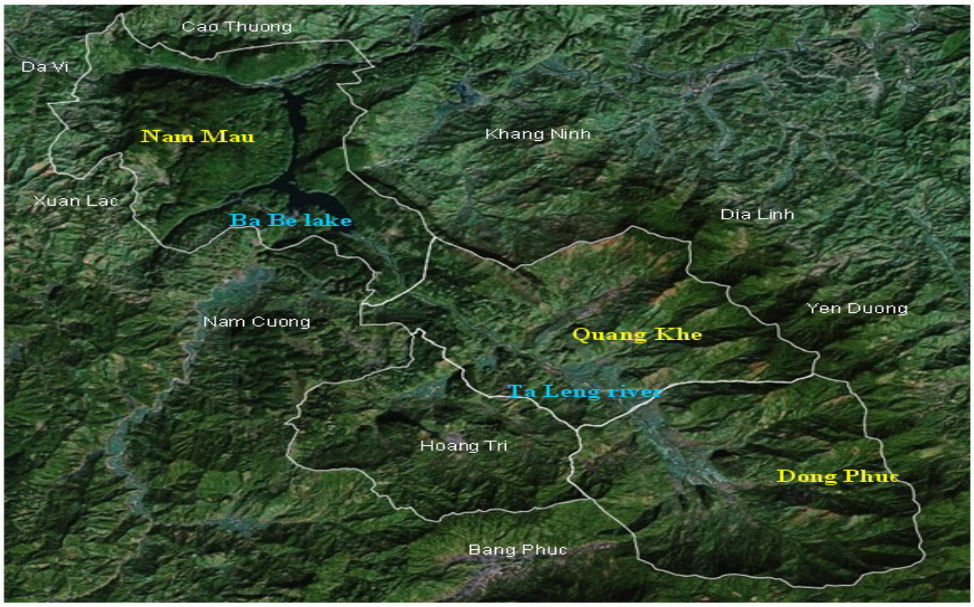

Figure 3. Maps of Nang River watershed (top) and Ta Leng River watershed (bottom)

NANG RIVER WATERSHED

PES beneficiaries and payment amount: To estimate the income that could be provided to forest owners by a PFES scheme, according to Decree 99, at the study sites in Pac Nam and Ba Be districts, we estimated the provision of water from 1 ha of forest. Since both Pac Nam and Ba Be districts are located within the Nang watershed, four steps were carried out for the payment estimation (Table 8). The calculation was made by dividing the total amount of money to be paid by water and hydropower companies in Na Hang into the total forest area within the watershed. As the K factor had not been decided by the province, there would be no difference in the amount of payments to forest owners according to forest status, types of forest, origins of the forest, and level of difficulty in forest management (that is, K is equal to 1).

Table 8. Estimation of payments for water services, according to Decree 99, in Nang River watershed

No.	Step	Source/Implementer	Output
1	Mapping of border of Nang River watershed	National Institute of Agricultural Planning and Projection Departments of Forest Protection (under DARDs) of Bac Kan and Tuyen Quang provinces	Topography map of Nang River watershed (scale: 1/50 000) with watershed boundary (cross-checked with forest status maps and forest land maps of 2010 of Bac Kan and Tuyen Quang provinces
2	Defining total forest area of Nang River watershed	2010 statistical and inventorial data on land, Bac Kan and Tuyen Quang provinces	Total forest area of Nang River watershed (96 602 ha), Na Hang (19 936 ha), Ba Be (40 158 ha),Pac Nam (17 239 ha), Ngan Son (9 826 ha), and Cho Don (9 442 ha)
3	Estimating amount to be paid by Na Hang hydropower plant	Report on commodity electricity of Na Hang hydropower plant (2009 and 2010)	Commodity electricity of Na Hang hydropower plant: 1238 million KWh in 2009, 1019 million KWh in 2010. Estimated payment by Na Hang hydropower plant: USD 1 238 000/year in 2009, USD 1 019 000/year in 2010
4	Estimation of amount of environmental services' payments per hectare of forest in Nang River watershed	Outputs of Steps 2 and 3; K factor is assumed to be 1 for all types of forest	Amount for 1 ha of forest in Ba Be, Pac Nam and Na Hang districts paid by Na Hang hydropower plant: USD 8.8[b]/ha/year in 2010 (10% of transaction cost of indirect payment has already been deducted)

[a] Two study sites Pac Nam and Ba Be districts located within Nang River watershed, where forest owners can be paid for environmental services provided by forest areas belonging to them

b The exchange rate used was approximately USD 1 = VND 20 000

Environmental services' providers, according to Decree 99, are all the forest owners and forest managers (Government organizations as well as non-organizations such as individuals, households and communities who have been allocated forests or contracted for forest protection by the authorities) in two upstream districts (Ba Be and Pac Nam of Bac Kan province, that are also 3PAD project's districts) of the Nang River watershed.

According to results of forest monitoring conducted by the provincial FPDs of Bac Kan and Tuyen Quang provinces and other relevant agencies in Ba Be and Pac Nam district, up to the end of 2010, more than 60% of forest area has not yet been allocated and this area is currently managed by the commune people's committee. Households and individuals have been allocated the largest area of forest, followed by forest management boards and Government enterprises (Table 9). This suggests that in addition to payments to households and individuals (as regulated in Decree 99), PES at community level should also be piloted on forest land under the management of the commune people's committee.

Table 9. Forest area under PES by forest land managers in two districts of the 3PAD project

Administrative boundaries	Forest area (ha)				
	Total	Forest management boards	State forest enterprises	Households	CPC (unallocated forest)
Ba Be district	40 158.57	5 427.53	1 126.39	10 797.66	22 806.99
Pac Nam district	17 239.37	-	-	3 526.34	13 713.03
Total	57 397.94	5 427.53	1 126.39	14 324.00	36 520.02
Percentage (%)	100	9.46	1.96	24.96	63.63

Source: Bac Kan FPD (2010), statistics of forests and forestry land area by forest managers

The forests in Ba Be and Pac Nam fall mainly into the natural (80.24%) and production categories (56.20%) (Table 10).

Table 10. Forest area under PES in the two 3PAD districts by forest origin and forest types

District	Total forest area	Forest origin		Forest type		
		Natural	Plantation	Special use	Protection	Production
Ba Be district	40 158.57	31 833.44	8325.13	8634.23	10 209.62	21 314.72
Pac Nam district	17 239.37	14 220.25	3019.12	-	6 296.55	10 942.82
Total	57 397.94	46 053.69	11 344.25	8634.23	16 506.17	32 257.54
Percentage %	100	80.24	19.76	15.04	28.76	56.20

Source: Bac Kan FPD (2010), statistics of forests and forestry land area

TA LENG RIVER WATERSHED

PES beneficiaries and payment amount: Similar to the Nang River, the method to determine the Ta Leng River basin boundaries also involved four steps. The PES beneficiaries and payment amount for Ta Leng River basin, Bang Phuc commune, Cho Don district are presented in Table 11.

Table 11. Estimated payment amount of PES for water under Decree 99 in Ta Leng watershed

No.	Steps	Implementing agencies/ sources	Results
1	Determining the boundaries of Ta Leng river basin	Forest Inventory and Planning Institute, National Institute of Agricultural Planning and Projection, Bac Kan DARD and FPD	Topographic map of Nang River basin (scale 1/50 000) with basin boundaries and defined forest status and forest land in Bac Kan for 2010
2	Defining total forest area of Ta Leng River basin	Statistical data of forests and forestry land area in 2010 from Bac Kan DARD and FPD	Total forest area of Ta Leng River basin (2170.88 ha) per total forest area of Bang Phuc commune (3836.93 ha)
3	Estimate payment amount by Ta Leng hydropower plant	Report on commercial electricity production of Ta Leng hydropower plant in 2010	Commercial electricity output of Ta Lang hydropower plant: 11.7 million Kwh in 2010. Estimated total amount of money that the company has to pay: USD 11 800/year in 2010
4	Estimate payment amount for PES per hectare of forest of Ta Leng River basin	Outputs of Steps 2 and 3; K factor is assumed to be 1 for all types of forest	Amount for 1 ha of forest in Bang Phuc commune by Ta Lang hydropower plant: USD 4/ha/year in 2010

[a] The two study sites in Pac Nam and Ba Be district are located in Nang River basin. Forest owners in this basin have the potential to receive money through PFES for their own forests

[b] The exchange rate used is approximately USD 1 = VND 20 000

PES providers in Ta Leng watershed: PES providers in Ta Leng watershed were households who owned production forests (75% of total area) and protection forests managed by commune people's committees (that were not yet allocated to households; occupying 25% of the total area). Total forest areas that were eligible for PFES were 2170.88 ha of the total area of Bang Phuc commune of 3836.93 ha (Table 12). In addition, there were 2159 ha of forests located outside of Ta Leng River basin in the Cau River basin.

Table 12. Forest area that will be paid by PFES according to PES providers in Ta Leng watershed

Administrative boundaries	Forest area (ha)		
	Total	Households[a]	PPC[b] (not yet allocated)
Bang Phuc commune	2170.88	1635.87	535.01
Percentage	100	75.36	24.64

Sources: Statistical data of forests and forest land area according to forest owners in 2010, Bac Kan FPD

[a] Production forest area

[b] Production forest area

The findings from Nang and Ta Leng watersheds show the importance of PFES, according to Decree 99, in improving livelihoods for poor farmers in the province. Furthermore, it also indicates the importance of PES at community level for the 63% of forest land that has not yet been allocated to households and that is still under the management of the commune people's committee.

1.2.2 Payment for carbon sequestration

POTENTIAL PAYMENT FOR CARBON SEQUESTRATION SERVICES IN BAC KAN PROVINCE ACCORDING TO INTERNATIONAL AND NATIONAL REQUIREMENTS

The REDD+ payment scenario in Bac Kan, if any, will be similar to that nationally since both jurisdictions have increasing forest area thanks to plantations. At the national level, there has been no consensus on how to develop a reference emission level as well as business-as-usual scenarios to estimate carbon payments under any REDD+ scheme.

Data and information required for aboveground carbon stock of forests in the provinces and 3PAD project districts have been collected, including:

- Forest status map and land-use map;
- Forest evolution maps over time: 1990, 1995, 2000, 2005 and 2010;
- Forest carbon-stock evolution over time: 1990, 1995, 2000, 2005 and 2010; and
- reference emission level based on forest carbon-stock evolution.

For Bac Kan province, forest data is available from 1990 to 2010. However, unlike most developing regions that have experienced deforestation in the last few decades, Bac Kan (similar to many other parts of Vietnam) has enjoyed an increase in forest cover (Figure 4a). As a result, the total stock of carbon (aboveground) stored in the forest increased about 7 million tonne over a period of 20 years (from an estimated 19.8 Mt in 1990 to about 26.8 Mt in 2010; Figure 4b). This represents an average annual increase of 1.8%.

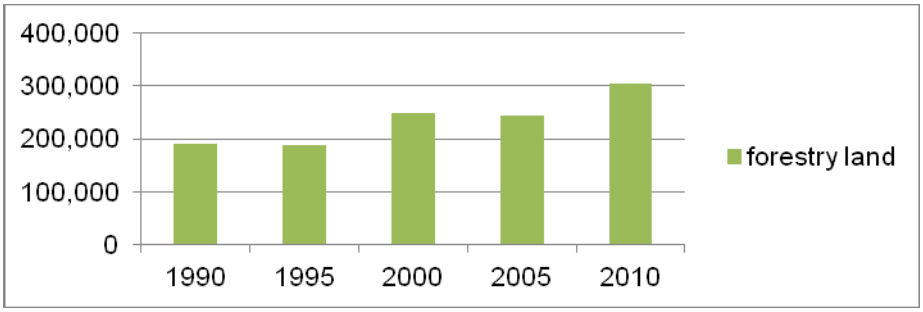

Figure 4a. Change in forest area in Bac Kan province, 1990-2010 (hectare)

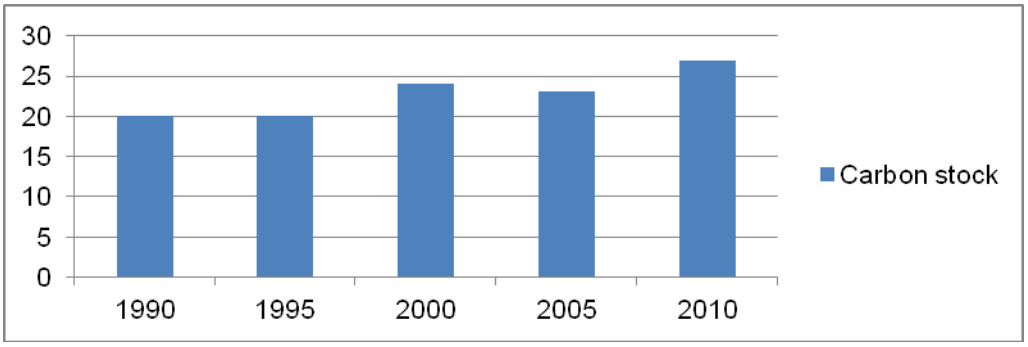

Figure 4b. Change in forest carbon-stock in Bac Kan, 1990-2010 (million tonne of carbon)

Similar trends in forest and carbon stock are prevalent in most parts of the province. Figure 5 shows that the area under forest decreased marginally between 1990 and 1995 in the three districts of Ba Be, Na Ri, and Pac Nam, but since then has grown rapidly, much of it due to re-growth and reclassification of evergreen forests, as well as new plantations. As a result, carbon stock increased in all the three districts during the same period, the highest growth being in Na Ri district (Table 13).

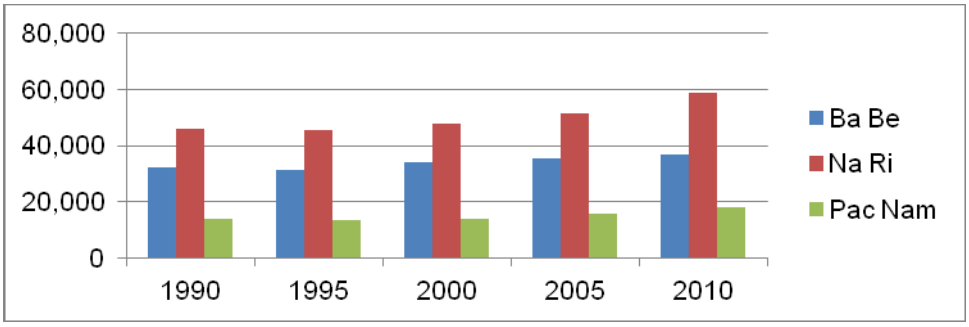

Figure 5. Change in forest areas in selected districts, 1990-2010 (hectare)

Table 13. Change in carbon stock in selected districts, 1990-2010 (tonne)

No.	District	1990	1995	2000	2005	2010
1	Ba Be	3 586 420	3 397 143	3 610 513	3 691 126	3 783 639
2	Na Ri	4 410 214	4 272 157	4 451 142	4 732 353	5 362 115
3	Pac Nam	1 399 689	1 339 347	1 385 045	1 522 060	1 754 432

THE POTENTIAL FOR REDD+ IN BAC KAN PROVINCE

The above data show that under a strict REDD regime that only focuses on reduction in deforestation in forest areas, most parts of Bac Kan province would be ineligible to earn any carbon credits for the impressive plantation and conservation activities undertaken in the recent past. Even if re-plantation is accounted for in any REDD+ regime that encourages 'gap filling' and regrowth in forest areas, the Government would need to make a special case as to why the average increase in carbon stock by 1.8% per annum should not constitute the 'business-as-usual' scenario.

The potential for REDD+ payments for Bac Kan province, therefore, is more likely to be payments for 'forest carbon-stock enhancement' of existing forests than 'prevention of deforestation and forest degradation'.

The choice of the specific scenario to estimate the reference emission level for a potential REDD+ program in Bac Kan will not only depend on what rules are formulated at the national level. The province itself will need more precise data on quality of forests. There are concerns that even though the area under forests has increased in many parts of the province, the quality of forests as measured in terms of crown density and biodiversity may have actually gone down, especially in natural forests.

THE POTENTIAL FOR REDD+ PAYMENT IN NA RI DISTRICT

For Na Ri district, REDD+ payment potential takes the form of 1) international carbon markets; and 2) national support through a REDD+ program, UN-REDD, Forest Carbon Partnership Facility, 3PAD, IFAD and similar international mechanisms.

Na Ri is heavily forested with about 70% of its area under forests. It also contains the Kim Hy Nature Reserve, which is about 15 000 ha. Although the area under forests has increased rapidly over the last 20 years (Figure 5), a significant proportion of the forests faces degradation in the form of slash-and-burn agriculture. In terms of the reference emission level, similar to the province as a whole, the total forest cover in Na Ri increased about 12 000 ha (from 46 190 ha in 1990 to 58 882 ha in 2010) during 20 years. Similarly, the estimated aboveground carbon stock increased from 4 410 214 tonne in 1990 to 5 362 115 tonne in 2010. However, these figures are based on coarse data and higher resolution data will be needed to document forest degradation and the resultant changes in carbon stock. The first findings recommended that a REDD+ mechanism be developed for Na Ri as well as for Bac Kan, that should focus on enhancing forest carbon-stock rather than emphasising avoiding deforestation or degradation.

ICRAF carried out a pre-feasibility study for REDD+ piloting in four villages: Leo Keo in Ba Be district, Khuoi Tuon village in Pac Nam, and Na Muc and To Dooc villages in Na Ri district. Although all four villages showed potential for carbon-mitigation activities, the detailed feasibility study was carried out in To Dooc village. Along with Na Muc, it is among the first few villages in Vietnam to receive Red Book certificates for commune forests. This demonstrates the readiness of the village community to protect and conserve their local forests after receiving secure tenure rights. A long-

term forest management plan under a prospective REALU pilot in this village offers potential for wider testing in other parts of the province and the country.

NET PRESENT VALUE AND OPPORTUNITY-COST ANALYSIS OF LAND-USE CHANGES IN BAC KAN PROVINCE AND NA RI DISTRICT

To assess the feasibility of REDD+ implementation for the whole province as well as to find appropriate sites for REDD+ in the province, it was necessary to estimate the 'opportunity costs' of land-use changes, especially those from forest to other land uses, in conjunction with REALU project activities in Bac Kan. The steps of the analysis are shown in Table 14.

Table 14. Steps in the opportunity-cost analysis of land-use changes in Bac Kan province and Na Ri district

No.	Step	Operational unit/Method
1	Develop a land-use and land-cover classification system appropriate for Bac Kan and Na Ri[a]	Forest Resources and Environment Center, Forest Inventory and Planning Institute and National Institute for Agricultural Planning and Projection/Remote sensing and desk review
2	Develop land-use change matrices of Bac Kan and Na Ri for different periods during 1990–2010	National Institute for Agricultural Planning and Projection, remote sensing and GIS
3	Estimate aboveground carbon stock of identified land uses (see details in Appendix 2.1	Forest Resources and Environment Center, Forest Inventory and Planning Institute and National Institute for Agricultural Planning and an independent consultant from ICRAF, remote sensing and plot-level data collection, RaCSA
4	Estimate net present value of identified land uses (Appendix 2.2)	A research team from Forestry Economics Department, Forest Science Institute of Vietnam and ICRAF staff/field survey, data synthesis and calculation of net present value
5	Opportunity-cost analysis of land-use change	ICRAF technical team, opportunity-cost analysis follows ASB/World Bank methodology and uses REDD Abacus software

[a] The land-use classification system is based on the structure of the land-use classification system used by MARD. Details are found in Appendix 2.1

The total area of Bac Kan province can be classified into 19 land-use types (Appendix 2.1), including eight types of forests, one type of mosaic land use, three types of non-forest vegetation, four types of agriculture, and three types of non-vegetated land. For Na Ri district, there were only 17 land-use types since rich timber forest and industrial crops do not exist.

The opportunity-cost analysis of land-use changes in Bac Kan province (Figure 6) and Na Ri district (Figure 7) during 20 years (1990-2010) resulted in the following.

For Bac Kan province: Land-use changes resulted in either carbon emission or carbon sequestration. The largest amount of emissions were owing to conversion of poor forest to re-growth forest. Emissions owing to conversion of forest to agriculture land occurred, but at a very low rate compared to forest degradation. This was in line with the results of the land-use change analysis. Most of the carbon emissions occurred at low opportunity cost, except for conversions of forest to agriculture.

Regarding sequestration, forest plantations on bare land contributed to the highest rate of carbon sequestration. Most sequestration happened at a positive opportunity

cost. Almost all land-use-based emissions could be compensated at a carbon price of USD 5/tCO_2e. This shows a high potential for REDD+ in the province.

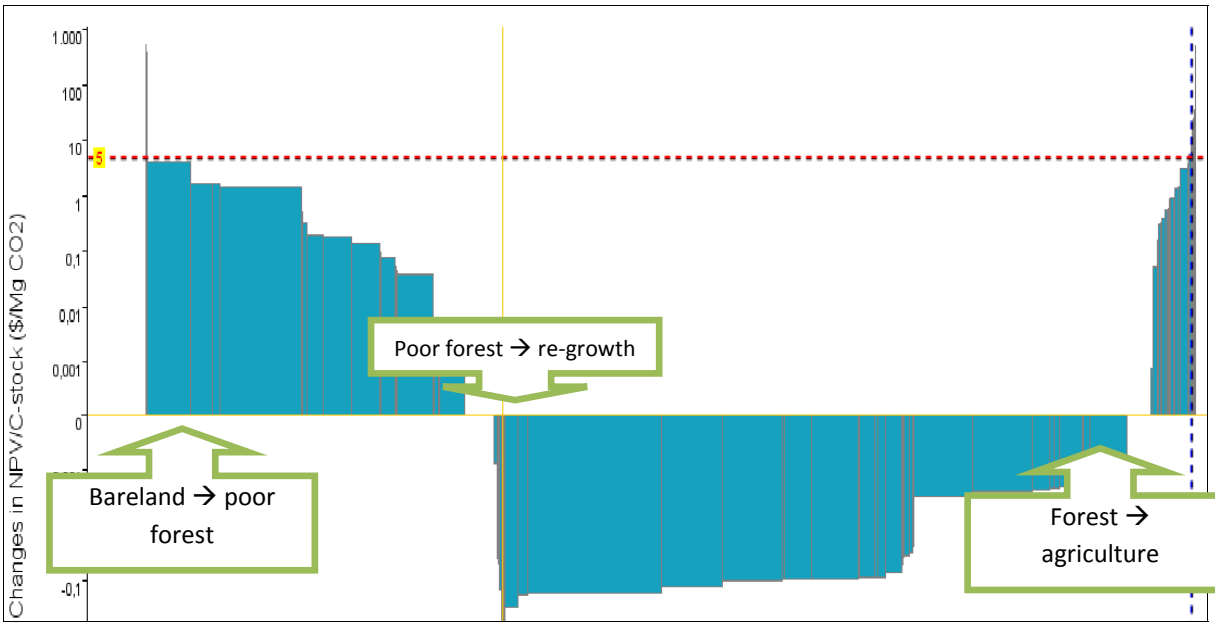

Figure 6. Opportunity-cost curve for Bac Kan province, 1990-2010

For Na Ri district: Land-use changes produced either carbon emission or carbon sequestration. The largest amount of emissions was owing to conversion of poor forest to re-growth forest (degraded forest). The second largest amount was owing to deforestation: recovered timber forest on rocky mountains was cut. Emissions owing to conversion of forests or bare land with trees to mixed fruit gardens contributed a fairly large amount compared to Bac Kan province.

Similar to Bac Kan, most of the carbon-emitting land-use changes in Na Ri district occurred at low opportunity cost. However, the conversions of forest to mixed fruit gardens happened at a higher opportunity cost than would be feasible for REDD+ in the area.

Regarding sequestration, conversion of re-growth forest to poor forest contributed to the highest rate of carbon sequestration and occurred at a positive opportunity cost. This, again, could be due to forest protection and development programs (for example, the '661' program) that have been carried out in the province since the late 1990s.

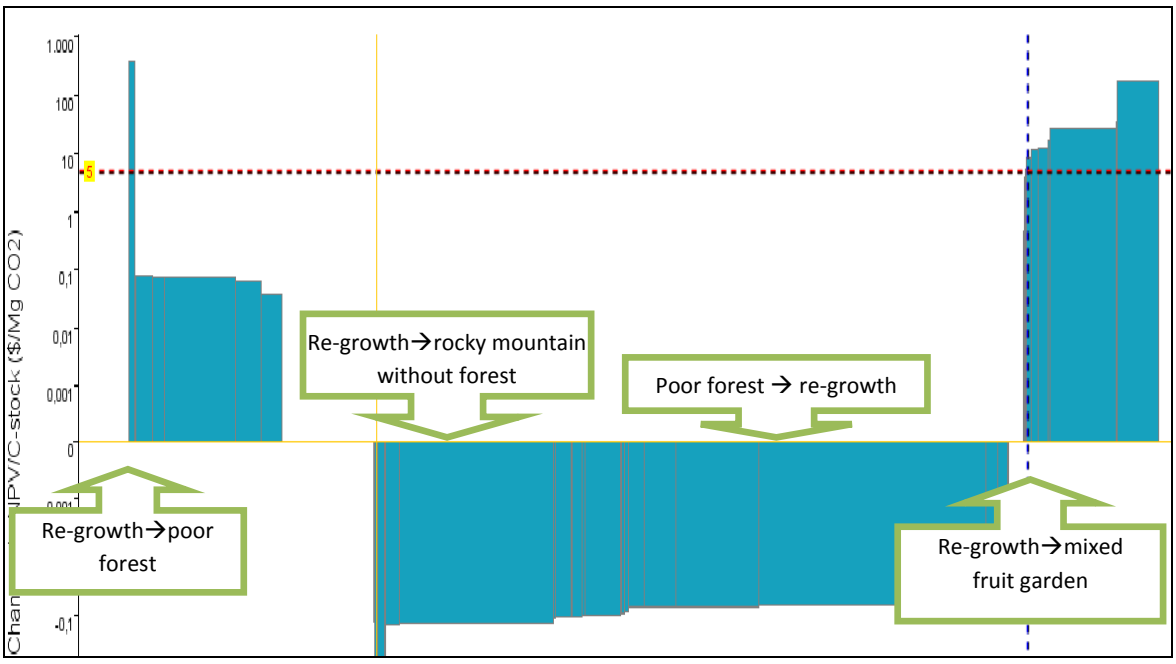

Figure 7. Opportunity-cost curve for Na Ri district, 1990-2010

Overall, the opportunity-cost analysis shows that in general that Bac Kan province has had to face forest degradation rather than deforestation. During 1990-2010, a large area of poor forest was replace by degraded forest. Emissions owing to forest degradation were mostly compensable by current market carbon price (USD 5/tCO_2e), while deforestation owing to agriculture will only be affordable at a higher carbon price.

In the same period, some forest development activities resulted in carbon sequestration through forest plantations or assisted natural re-growth. Such activities were also mostly in the range of USD 5/tCO_2e. Based on these historical changes in land use, we suggest that REDD+ efforts should be focused on: 1) enhancing the forest carbon-stock of the current large area of re-growth forest and poor forest; and 2) compensating local people for not converting forests to agricultural land.

CDM POTENTIAL IN PAC NAM DISTRICT

At the time of writing, participants in the international carbon market were waiting for a new global legal commitment on reducing greenhouse gas emissions (post-Kyoto Protocol). Hence, investment in CDM projects has been on hold. In particular, AR CDM has been considered to have less potential and will likely be replaced by REDD+.

The next activities for piloting PES for carbon sequestration in the province will be the investigation of REDD+ possibilities in Pak Nam district, particularly for sustainable and carbon-rich land uses such as agroforestry. The possibility for CDM energy funds owing to the use of improved stoves has been investigated and the results are presented in Chapter 4.

2.2.3 Payment for landscape beauty

Ba Be National Park, which was established in 1992, surrounds Ba Be Lake. The lake is Vietnam's largest body of freshwater. The Park lies in a remote area characterised by forested limestone mountains with numerous caves and dramatic peaks, making it a renowned tourist destination. In 2010, the Park registered around 30 000 paying visitors, of which 80% were Vietnamese nationals (personal correspondence, Ba Be National Park). The national park is recognised as an ASEAN Heritage Park and is preparing for Ramsar registration. The relationship between environmental services' providers, beneficiaries and intermediary groups is described in Figure 8.

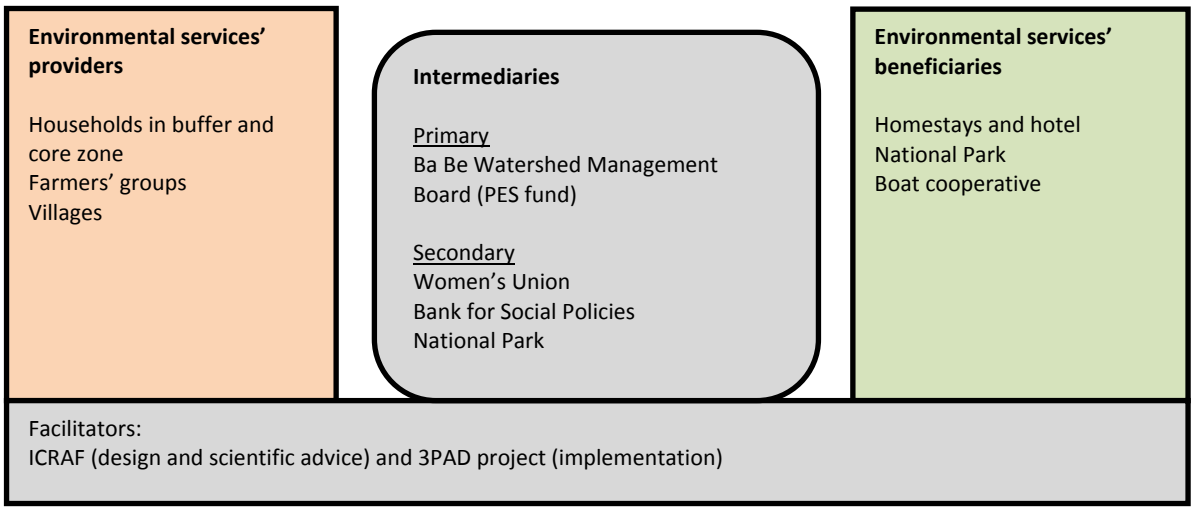

Figure 8. Stakeholders in PES scheme for landscape beauty, Ba Be Lake

PES providers: There are five communes partly or fully within the Park's core and buffer zones. The strictly protected ecological rehabilitation zone of 10 048 ha is home to about 3200 people (most belonging to ethnic minorities) in 13 villages surrounding the lake. Environmental degradation-such as deforestation, unsustainable agricultural land-use and water pollution-is a severe problem and local people struggle to find ways to make a living because they are restricted in their use of forest resources owing to the Park's 'protected' status. The national decree on PES (Decree 99), which took effect in January 2011, created the legal environment for income from hydropower, water services and tourism to be paid to environmental services providers, that is, land owners and forest protectors. A PES scheme in the area could potentially help to resolve conflict between the people who live in and near the forest (and depend on it for their livelihoods) and the Park administration, which must protect the forest.

PES beneficiaries: Tourism in Ba Be occurs at a small scale. For accommodation, tourists have the choice of either a guesthouse that is run by the Park and located at the entrance next to the Park's headquarters or in one of the 20 homestays in Pac Ngoi or Bo Lu, where one night costs in the range USD 2.50-4. There is at least one plan to develop a bigger hotel outside the Park, close to one of the other entrances. According to the development strategy for Bac Kan province, there will be more investment in tourism in the area. While some individual travellers reach the area by public transport, most arrive either by car, motorbike or

with a guided tour. The tours are mostly organized by agencies in Hanoi who have connections with some homestays in Pac Ngoi and, occasionally, Bo Lu.

Thus, there are three different types of entities-accommodation services, National Park, boat cooperative (see below)-which could be asked to enter into a contractual agreement for PES and commit to pay 1-2% of their income to a future 'Ba Be Forest Protection and Development Fund', in accordance with Decree 99.

The homestay owners are themselves local people who are barely escaping poverty. The National Park is the legal forest owner that subcontracts households for forest protection. It would thus be a secondary intermediary that is also entitled to payment of management costs. However, the Park also has income from tourism through a guesthouse, restaurant, tour guides, a small boat station and entrance fees. This means that there would be PES payments from and to the Park. In accordance with Decree 99, the local PES fund would transfer PES payments to the National Park, which in turn would transfer them to the subcontractors. This intermediary role would entitle the Park to keep 10% of the PES payment for management costs. However, apart from receiving payment for its role as a secondary intermediary, the Park would also be obliged to pay 1-2% of its revenue from all touristic activities, that is, the guesthouse, restaurant, entrance fees and tour guiding.

For the PES design, this means that, especially in Ba Be, the beneficiaries who must pay will have to be informed about the possibility, under in Decree 99, to include PES payments in production costs. Thereby, the costs are transferred to the end user, who is either the individual tourist or the tour operator who books on behalf of a tourist. A slightly higher price is not likely to influence the decision of tourists to come to the area and stay overnight because 1) current prices are far below the average elsewhere in Vietnam and account for only a very small proportion of the overall price of a tour; 2) there are almost no other options to stay elsewhere in the Park; and 3) when a PES scheme is established it would be important to inform visitors of its nature via leaflets or other media in advance via their tour operator and the Park's website and on arrival at their accommodation, which would likely positively influence the visitors' decisions.

The third important entity from which payments can be expected is the 'boat cooperative' (officially, the Ba Be Lake Management Cooperative, but local people always use the short name), which was formed several years ago. All boatmen are members of the organisation, which manages the dock and the distribution of the tourists to boats. Compared to the Park and homestay owners, the cooperative is less complex as there are already clear rules and regulations on how much the boatmen have to pay to the organization. At the time of writing, the cooperative keeps 25% of the fee for a boat trip; the remaining75% is paid direct to the boatmen.

If PES payments are introduced, we recommend using the boat cooperative as the central entity that transfers 0.5-2% of the overall revenue from boat tours to the PES fund.

Estimated contributions from tourism to the PES fund: We recommend a 2% payment rate, which is the upper end of the possible range given in Decree 99. Table 15 below shows a preliminary calculation for payments from tourism. The estimated payments from the boat cooperative are based on a report and interview, using data from 2009. Data for 2010 was not available at the time of writing. The interviewee stated that 2009 was a bad year for tourism and income from the cooperative was likely to be higher in forthcoming years. Data from the homestays were collected by means of a questionnaire and personal interviews and thus rely on declarations by the homestay owners. Many of them do not have a formal accounting system, which might be a drawback for the actual calculation of the PES payment. Receiving data from the National Park was a challenge because they were

restrictive on sharing income rates and the same applied to the Post Hotel, which is run by the Government's national postal service. A major contribution would be expected from the hotel.

Table 15: Estimated contribution to PES fund

Income activity in 2010	**100% (VND)**
Entrance fees to Ba Be National Park and four other forest stations	395 669 000
Homestay services	630 000 000
Tour guide services	13 965 000
Boat cooperative	222 995 000
Homestay services in Bo Lu and Pac Ngoi villages (18 homestays)	370 500 000
Total income	1 633 129 000
Under Decree 99 (extracted 1-2%): 2%	32 662 580

Source: ICRAF Vietnam 2011

These payments would be bundled with payments from Na Hang hydropower plant into a local PES fund, which will be established as outlined in Decree 99. For the pilot scheme, only 100 ha would be included and, from this we are able to estimate that one household would receive between VND 150 000 and 200 000. The exact amount would depend on the quality, type and location of the contracted area. The content of the contract would also depend on the location of the respective area of land; some households would be required to ensure strict protection while others would be required to change current agricultural practices, for example, no slash and burn or no grazing animals in the forest. The conditionality criterion would ensure that payments would only be made when the household met their responsibilities as stipulated in their contract. Monitoring the conditions of the contracts would be an important task of the Ba Be Watershed Management Board (the 'boat cooperative').

Chapter 3: Develop and propose mechanisms for managing and using PES fees at different levels

Dam Viet Bac, Kira de Groot, Tran Duc Luan, Do Trong Hoan, Hoang Minh Ha, Rohit Jindal,

3.1 PES fund management mechanism

3.1.1 Some main principles of PES, including REDD+, fund management at different levels

The principle for implementation should be to place the management of the different tasks at the lowest possible level but with due regard for efficiency, transparency and manageability. This implies that at nationally there should be disbursement from central to provincial levels based on provincial reports certified by an independent body according to the information contained in a national monitoring, reporting and verification system. The province then make further payments to lower administrative levels. All levels need to have their own monitoring, reporting and verification system (Hoang et al. 2011a).

Several possible mechanisms do exist. One example is the Forest Protection and Development Fund (FPDF), created in part to manage PES revenues, that incorporates a national FPDF mirrored by provincial and, potentially, district funds. The governance principles applying to PES and REDD+ revenues implies the need for broad participation in revenue management. This may need to be addressed if using the existing fund system. Another potential mechanism is watershed management. At the community level, payments could be combined with various other funds such as the Community Development Fund, as already occurs as part of the 3PAD project in Bac Kan, or community forestry, which exists in most of the forest communes. Principles of, and readiness for, possible different governance regimes are given in Table 16.

Table 16. Potential PES revenue governance systems at different levels

	Potential governance	Principle	Readiness
National	To create a sub-fund for REDD+ under the FPDFa system similar to PES and TFFb, but with different regulations to meet international requirements. Or to create a new, dedicated fund for REDD+ revenue management and distribution	Government ensures the REDD+ fund is governed by a broad-based, multi-stakeholder board subject to independent external audit. Any other requirements stated in the UNFCCC decision on REDD+ need to be incorporated. MARD has indicated that REDD+ revenues will be managed separately from the Government's budget	The current policy for FPDF already allows for a REDD+ sub-fund to be managed as a trust fund
Watershed management sub-nationally	Establishing a 1) Watershed Management Board (WMB), containing land-users' representatives within the watershed (votes are on the basis of percentage of forest land areas and forest types); and 2) a conservation fund, including all payments of water, carbon and biodiversity that will be managed by the	The WMB is for 1) conducting negotiations with other sectors having conflicting interests with forest protection; 2) negotiating with individuals and communities on contracting forest management and protection; and 3) monitoring, reporting and validating activities for funders. Social and state organizations provide technical assistance and	Government Decree 120/2008/ND-CP, 1 December 2008, on Watershed Management

	WMB	training to the WMB. Foresters and communities work with forest protection, sustainable land-use management and participatory monitoring	
Commune and village level	Community Development Fund (CDF)	The CDF is the core of 'income generation opportunities' for the 3PAD project in Bac Kan funded by IFAD. The CDF supports costs associated with decentralised investment at the village/hamlet level. It is used for three investment streams: infrastructure; pro-poor agroforestry investment grants; and service delivery contracts	Vietnam Law on Forest Protection and Development, 2004.

a Government of Vietnam Decree 05/2008/ND-CP, 14 January 2008, Forest Protection and Development Fund (FPDF), especially articles 2, 4 and 6, mentioned the fund as a trust fund for all contributors
b Trusted Forestry Fund
Source: Hoang et al. 2011a

Experiences in organization of PES implementation and management of a payment fund in Lam Dong and Son La provinces in 2010 (Appendix 1.1) will be the basis for a proposal for a PES scheme in Bac Kan province.

3.1.2 Organizing implementation and management of the provincial PES funds

ORGANIZATION OF TRUST FOR MAKING PAYMENTS

The Nang River basin is located within the administrative boundaries of two provinces. Hence, according to Decree 99, PES payments will be paid for through a trustee contract with the Vietnam FPDF. The Vietnam FPDF represents environmental services' providers when making agreements with environmental services' beneficiaries, such as Na Hang hydropower plant. The Bac Kan provincial FPDF will contract with the Vietnam FPDF according to the forest area that provides environment services. Transfer of PES funds will be made quarterly.

The Ta Leng River basin and Ba Be National Park are located within the administrative boundaries of Bac Kan province. Therefore, PES payments will be paid to the Bac Kan provincial FPDF or any other agency or organization that is responsible for this work. The Bac Kan FPDF represents environmental services' providers when making agreements with environmental services' beneficiaries, such as Ta Leng hydropower plant and Ba Be National Park. Transfer of PES funds will be made quarterly.

According to the results of stakeholders' workshops and consultations, we recommend indirect payments for Bac Kan province, as illustrated in Figure 9 below.

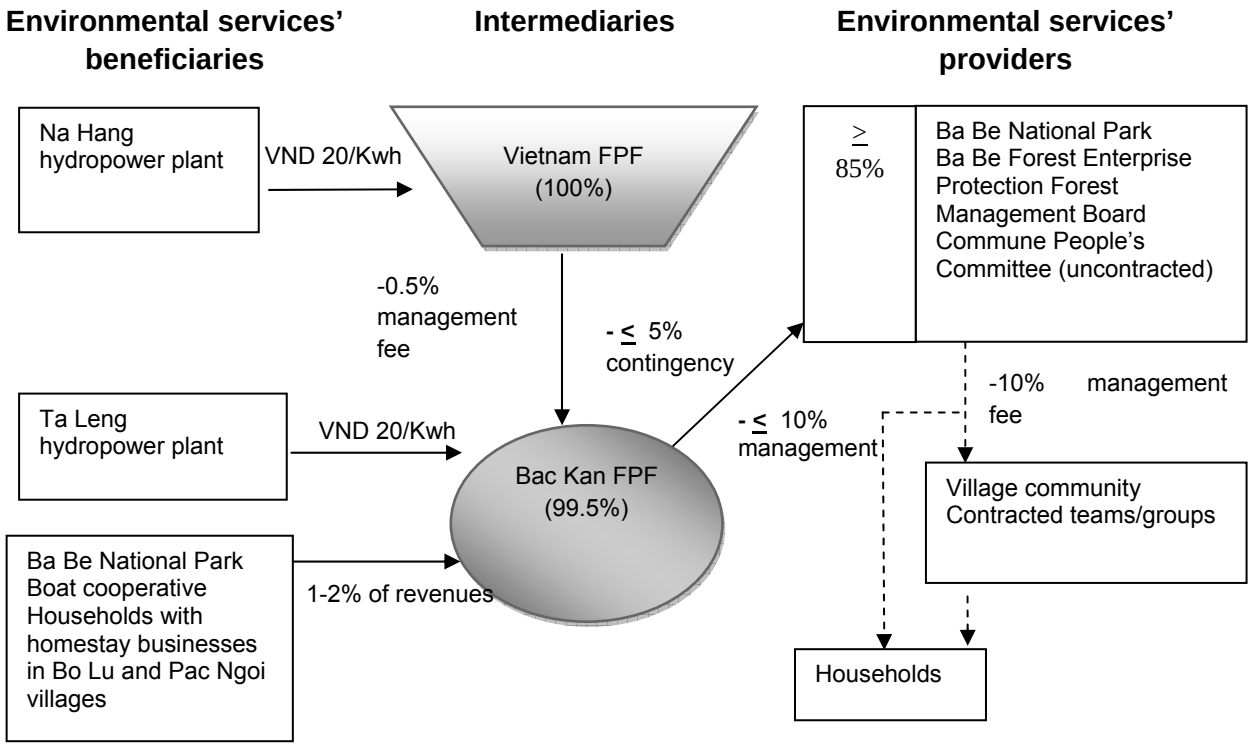

Figure 9. Fund management and uses of indirect PES payments

MANAGEMENT OF PES FUNDS AT THE PROVINCIAL FPDF

The PES trust fund from the central governmental fund and from environmental services' beneficiaries in Bac Kan province will transfer to the Bac Kan provincial FPDF. The PES fund will be used in accordance with the guiding circular (eighth draft), dated 21 October 2011, on the procedure for evaluation and disbursement of PES.

- No more than 10% will be used for provincial funds' operational costs. The deduction rate will be decided by the chairperson of the provincial people's committee.
- No more than 5% of the total PES revenue plus other legal sources can be used to establish a contingency fund. The percentage of deduction is determined by the chairperson of the provincial people's committee. The remaining fund (over 85%) should be transferred to environmental services' providers. Defining PES payment amounts for forest owners is based on the K factor.
- Eighty-five percent or more of the fund is to be used as follows: 1) Forest owners or organizations should develop plans in order to apply to the PES fund for allocations for forest protection and management. The applications should be submitted to DARD for evaluation and incorporation into the provincial PES plan to be approved by the provincial people's committee. After the approval, the provincial FPDF will sign contracts on the basis of forest areas that belong to the particular forest owners; 2) No new application is required for forest areas that are already contracted for protection under other projects and programs, such as the '661' and '30a' programs. The legal

records and documents from the previous contracts of forest protection will be used. If there is no change in conservation targets, forest area and location, the provincial FPDF will sign the contract of PES with forest owners and the commune people's committee on the basis of those documents.

- The not-yet-paid PES money can be placed in an interest-bearing account. The interest on the amount accrued during the payment process, as well as from other financial sources, if any, shall be credited to the contingency fund of the provincial budget. The use of the contingency fund shall be decided by the chairperson of the provincial people's committee.
- The interest on the amount held for administrative expenses shall be credited to cover operational costs.

It is planned that the abovementioned circular on using PES funds and procedures for evaluation and disbursement will be finalised in 2011 in order to implement Decree 99.

ORGANIZING VALIDATION AND DISBURSEMENT OF PES EXPENDITURE

According to Decree 99, DARD has the main responsibility for defining the quantity and quality of forests as well as to disburse expenditures related to PES, for example, costs for checking more than 10% of forest area. The K factor should be issued every three years on the basis of those checks. Time and process of forest checking will be the same for all kinds of forest owners. But for those households which have contracts with forest owners, one more round of checking of forest quality and quantity as well as the contract itself will be conducted.

The district people's committee is assigned responsibility for assessing forest quantity and quality, for informing forest owners (households, individuals or communities) on the checked forest quality and quantity, and for disbursement of expenditures of PES for checked 100% for forest area. This organization will also take part in defining K factor for forest owners. PESThe check at this level is required annually, and it should involve representative from the implementation level (households, villages, and communes) into the process.

Suggested organization for tourism-related PES management in Ba Be district

Ba Be district is a special case in PES management owing to the many potential environmental services in the district, including water quantity and quality, landscape beauty and carbon sequestration.

A suggested framework for a tourism-related PES scheme in Ba Be is shown in Figure 10 below.

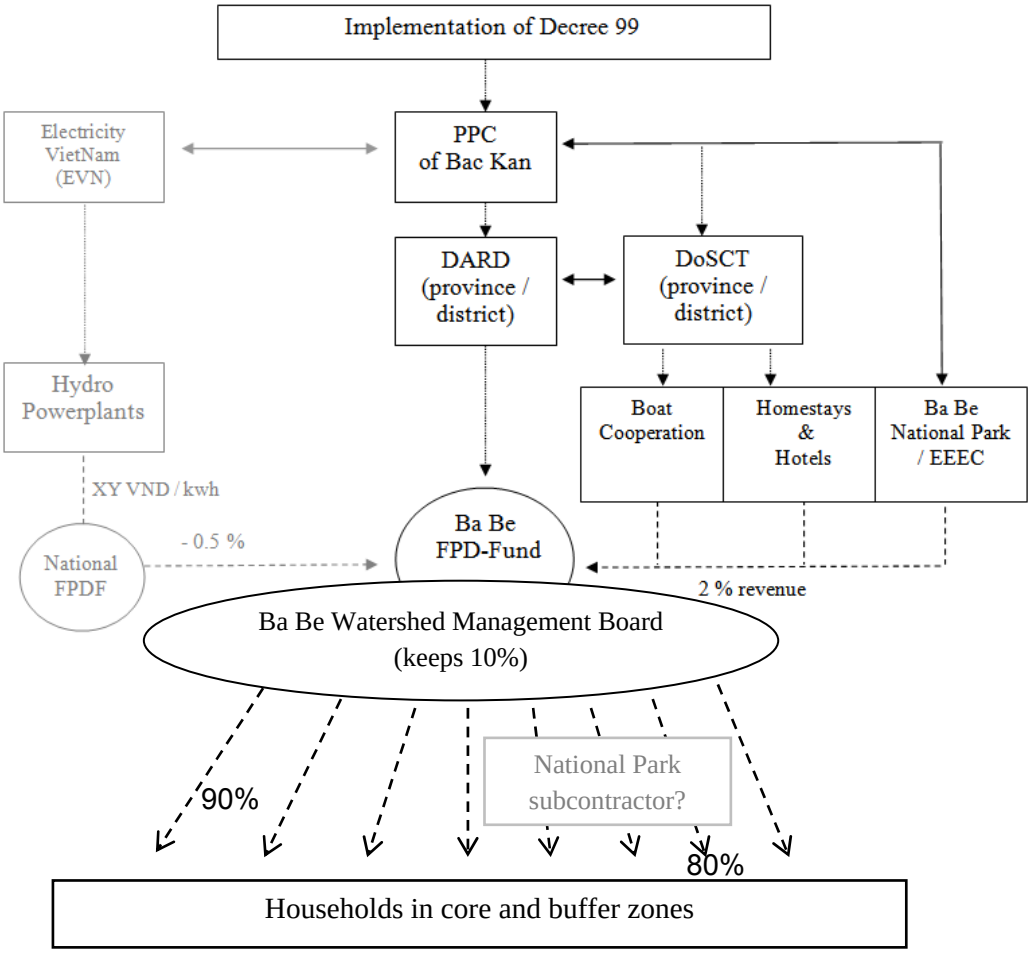

Figure 10: Proposed PES framework for Ba Be district
Note: The continuous lines denote an information flow and the broken lines denote a money flow

Unlike than the scheme in Lam Dong province (Appendix 1.1), this framework places the Department of Sports, Culture and Tourism (DoSCT) as an equally important institution next to DARD. This is necessary because the tourism-related beneficiaries in Ba Be are a highly heterogeneous group, wherein certain actors, that is, homestay owners, are likely to need differentiated and close support. This would clearly be the task of DoSCT, which already has a certain level of familiarity and trust amongst the villagers in Pac Ngoi and Bo Lu villages (the tourism villages of Ba Be district).

In order to apply the watershed management approach (Table 16), we recommend the creation of a Ba Be Watershed Management Board. The members of the board can be representatives of various groups:

- Upstream farmers
- Downstream homestay and boat owners
- Boat cooperative
- Head of Nam Mau and Quang Khe communes
- Village leaders
- Head of Women's Union
- Head of Farmers' Association

- Ba Be National Park Forest Protection Department
- Ba Be National Park Ecotourism and Environmental Education Centre

In creating such a body as the Ba Be Watershed Management Board, the facilitator's efforts should especially focus on making sure that it provides a platform for environmental services' providers as well as beneficiaries to interact and express their concerns during contract design as well as the follow-up phases. This is particularly relevant in Ba Be owing to the complex poverty-environment dynamics and tensioned relationships between upstream and downstream residents.

Being the central PES steering body, Decree 99 allows such board to keep a maximum of 10% of the PES payments for its management costs. Since its operational tasks involve contract establishment, monitoring of compliance and mediation in case of conflict between providers and beneficiaries, the most important guiding principle should be to guarantee full transparency at all time: concerning mode of operation as well as the use of the budget. To achieve this should be one of the main tasks of the facilitators in the initial phase. Once all actors have understood the functioning of the scheme, are aware of their rights and responsibilities and, importantly, have been given a platform to voice their concerns (through the board), then a mechanism of reciprocal surveillance can take over.

The distribution of PES funds to providers should be done in the most direct way possible, which in this case is via the water management board instructing the Social Policy Bank of the actual transaction so that 90% of the payments go directly to the individual contracted households. Where the National Park is the official landowner, a direct transfer might not be possible. In this case, as mentioned before, the Park acts as a secondary intermediary that subcontracts the individual households. Decree 99 allows the Park to keep a maximum of 10% for management costs. This, on one hand, means that a smaller amount is transferred to households but, on the other, it also means that the Park has an additional source of income for other administrative costs and conservation activities.

3.2 Proposed uses of PES payments at the implementation level (commune and village)

Studies at the three pilot villages representative of the three project districts found that poverty and food insecurity related to infertile or lack of suitable land and, in some cases, either unclear land tenure or customary agricultural practices may push farmers into unsustainable land uses, including deforestation. Developing alternatives to such practices would require a comprehensive constriction of the main drivers. Towards this, a benefit distribution system for PES in the studied site should focus on securing forest land tenure for local farmers as a reward for forest conservation and development. At the same time, it should aim at encouraging agroforestry or other alternatives together with the development of markets so as to overcome the limitations of current extensive agricultural systems that require larger areas of land. Possible incentives are shown in Table 17 below.

Table 17. Potential incentives for PES in Leo Keo village, Quang Khe commune, Ba Be district

Monetary
▪ Compensation for the income obtained from growing maize on forest land ▪ Compensation from the income obtained from growing soy bean on forest land ▪ Payment for the labour force for forest protection ▪ Micro-credit schemes for improved agriculture ▪ Micro-credit schemes for forest plantations
Non-monetary
▪ Provide seedlings and training and collaborate in development plans for various trees such as persimmon, Chukrasia tabularis A. Juss (lat), tea and Mangletia Conifera (mo) ▪ Promote and support mo plantations in order to generate fuel wood and timber for house construction ▪ Support and promote alternative sources of fuel wood and timber ▪ Improved cook stoves to use during hot periods combined with traditional cook stoves for cold periods ▪ Promote cassava on degraded land or intercropped for pig fodder, food security or cash ▪ Improve irrigation systems ▪ Promote alternatives for fodder for buffalo: rice straw, cassava, vegetable, banana trunks ▪ Provide fertilisers

A simplified pathway for a benefit-distribution system to encourage shifting from current, unsustainable practice to carbon-rich land uses is shown in Figure 11.

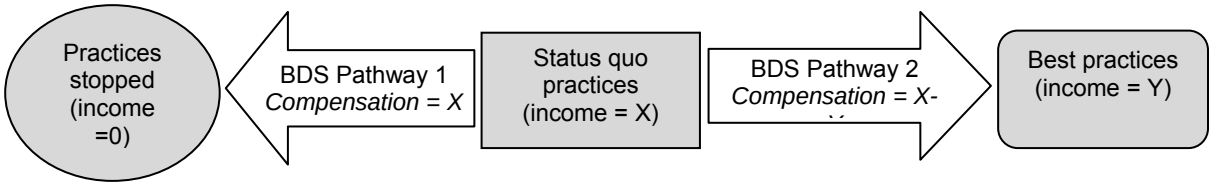

Figure 11. Options for a benefit-distribution system (BDS)

Since the income from carbon-rich land uses (Y) may be less than that of status-quo practices (X), especially in the initial years, any benefit-distribution system must at least compensate for the gap between X and Y. The participatory rural and rapid rural appraisal survey results show that 1 ha of maize monocropping on forest land (status-quo practice) generates a gross income (in this case, X) of about USD 750/ha/year, USD 500/ha/year and USD 700/ha/year for Leo Keo, Khuoi Tuan and Na Muc villages, respectively, while the Government's payment for forest plantations through the 661 program is about USD 300/ha over three years (in this case, Y). Since the payment offered for forest plantations is much lower than what people earn from maize monocropping on the same land, the program has not been successful in changing land use in the area.

On the other hand, the idea of carbon-rich land uses, such as promoting community forestry or establishing agroforestry, has been only recently introduced to the community. Although there is an expectation that these practices will generate relatively higher income for local farmers compared to current environmental services' and conservation payments, there are no reliable estimates of how much income can actually be earned from them. Moreover, there are significant risks and uncertainties. For instance, in Na Ri district, local people will have to wait for at least 7-8 years before they receive any income from community forests, while in Pac Nam, stylo grass that was planted on hills was destroyed by cold weather before it could be harvested. Even within a district, there can be significant differences across returns from the same practice. For example, in Dia Linh commune of Ba Be district,

Phyllostachys edulis agroforestry brought in about USD 120-150/ha/year over eight years, while in Leo Keo (Ba Be district), the bamboo forest was not growing well at all. Another crucial point to consider for an effective payment system is that a new practice may fail if local farmers are not equipped with adequate knowledge and techniques, especially when it requires longer time than current crops. In this case, even when Y is greater than X, a 'participation incentive' is still needed for farmers to cover their upfront risk.

More detailed investigation is designed to estimate both the potential income from the carbon-rich land uses as well as the losses that farmers might suffer owing to environmental risks or non-familiarity with the new practices. Generally, bundling payments for environmental services with income from products of a land-use system will help to raise the compensation level and reduce the risk of failure of any benefit-distribution system. Details on proposal for PES mechanisms at the piloting villages are presented in Chapter 4.

Given that Decree 99 is still in its pilot phase, payments might be delayed. In order to pilot the proposed PES mechanism, it was agreed in consultation with local authorities and the 3PAD project that the benefit-distribution system should make use of local, existing, funding structures. According to the result of our investigation in the pilot villages, several community funds have been, or are currently, operating (Table 18). All of them could potentially be involved in the PES scheme.

Table 18. Potential approaches to unsustainable land uses in the study sites

Alternatives	Ba Be	Pac Nam	Na Ri	
	Leo Keo	Khuoi Tuon	To Dooc	Na Muc
Community Development Fund at the commune level (3PAD)	x	x	X	x
Forest Fund funded by Australia development project named CARD			X	X
Microcredit by Finland Project[17]	x			
Microcredit by the Social Policy Bank	x	x	X	X

[17] Forestry sector cooperation program in Ba Be district

Chapter 4: Proposal for a 'Payment for Forest Environmental Services' (PFES) mechanism to be piloted in the 3PAD project's districts of Pac Nam, Ba Be and Na Ri

Dam Viet Bac, Nguyen Van Tri Tin, Do Trong Hoan, Nguyen Duc Cuong, Sweta Pokharel, Hoang Minh Ha

The development of a PES mechanism in the 3PAD project's districts

Developing a PES mechanism at community level has been carried out in Ba Be and Na Ri districts by ICRAF and 3PAD over four months, from June to October 2011. In Pac Nam district, ICRAF did not develop an AR CDM mechanism as planned owing to the fact that the AR CDM, according to the Kyoto Protocol, will end in 2012. We agreed with the 3PAD project leaders that the proposed PES mechanism developed for Ba Be and Na Ri was also suitable for testing in Pac Nam district because this district has the same environmental services, including water and carbon sequestration. In addition, consistent with the plan of the 19 TV contract, the research results are presented in this chapter on the potential CDM energy project associated with reduction of deforestation (REDD+) for communes in the north of Pac Nam, through minimising use of firewood, providing efficient wood-burning stoves and establishing a community firewood forest.

The PES mechanism development was conducted in four villages that are representative of the three project districts. The socio-economic conditions of the study villages are shown in Table 19.

Table 19. Socio-economic conditions of the studied villages

Parameter	Leo Keo (Quang Khe, Ba Be)	Khuoi Tuon (Nghiem Loan, Pac Nam)	Na Muc (Van Minh, Na Ri)	To Dooc (Lang San, Na Ri)
Foundation of the village	1963	1945	1951	1977
Number of households in 2010	45	36	23	29
Main ethnicity in the village	Tay	Red Dzao	Tay	Nung
Presence of the ethnic group at the commune level (%)	75	46	85	33
Village poverty rate, including two poorest groups (%)a	78	59	26a	66
Commune poverty (poor households/total) (%)b	39	54	58	28
Electricity (year of instalment)	2005	Not installed	2003	2001
Average income of richest group in village (VND/person/month)	> 520 000	No cash, subsistence agriculture	> 300 000	No cash, subsistence agriculture
Average income of poorest group in village (VND/person/month)	< 400 000	No cash, subsistence agriculture	< 200 000	No cash, subsistence agriculture
Lack of food (months/year)	1-2	0-4	0	2-5
Farm size per household of richest group: rice and maize (m2)	> 700	2500 and 6000 - 8300	500	3000 and 5000
Farm size per household of poorest group: rice and maize (m2)	< 500	1000 and 1600 - 3300	500	2000 and 3000

Forest land allocation	All allocated under the National Park	No allocation, but cadastral survey was conducted in 2007	All allocated, including one Red Book for community forest	Partly allocated, including one Red Book for community forest and 3 ha production forest

a According to a survey carried out by the 30A program from the Department of Labour, Invalids and Social Affairs of Bac Kan province in 2010
b The number was not obtained by the ICRAF survey but is the Government's official figure
Source: ICRAF rural appraisal survey 2011

4.1 Development of a mechanism for bundling environmental services payments in Leo Keo village, Ba Be district, Bac Kan province

The PES potential of Ba Be district includes 1) the water supply to Na Hang and Ta Leng hydropower plants; 2) eco-tourism businesses (by state-owned and private small-scale enterprises) surrounding Ba Be Lake, such as Ba Be National Park and homestays in Pac Ngoi and Bo Lu villages; and 3) REDD+ payment for carbon-stock sequestration through improved forest protection and management. Furthermore, there is a loan of VND 30 million per pilot model (minimum of 10 ha) of community forest development available from the Community Development Fund under the 3PAD project.

A model for piloting payment for environmental services in the area will be developed, aiming at 1) maintaining forest environmental services (water supply, landscape beauty and carbon sequestration) in Nang and Ta Leng river basins, through PES; and 2) enhancing forest protection and management and aboveground carbon-stock absorption and storage, that is, REDD+. The proposed mechanism for bundling PES for water supply, carbon sequestration and landscape beauty services in Leo Keo village, Quang Khe Commune, Ba Be district, was developed using a participatory method (Dam et al., 2011). This is a pilot model that can be expanded at district level. The model is in the form of a procedure, including the following sections

- Organizational structure and roles of relevant stakeholders for implementing the pilot model
- Procedures and methods for planning the pilot model
- Operational plan
- Benefit distribution and village forest environmental services fund management.
- PES contract and its monitoring, report and verification

4.1.1 PES pilot model

The proposed pilot model consists of special-use forest with a poor forest status (2b). It is located in block number 83 including 16 plots with a total area of 100 ha. The standing volume is less than 10m3/ha with an estimated standing carbon of 1.84 tC/ha. The forest is owned by Ba Be National Park. Through the PES pilot model the forest is expected to be upgraded to rich forest status (3B) within 77 years to reach a carbon stock of 57.5 tC/ha, with an average annual forest growth of 2.11 m3/ha/year equal to a carbon sequestration rate of 0.49 tC/ha/year. The estimated economic effectiveness of the model, from a bundle of environmental services (carbon, water and landscape beauty), accounted for VND 1 million ha/year, or one-tenth of the annual income of a poor household.

4.1.2 Scenarios for forest protection and management enhancement and carbon stock absorption and storage within PES and REDD+

An inter-ministerial circular 58/2008/TTLT-BNN-BKH-BTC on guiding the implementation of decision 661/QD-TTg of the Prime Minister, dated 29 July 1998, specified silvicutural techniques to be applied in special-use forest zoning. They can be applied in areas of functional blocks, such as strict protection areas, ecological rehabilitation zones, administrative and service areas. The techniques include 1) protecting non-forested land to allow natural regeneration; or 2) combining natural regeneration and additional forest plantation. The second option will be allowed after successful pilot studies and the approval by the Science Council. According to a representative from Ba Be National Park the pilot site must be kept under natural succession process by forest protection activities only and forest plantation and silvicultural techniques are not suitable in this case. This was because of the characteristics of current forest status in the model.

Assuming that illegal logging activities are not prevented and forest degradation continues at the current rate (3-7 cases per year, equal to 7-14m3/ha/year and loss of 1.6-3.2 tC/ha/year), the pilot model will reduce in both area and carbon sequestration capacity. The scenario for voluntary carbon credits will therefore instead be payment for avoided forest degradation (Figure 12).

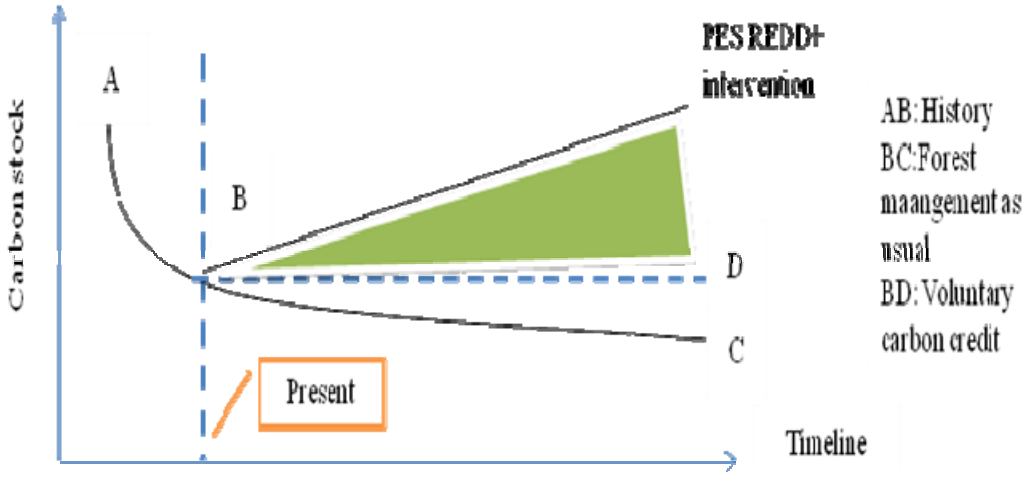

Figure 12. Scenarios for PES and REDD+ interventions at the pilot site

Forest volume and natural growth of the pilot model

According to circular 34 of MARD on forest classification, dated 2009, forest statuses as defined by standing volumes are as follows: 1) very rich forest (over 300 m3/ha); 2) rich forest (201-300 m3/ha); 3) medium forest (101-200 m3/ha); and 4) poor forest (10-100 m3/ha). A study on annual forest volume growth rate (m3/ha/year) by the Forest Investment and Planning Institute in 2000 indicated that the natural growth rate of forests ranged from 2.11 m3/ha/year for forest status 2A and 2B up to 5.83 m3/ha/year for rich forest, equal to 0.49 and 1.34 tC/ha/year. On the basis of these studies, we developed scenarios for the pilot area (Table 20).

Table 20. Scenarios for carbon absorption, storage and estimated PES and REDD+ payments

Forest trend scenarios	Estimated average standing volume (m3/ha)a	Annual forest growth (m3/ha)b	tC/ha/ year	tCO2e/ ha/year	Amount VND/ha/year, (USD 5/tCO2 e)c
Rich forest	250	5.83	1.34	4.92	492 110
Medium forest	150	4.24	0.98	3.58	357 898
Poor forest	100	3.31	0.76	2.79	279 397
Very poor forest	50	2.67	0.61	2.25	225 374
Forest restoration status (2B) & (2A), 100 ha	< 10	2.11	0.49	1.78	178 105

a According to circular 34 from MARD on forest classification
b According to the results of a study by the Forest Investment and Planning Institute, 2000
c Voluntary carbon market price is USD 5/tCO2e

Based on the annual volume growth of natural forest, the minimum time required for forest to advance from status 2A or 2B (< 10 m^3/ha standing volume) to rich forest (250 m^3/ha) and then to very rich forest (350 m^3/ha) is 77 years and 99 years, respectively. The detailed evolution process is assumed as 20 years to advance from restored forest (2A, 2B) to very poor forest; 19 years from very poor to poor forest; 15 years from poor to medium forest; and 24 years from medium to rich forest.

4.1.3 Payment levels for the PES models

For water and landscape beauty environmental services: the payment levels depending on forest type (here called as K2) and forest origin (here called as K3) were applied, following the fifth draft circular on guidelines for the implementation of Decree 99. However, forest status (here called as K1) and the difficult level of forest management (here called as K4) were not used for estimating PES payments because those statistics were missing. The annual payments for water were estimated to vary in the range VND 83-176 000 per hectare and for landscape beauty at VND 1700 ha/year.

For carbon stock sequestration: the payment level was calculated using the annual natural growth rate of forest (m3/ha) according to natural forest status trends (according to report of Forest Inventory and Planning Institute in 2000 and Circular 34) and was estimated to be in the range VND 178-225 000 ha/year.

Table 21. Payment levels for the pilot PES model

Forest environmental services	Payment level/ha/year (VND)	Payment sources	Targeted ecosystem types
Regulation and provision of hydrological functions and soil conservation	176.236 (K= 1)	Na Hang hydropower plant	Special-use forest
Landscape beauty	1.700 (K= 1)	Tourism businesses of organizations, individuals (National Park, Pac Ngoi and Bo Lu villages)	Special-use forest
Carbon absorption and storage	178-225 000	Voluntary market	Special-use forest

Source: Calculation data 2010-2011, ICRAF Vietnam

4.1.4 Financial flows for the pilot model

The survey indicated that 73% of respondents agreed that PES money should go straight from the provincial FPDF to owners and managers of forests. Then, the owners and forest managers would pay the community through the PES contracts. On the other hand, 31% of respondents said that money from a PES fund should be paid directly to the commune people's committee, then to the community. If the provincial FDPF has the ability to implement direct payments, the PES money could be paid directly from it to communities,

households and individuals, who have land-use certifications ('Green' or 'Red' books), through PES contracts. This would be in agreement with Decree 99.

In order to test the proposed model, the 3PAD project plans to provide a budget to the forest owner: Ba Be National Park. The Park will then establish contracts with residents of Leo Keo village.

4.1.5 Framework for implementation of the PES pilot model

Figure 13 below illustrates the different roles of stakeholders in the implementation of the proposed model. The specific roles are also provided in more detail in Table 22.

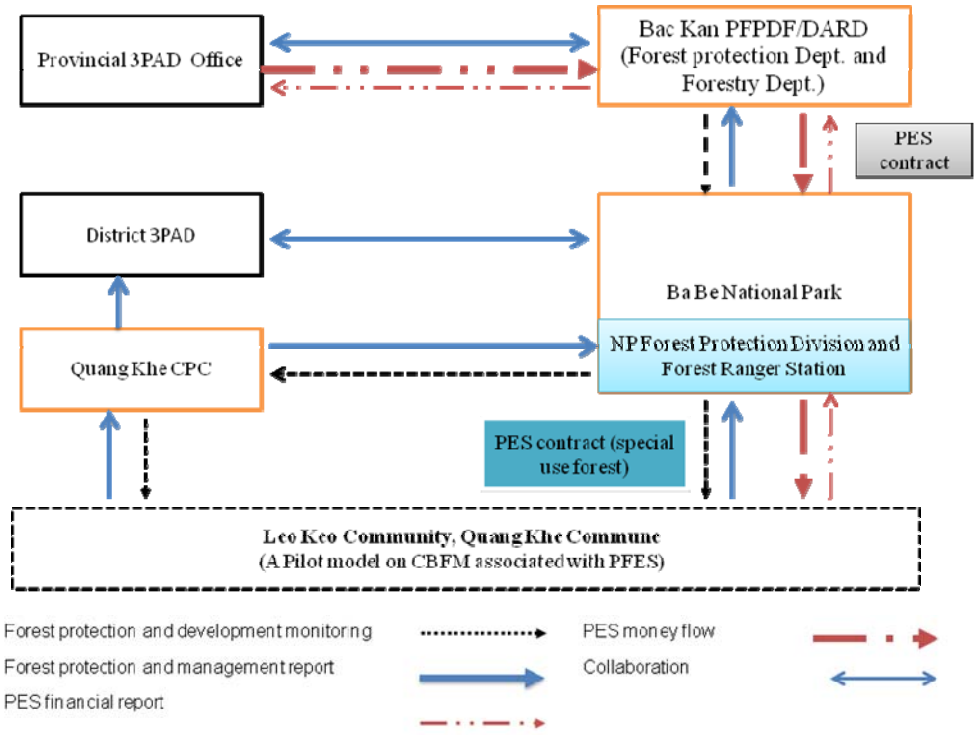

Figure 13. Roles and relationships of stakeholders in the proposed PES model

Table 22. Detailed description of the roles of stakeholders in the proposed PES model

Who/institutions	Role in planning, operation, monitoring, reporting, fund management and contracting
Forest protection group	• Plan community-based forest management in connection with the PES scheme • Review and develop the village's forest protection regulations and conventions and organise the forest protection groups • Establish people's groups involved with forest protection (if necessary) • Organise forest inspections and benefit-sharing systems among the households participating in the pilot model • Handle cases violating village regulations • Coordinate with Quang Khe forest ranger station to handle violations • Report to the forest ranger station after regular forest inspections and provide ad-hoc reports after incidents • Report to 3PAD and the National Park on inputs, expenditures and balances of PES money; keep account records and monitor and manage PES funds • Represent the community in PES contracts with the National Park
Households	• Participate in creating community-based forest management plans, forest inspections and carbon monitoring • Make forest-protection agreement with Ba Be National Park • Report and provide information to the forest protection group and the local forest ranger station when illegal logging or regulation violations occur

Quang Khe Communal People Committee (CPC)	• Supervising the CPC Forest Protection and Management Board • Establishing a coordination mechanism on forest protection with the National Park • Reporting to the District People Committee (DPC) on forest protection and management activities for areas located outside the National Park. • Act as a party in a PES contract between the National Park and Leo Keo community
CPC's forestry board	• Participate in developing the village forest protection and management plan • Provide an advisory role for community-based forest management planning • Participate in forest inspections together with the community • Report to CPC on forest protection and management activities
Commune policeman	• Participate in developing the community-based forest management plan, forest inspections and handling minor illegal logging cases
3PAD commune management board	• Support the community in developing the community-based forest management plan associated with PES • Support community members who want to take loans for developing agricultural production models outside the forest area (following the Community Development Fund process) • Facilitate the pilot model implementation process
Ba Be National Park	• Authorise the community-based forest management plan • Support monitoring the model by the science and technology, and forest protection, divisions of the Park • Negotiate the K factors with the service providers (Leo Keo community) • Take action according to law if anyone violates the contract payment terms • Report to forest protection and forestry development departments on forest protection activities and the PES model • Report annually the financial statements of PES to Bac Kan provincial forest protection department and provincial FPDF • Establish PES contract with the provincial FPDF • Establish PES contract with the service providers (Leo Keo community)
Division of Science and Technology, Ba Be National Park	• Support the community to develop a community-based forest management plan associated with PES • Support implementation, benefit sharing and carbon-baseline survey • Monitor implementation of the community-based management plan regularly (every six months or annually) according to the contract. • Organize regular carbon measurements • Report to Ba Be National Park on PES activity
Division of Forest Protection, Ba Be National Park	• Develop monthly forest protection and management plans • Support the Quang Khe forest ranger station in forest protection and development • Monitor forest protection and management activities regularly or ad hoc, if necessary • Handle illegal logging or forest law violations under its authority and jurisdiction • Report directly to the Park director regarding forest protection and management
Quang Khe forest ranger station of Ba Be National Park	• Collaborate with the Division of Science and Technology for concrete guidance about the community-based management plan for PES • Participate in regular forest monitoring and handle violations under the station's jurisdiction • Submit weekly and incidental reports on forest protection and management to Ba Be National Park's forest protection division
Bac Kan forest protection and development fund	• Coordinate with Bac Kan DARD to provide advice to the provincial people's committee on policy development for the planning and implementation of the community-based forest management plan for PES • Establish a contract with Ba Be National Park on piloting the model PES • Monitor and evaluate the PES pilot
Bac Kan DARD	• Act as an advising institution for Bac Kan provincial people's committee in policy development for planning and implementing a community-based forest management plan when expanding and replicating the model • Allocate the detailed PES plan to the national park • Access, verify and authorise the contract's results from the pilot PES implementation • Adjust the K factor • Establish a contract on a pilot PES model with the forest owner (Ba Be National Park)
3PAD	• Collaborate with Bac Kan DARD and provincial FPDF in implementation, monitoring and evaluating the pilot PES model

4.1.6 Pilot PES model planning

The participatory approach for planning community-based forest management in connection with PES is described in Table 23 below.

Table 23. Process and methodology of planning community-based forest management for PES

Activities	Method	By whom	How/supports
Defining the environmental services, providers and beneficiaries, activities to maintain the services	Participatory landscape analysis (PaLa)	District 3PAD office Commune 3PAD project management board National Park	Training on PaLa including practice
Identifying the pilot model, conditionality, payment approaches through negotiation process	Negotiation with forest owner, service providers and intermediaries	District 3PAD office	Training/facilitating the negotiation process
Conducting forest inventory and identifying the purposes of each plot management	Rapid carbon appraisal (RaCSA)	National Park Leo Keo village District 3PAD office	Training in RaCSA and participatory carbon monitoring including practice
Developing community-based forest management plan associated with PES	Participatory planning	District 3PAD office Commune project management board National Park	Training in community-based forest management associated with PES Facilitating community-based forest management plan development
Reviewing and developing village forest regulations and village forest protection board	Participatory planning	District 3PAD office Commune project management board National Park	Facilitate the process and methodology

4.1.7 Benefit sharing and village's PES fund management

One hundred percent of the respondents agreed that PES money should be paid to the community. The PES fund should be divided into two parts: 1) investment in the community's production activities or infrastructure when necessary (70% of respondents agreed); and 2) covering costs of monitoring, evaluation and dissemination of information (30% of respondents agreed). Furthermore, 78% of respondents agreed that payment should be in the form of technical support like seed, seedlings, animals, fertilizer and improved cooking stoves and 54% thought that the payment should be used for public construction work such as a village meeting hall and ditches. The final decision on the payment form should depend on the practical needs of the community each year. The community will decide it. However, the core rule is that environmental service payments will not be in cash. 70-7% of respondents agreed that PES fund should be managed by a village forest management and protection board rather than kept in a bank account. The fund management board must have at least three people (head, deputy head and treasurer). In order to have transparent management of the village PES fund, the fund management board should use an open cash book approach.

4.1.8 PES contract

Ninety percent of respondents said that there were two types of PES contracts. The first type was the contract between the Provincial Forest Protection and Development Fund and the State forest owner (Ba Be National Park). The second type was the contract between the forest owner (the Park) and Leo Keo community. In addition, 72-84% of respondents agreed that the PES contract structure should consist of five basic parts.

1. The legal basis: Laws, decrees, decisions from central and provincial levels.
2. The parties: Party A: Vice-director of Ba Be National Park, Accountant, Forest Protection Division, Forest Ranger Station, Communal People Committee; party B:

Village head or representative of village forest protection group having identity card and local residential registration book; and party C: representative of local government, the commune people's committee.

3. The contents: The contract value is to be in Vietnamese dong. Contract duration: 5 years. The output criteria of the contract will include forest protection and management and forest environmental services of water supply, landscape beauty conservation and carbon sequestration.
    a. Criteria: Forest protection and management. Indicators: no mining, deforestation or illegal logging; no grazing on the contracted area for forest protection; no hunting of animals in the forest; quickly stop forest fires and inform relevant institutions.
    b. Criteria: Carbon-stock enhancement. Indicators: Total of biomass or annual forest growth (m^3/ha/year); carbon-stock enhancement (tCO_2/ha/year).
    c. Criteria: Water regulation (water quantity). Indicators: Leng River basin water level during dry season
    d. Criteria: Landscape beauty (income from tourism businesses in Ba Be National Park and surrounding tourism villages). Indicators: Number of tickets sold every year and income after tax revenue.
4. Terms/articles of party A and party B: rights and duties or the conditionality. General provisions: breach of contract and sanctioned contract between party A and party B; and how to sanction at the community through village regulation (Dam et al. 2011).

4.1.9 Monitoring, reporting and verification

Monitoring is systematic data collection based on indicator. It provides information on the progress towards the goals of project and the uses of allocated funds. Careful monitoring will ensure that the community-based forest management plan is being correctly implemented, inputs are provided properly, the resources are used, reasonable adjustments are made, problems are identified and appropriate solutions proposed.

The majority of the respondents (87%) answered that monitoring criteria and indicators must be traceable, readily available, easy to collect and available at low cost. The monitoring criteria and indicators should encompass forest protection and management, carbon-stock enhancement and the management of the PES fund (Table 24).

Table 24. Stakeholders' views on criteria and indicators for monitoring forest protection and management, carbon-stock enhancement and PES fund management

Criteria/contents	Indicator	Approach	Periodicity	Participant	Percent consent (n=19)
Forest protection and management	As indicated in contract	Ad hoc or periodical inspections, meetings	Regular inspection 3 times per month	Village forest protection group (VFPG), commune forestry board, forest protection division and station of the National Park	90
Carbon-stock enhancement	Carbon stock (tCO2/ha)	Rapid Carbon Stock Appraisal	Every 2.5 years	Department of Science and Technology of the Park, VFPG or an independent auditor	81
PES fund management	Payments are according to the purpose of the benefit-sharing mechanism	Cash book and documents, invoices	Monthly, annually	Forest owner, commune people's committee, community	84

The consultations indicated that the pilot PES activities should have three types of reports (reporting mechanisms are presented in Table 25).

1. Monitoring of forest protection and management

2. Participatory carbon monitoring
3. PES financial

Table 25. Reporting schedule for monitoring activities proposed for Ba Be district

Content	Who will report	Institutions receives reports	When	Reporting mechanism	% consent (n=19)
Forest protection plan implementation	Village forest protection group	Forest ranger station Commune forestry board	Every inspection time Ad hoc cases	Written report or official meeting	90
	Forest ranger station	Forest protection division of Ba Be National Park	Meeting, unforeseen event, monthly, semi-annual, annually	Written report or official meeting	90
	Commune forestry board	Forest protection division of Ba Be National Park	Monthly	Written report	81
	Forest Protection Division of Ba Be NP	Ba Be National Park	Monthly, quarterly and bi-weekly	Meetings	90
	Forest Protection Division of Ba Be NP	Provincial forest protection department	Monthly, quarterly, semi-annually, annually	Written report or official meeting	81
	Ba Be NP	Provincial FPDF, District People Committee, District 3PAD office	Annually	PES report including financial section	81

Verification is an activity to determine whether the provided information on environmental services criteria and indicators and PES fund management is correct. The stakeholders' preferred means of verification was secondary data, such as reports and survey results (90% of respondents). The second most preferred were surveys and direct measurement in the field (81%). Specifically, the stakeholders recommended that verifications of

- The forest protection and management monitoring should be done by cross-checking the reports from the village forest protection group, local forest ranger station, and forest protection division of Ba Be NP; and
- Carbon measurement should use existing reports on initial and subsequent carbon-stock calculations or measurements and/or direct measurement at sample plots.

Verification should occur after the reports by relevant institutions and every 2.5 years for aboveground carbon-stock measurement.

The verifying organizations are to be the provincial forest protection department for forest protection activities, conducted annually (81% of respondents agreed), and an independent institution or the science and technology division of Ba Be National Park for carbon monitoring (72% of respondents agreed).

4.1.10 Some recommendations for expanding to district level in Ba Be

The provincial and district stakeholder consultations recommended that the 3PAD project should support a pilot model as follows.

- Financial support for transaction costs
- Training of trainers in community-based forest management planning for PES
- Training in the RaCSA method for identifying baseline carbon-stock for the pilot model
- Training in developing a reporting and monitoring system for the pilot model

- Developing or revising two PES contracts
- Supporting local partners to implement the pilot model.

The pilot model will provide the basis for expansion when the province fully implements Decree 99. The approach to expanding the pilot model to district level was agreed upon at the district and provincial stockholders' consultation workshops and is detailed in Table 26 and Figure 14 below.

Table 26. Approaches for expansion of the PES pilot to district level

Pilot model	Expanding the model in Ba Be district
Forest type	
Special-use forest	Production and protection forest
Forest owner: Ba Be National Park	Forest managers: commune people's committees, Ba Be forest enterprises, households, individuals
▪ Contracted area for forest management and protection by the community or groups of households	▪ Contracted areas for communities, groups of households ▪ Protection and production forest plantation areas and un-contracted areas
Rights	
▪ Special-use forest: not allowed to log (Decree 117/2010/ND-CP)	▪ Protection and production forest: logging must adhere to Circular 35/2011 from MARD
PES approach	
▪ Community–based forest management associated with PES	▪ Community–based forest management associated with PES; common-interest groups for forest protection and development
▪ Community–based forest management plan associated with PES: no logging plan	▪ Community–based forest management plan associated with PES: detailed forest logging plan and use

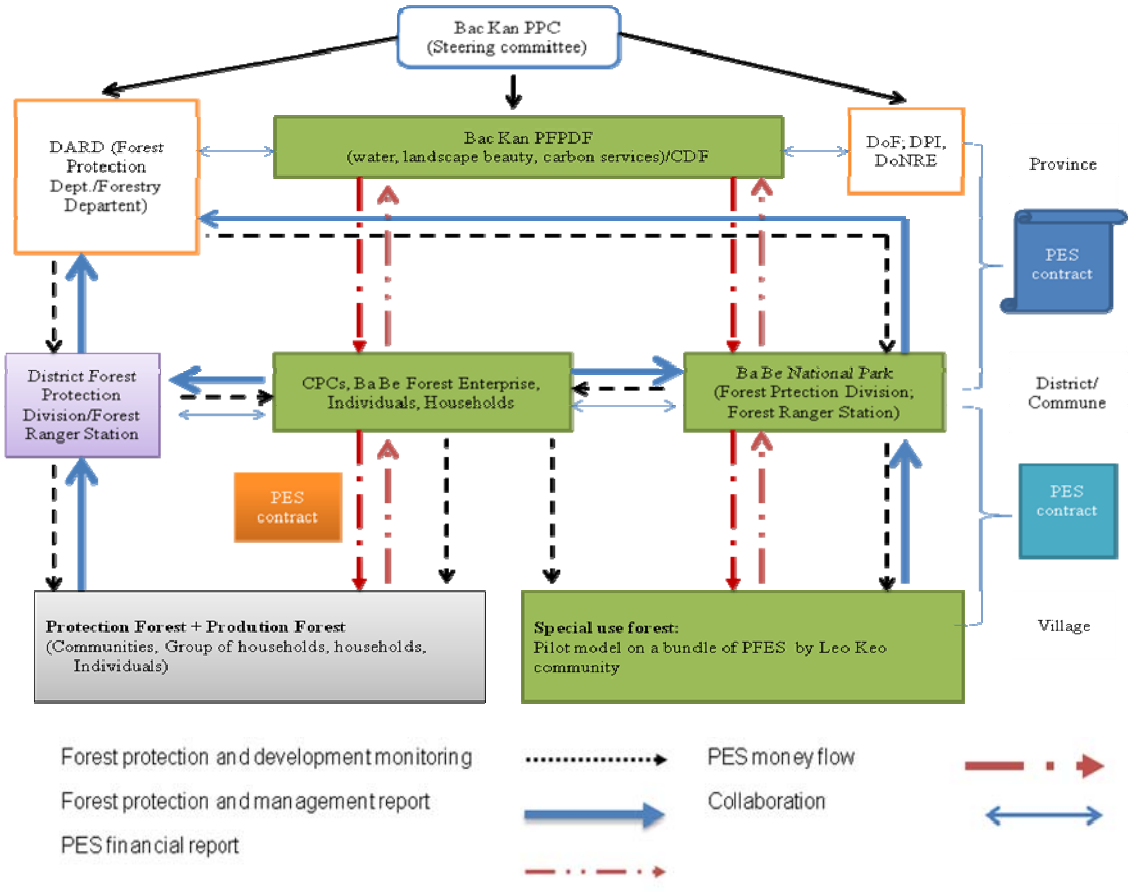

Figure 14. Organizational structure for expanding the PES model in Ba Be district

4.1.11 Pilot model criteria for PES and REDD+ payments

The stakeholder consultations recommended that the pilot model should follow certain criteria to ensure appropriateness to local contexts. The consensus levels among stakeholders on each point are presented below (n=19):

1) **Voluntary and equitable:** 81% of the stakeholders agreed that the pilot model on PES should result from negotiations between the forest owner and the service providers. The process will be considered equitable if the community is involved in making decisions. The negotiation process should support the mobilisation of the community and households participating in the model.
2) **Efficiency and effectiveness:** 72% of the stakeholders said that the payment amount per hectare was low. However, effectiveness can still be obtained if the payment is used for the right purposes, such as support for seed, seedlings, fertilizer, animals, improved cooking stoves or community work.
3) **Pro-poor:** Only 45% thought it was important that the payment for community purposes should reach poor people. Seventy-one percent of respondents worried that the reverse auction method might limit the participation of poor people in the PES model. Instead, it was recommended that negotiations should be the main method for reaching consensus (Table 23). Support from an intermediary before the negotiations began was important.
4) **Conditionality:** 63% said that the conditions could only be met when the contracts are supported by legislation, particularly, monitoring and appropriate punishments would be needed to identify and deal with non-compliance with contracts and village regulations. It was agreed between the Ba Be National Park (forest owner) and Leo Keo community (forest user) on the management and protection of the adjacent area (30.6 ha).
5) **Leakage:** leakage (an effect of pilot model activities) could be indicated by an increased rate of deforestation and forest degradation owing to human activity in areas outside the pilot model. Fifty-four percent agreed that activities in the pilot model must not reduce the ability of forests to sequester carbon.
6) **Additionality:** REDD credits will not pay for previously succesfully implemented activities, for example, a forest protection program. This means that additional activities will be needed that can be considered for carbon credits. Seventy-two percent of respondents agreed that forest protection and management activities must be enhanced by the community. This means that illegal logging must be stopped.
7) **Sustainability:** 90% agreed that PES must conform with the strategic objectives and the specific contexts of the province. Transaction costs need to be kept low and external funding sources will be required to support the pilot model's implementation.

4.2 PES mechanism proposed for To Dooc village, Lang San commune, Na Ri district

4.2.1 Introduction of the study site, To Dooc village community forest

The community forest of To Dooc village was allocated when 'Red book' (land-use certification) was issued in 2007. The community forest consists of about 45 ha of forest mixed with upland maize (5.13 ha) and open grazing land. The forest belongs to the 'poor production forest' category, where secondary forest has regenerated after shifting cultivation

(forest classifications 2A, 3A), shrubs mixed with regenerated woodland (1c) and grass land. The vegetation cover includes shrubs, upland maize, fruit trees, shifting cultivation with maize during the cropping period, plantation forests of acacia and anise species. During the 1960s, the area was occupied by primary forest. Since 1970, forest cover has been declining owing to shifting cultivation. From 2000 to the present, there has been less logging and people only collect timber for house repairs, livestock pens and firewood. At the moment, the community forest is managed by a management board of five people and forest protection teams with support from a communal forester and Kim Hy Nature Reserve. The village regulation, 'Huong uoc' on forest protection was developed in 2007 with support from a development project.

4.2.2 Estimation of PES payment according to senario of PES for carbon sequestration in To Dooc village forest community, Lang San commune, Na Ri district

Through consultations, the basis and criteria for development of a PES model for carbon sequestration at To Dooc village community forests should address the following points.

- The natural forest growth rate and the forest growth rate with human impact (such as forest enrichment, forest regeneration zoning, and strict forest protection)
- The model's activities should be designed to increase forest carbon stocks that local people prefer and that they are (physically and economically) able to carry out. For example, additional forest planting, strict forest protection, forest regeneration zoning and applying sustainable logging plans.
- Payment for carbon sequestration should follow the REDD+ mechanism (from central government to province), which includes payments for:
  - supporting effective forest regeneration and forest enrichment (including afforestation);
  - avoiding deforestation (including forest fire prevention); and
  - sustainable forest management and conservation.
- The price for carbon credits ranges USD 3-20 per tonne of CO_2e depending on the market. In the voluntary carbon market the price is USD 5/tCO_2e.

Scenario 1: Supporting forest regeneration and agroforestry for carbon-stock enhancement in To Dooc community forest

Table 27. Proposed scenarios for forest enrichment and enhanced forest carbon-stocks in To Dooc village community forest

Current status	Expected status after intervention	Measures/interventions
• Poor production forests after shifting cultivation; classified as 2A and 3A1 • Forest area: 45.13 ha • Carbon stock: 60.63 tC/ha equivalent to 131.8 m3/ha (Do 2011)	• Medium forests; classified as 3A2 and 3B) • Forest area: 45.13 ha • Carbon stock: 88.40 tC/ha equivalent to 192.2 m3/ha. (Do 2011) • Average growth rate: 2 m3/ha/year • Forest carbon business rotation: 30–50 years	Forest protection, forest zoning regeneration and forest enrichment: strict forest protection, additional planting of indigenous trees and sustainable logging plans
Upland maize (5.13 ha)	Agroforestry (5.13 ha) to improve livelihoods	• Maize mixed with Melia Azedarach (xoan) • Maize mixed with rattan (K38 rattan species)

Strict forest protection measures (by level of importance as indicated by 17 respondents):

1) Establishing a forest protection team and organizing patrols to prevent illegal extraction of timber and non-timber products as well as forest fires (92%);
2) Developing regulations for forest protection and disseminating these to all community forest members, villagers and neighboring villages (73%); and
3) Setting up information boards regarding illegal logging, hunting and forest fire prevention (such as posters, signs along forest borders (56%).

Forest enrichment activities for To Dooc village community forest were also proposed.

- Defining the boundaries of areas that need forest enrichment intervention
- Clearing climbers and shrubs to facilitate better tree growth
- Supplementary planting with indigenous tree species on bare land within the community forest
- Cutting down trees that have disease, slow growth and are non-target species or selected thinning in areas of high tree density
- Organizing forest protection patrols to prevent illegal logging and free grazing cattle, which harm tree seedlings

Cost norms for additional forest planting should be applied as per the 661 program: VND 3 million/ha for additional forest planting and VND 0.2-0.3 million/ha for forest protection activities. Supplementary planting should be implemented for the first 2-3 years of the PES model. After that, forest protection activities as well as other interventions like regeneration zoning and silvicultural activities should take place.

Benefit-sharing system and sustainable logging of community forests

The stakeholder consultations suggested that the benefit-sharing system for community forests be applied and implemented following Decree 178 on the rights and obligations of households/individuals allocated and contracted forest and forest land for benefit-sharing and suitable logging. The 'model of sustainable forest' by Dr Bao Huy was also proposed. According to this model, farmers can harvest when the forest timber reaches 120 m^3/ha. This means that if community forest is well protected, the community will earn not only environmental services' income but also income from the timber that is over the above-mentioned volume. Farmers can also benefit from non-timber forest products in accordance with village regulation, such as:

- the products are to be used for daily life within the community;
- outsiders are not allowed to harvest non-timber products from the community forests without permission and they must take them for sale; and
- the community forest management board is in charge of organizing harvesting and distribution of products among community members.

Besides this, planted enriched species, dead wood, and supplement species can also be used by community members.

Payment rate

The payment rate has been calculated according to the growth of carbon by natural regeneration. It was estimated about 0.8 tC/ha/year by both ICRAF and Forest Inventory and

Planning Institute (FIPI) in 2010. On that basis, the payment rate of PES for carbon sequestration has been estimated according to three scenarios of carbon increase, respectively: VND 75 000/ha/year; VND 150 000/ha/year and VND 300 000/ha/year (Table 28).

Table 28. Increased carbon-stock scenarios and payment amounts under a REDD+ mechanism

Scenarios	Total increased carbon stock (tC/ha/year)	Actual increased carbon stock paid by REDD+ (tC/ha/year)	Payment amount by REDD+ (VND/ha/year)
Scenario 1	1.0	0.2	VND 75 000
Scenario 2	1.2	0.4	VND 150 000
Scenario 3	1.6	0.8	VND 300 000

a Actual increased carbon stock = total increased carbon stock - carbon stock increased by natural regeneration

4.2.3 Implementation process of PES for carbon sequestration

The organizational structure for implementing PES for community forest carbon is illustrated in Figure 15 and the roles of the stakeholders are presented in Table 29.

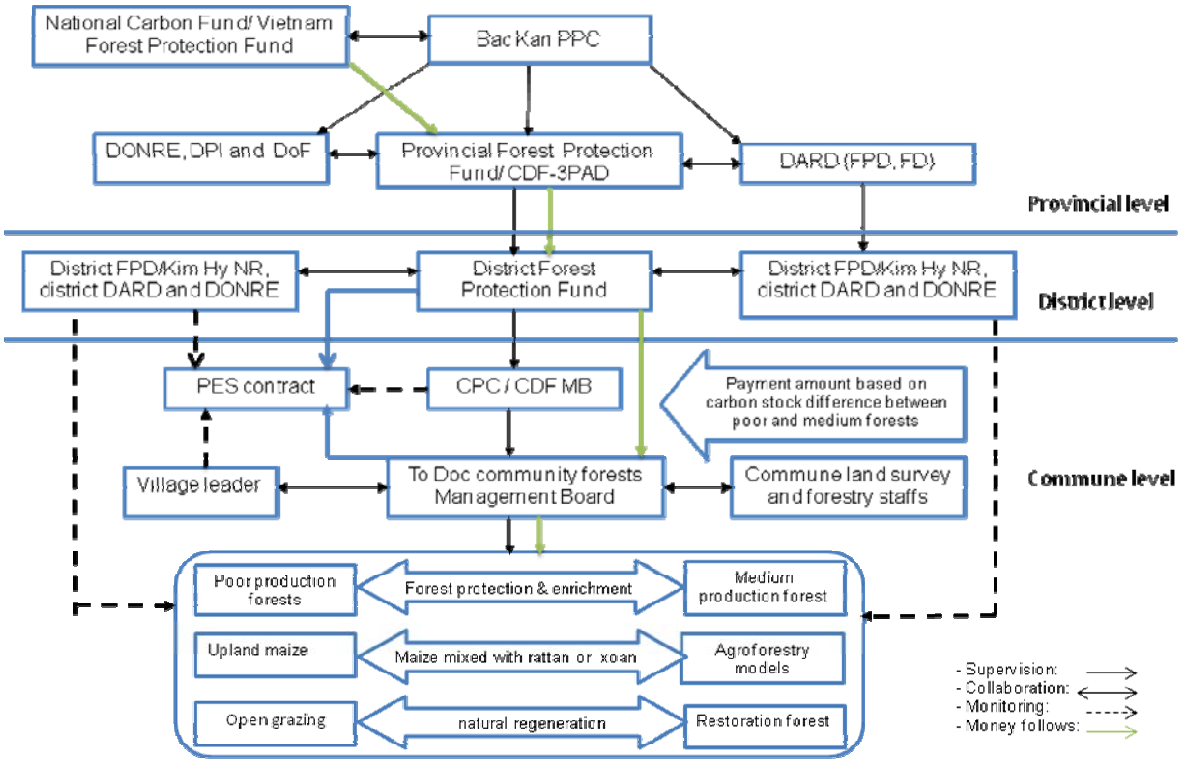

Figure 15. Organizational structure for implementing PES for carbon sequestration in To Dooc village

Table 29. Institutions and their roles in PES for carbon sequestration in To Dooc community forest

No.	Involved agencies	Role/responsibility
Provincial level		
1	People's committee	Establishing and directing provincial agencies in implementing PES as defined by the Government (Decree 99)
2	Forest Protection and Development Fund	• Receiving and managing the PES carbon funds from the national carbon fund and other grants • Implementing and guiding procedures for PES for carbon to forest owners in the province • In collaboration with relevant agencies, determine the payment rate for the different types of forests • Increase awareness of PES for carbon • Identifying environmental services' beneficiaries and providers
3	DARD	Advising the provincial people's committee on directing and coordinating relevant agencies (FPD, Forestry) involved in implementing PES for carbon
4	Forest Division	Directing the district forest division's collaboration with actors involved in monitoring community forest protection and enrichment activities
5	Forestry Department	Directing and coordinating agencies involved in forest inventory and carbon-stock measurement in order to determine the payment amounts for forest owners
5	DONRE	• Advising the provincial people's committee on directing and coordinating with the Forest development Fund of DARD (Forestry Department) • Determining land use ownership/forest owners in PES for carbon
6	Department of Finance	Advising the provincial people's committee and coordinating provincial agencies (DONRE, DARD) that are supervising PES funds
District level		
1	Forest Protection and Development Fund (FPDF)	Allocating payments to forest owners according to the guidelines of the provincial FPDF Directing the commune working group on developing work plans with forest owners in each commune for submission to the provincial FPDF for authorisation Developing plans for transaction costs at the district and commune levels for submission to the provincial FPDF for authorisation Establishing a contract between forest owners and district FPDF on PES for carbon including monitoring and evaluation
2	FPD/Kim Hy Natural Reserve	• Collaborating with relevant agencies to monitor and supervise forest protection and forest enrichment activities • Supporting the development of work plans for forest protection, forest monitoring and inventory for forest owners and community forests
3	DONRE	• Determining and/or verifying the ownership of land and forests and solving land disputes • Supporting the development of village-level forest land-use plans
4	DARD	• Advising provincial forestry department on authorisation of logging licenses for forest owners • Providing technical support communities for developing models associated with increasing forest carbon-stock and improved livelihoods
Commune level		
1	People's committee (chairman and land survey, forestry staff)	• Directing, disseminating and promoting the implementation of PES for carbon at the commune level • Coordinating commune officers to collaborate in the monitoring, supervision and support of forest enrichment models
2	Community Development Fund management board	• Collaborating with relevant agencies to supervise, monitor and approve the forest protection and forest enrichment/regeneration plans of the forest owners • Advising the commune people's committee in reporting the progress and results of PES for carbon performance of forest owners
Village level		
1	Village leader	• Directly supervising and monitoring the implementation of activities related to PES for carbon • Reporting the results of PES for carbon performance to district FPDF and the commune people's committee • Supporting relevant agencies in monitoring, evaluating and carrying out forest inventories • Developing village regulations for forest protection and management

2	Community forest management board	• Developing work plan related to forest protection and forest enrichment and other enhanced carbon-stock models • Developing regulations related to forest protection and management, benefit-sharing systems • Directly participating in implementing, monitoring and reporting the results of activities related to forest protection, forest enrichment and other enhanced carbon-stock models
3	Members of community forest/villagers	• Participating in activities for forest protection, forest enrichment and enhanced carbon stock models according to the community forest management board's work plan • Participating in group meetings and training courses as requested by community forest management board or village leader

4.2.4 Payment methods and cash flow

Local stakeholders recommended that PES payments from Vietnam FPDF (or National Carbon Fund) should be transferred to the Bac Kan provincial FPDF. The provincial FPDF will be the trustee fund that has responsibility to allocate payments to forest owners/community forest through the district FPDF. The district FPDF will pay directly to forest owners on the basis of verification by commune authorities. In addition, it is necessary to establish a supervising board at the commune level to prepare relevant documents to obtain PES payments as well as other activities related to PES carbon contracting. The district FPDF will be an organization to authorise PES for carbon documents and applications submitted from the commune level before making payment to forest owners.

Eighty-two percent of correspondents proposed that the Community Forest Management Board should directly manage the fund of PES for carbon on behalf of the village. However, the PES regulation should be integrated with forest protection and management and be developed by the village or all members of the community forest.

The following uses of the PES fund are proposed by To Dooc village forest community.

- Management or transaction costs (meetings and information): 20%
- Forest protection patrol: 20%
- Forest enrichment, regeneration and other enhanced carbon-stock models: 40%
- Capacity building: 20%

4.2.5 Contract of PES for carbon sequestration

The contents of the contract for PES for carbon sequestration should have the following main sections.

- The legal basis of the contract should be laws, decrees, decisions related to organizing, managing, exploiting and using of forests.
- Obligations, rights and responsibilities, duration and payment frequencies should be stated clearly in the contract.
- The outputs of the contract should be clearly agreed, including evaluation criteria.
- Annexes of the contracts should contain forest protection and enrichment plans, maps, statistical data on forest areas and statuses, and a list of community forest members.

Examples of some proposed contractual biddings and commitments are presented inTable 30.

Table 30. Contractual bindings and commitments of forest owners

Party B (forest owners/To Dooc community forest members)	Percent consent (n=17)
Preserving and developing the quality and quantity of the forest area assigned in the PES for carbon contract: avoiding deforestation through illegal logging, forest fires and agricultural encroachment. In the event that deforestation takes place and forest volumes decrease to < 60.63 tC/ha, payment of PES for carbon will be discontinued at the time of acceptance of evaluation	71
Compliance with regulations on forest management and use, including logging, according to the law (Forest Protection and Management Law, Decision 178, Circular 35 on logging and profit). In the event of violations the relevant law applies	94
Be subject to the inspection, supervision and guidance of party A (district FPDF) of the relevant contents of PES for carbon	47
Compliance with the terms in the PES for carbon contract	71
Monthly report or unscheduled (upon request) for party A on the results of forest protection and forest enrichment activities	82

Contract duration

The duration of the contract should be based on the forest carbon business rotation, which typically lasts from 30 to 50 years. However, the results of stakeholder consultations (17 people) showed that:

- The duration of the contract should be 5 years (82.25%). This is because changes in forest carbon-stocks can be best detected after 5 years. Furthermore, this contract duration fits well with the Government's forest inventory, which is conducted every 5 years.
- 62.64 % correspondents think that payment should be made annually in order to motivate local people to increase efficiency in forest protection and forest enrichment work; while 54% correspondents think that there should be two payments per year, one at the beginning of the contractual year and one at the end of the year after evaluation for the next payment.

Contract outputs

Eighty-seven percent of respondents thought that PES for carbon should be paid on a performance basis in order to motivate forest owners, foster competition and encourage good forest quality. This could help raise awareness among local communities and forest owners about their responsibilities for forest protection and enrichment work.

The output of the contract for PES for carbon will be an increase of carbon stock that is clearly specified by criteria, indicators and means of verification for forest protection and enrichment activities.

Parties involved in the PES contract

Consultations from stakeholders suggested that PES for carbon sequestration was subject to both legal and policy restrictions. Hence, forest owners must sign legal commitments to protect forests and the contracts should be certified by local authorities and district FPD for all forest areas that are managed by the forest owners.

In the case of piloting PES for carbon and using the Community Development Fund for payment, party A (the environmental services' buyer) will be the commune people's committee or community development fund and party B (environmental services' seller) will be mainly the forest owners. Stakeholders and community forest members suggested that the team leader of the community forests management board, that is, the representative of community forests, should sign the contract. The village leader should co-sign the contract because she/he knows the community forests, participates in monitoring and facilitates the

community's performance and compliance with terms as well as commitments to protect and enrich forest.

4.2.6 Uses of PES for carbon funds

The amount of PES for carbon payments should be regulated and reviewed for appropriate spending based on a work plan for community-based forest protection and management but regulated in the contract. Separate regulations should apply for each forest owner and be attached to the contract because each forest owner has different forest protection and forest enrichment plans. According to the results of the To Dooc community forests discussions, the PES for carbon funds should be allocated to four areas.

1) 20% for management, including group meetings, information or dissemination of forest protection regulations
2) 20% for forest protection patrol
3) 40% for activities for forest enrichment and enhancing forest carbon-stock
4) 20% for capacity building (silvicultural measures, seedling selection)

4.2.7 Monitoring, reporting and verification

ORGANIZATION OF MRV FOR PES FOR CARBON SEQUESTRATION

Monitoring PES for carbon sequestration will be organised at the district level and fall under the supervision of the vice-chairman of the district people's committee. The members of the monitoring group can be drawn from district agencies such as FPD, DARD and DONRE. Commune and village-level officers should support and join the district monitoring activities (Figure 16).

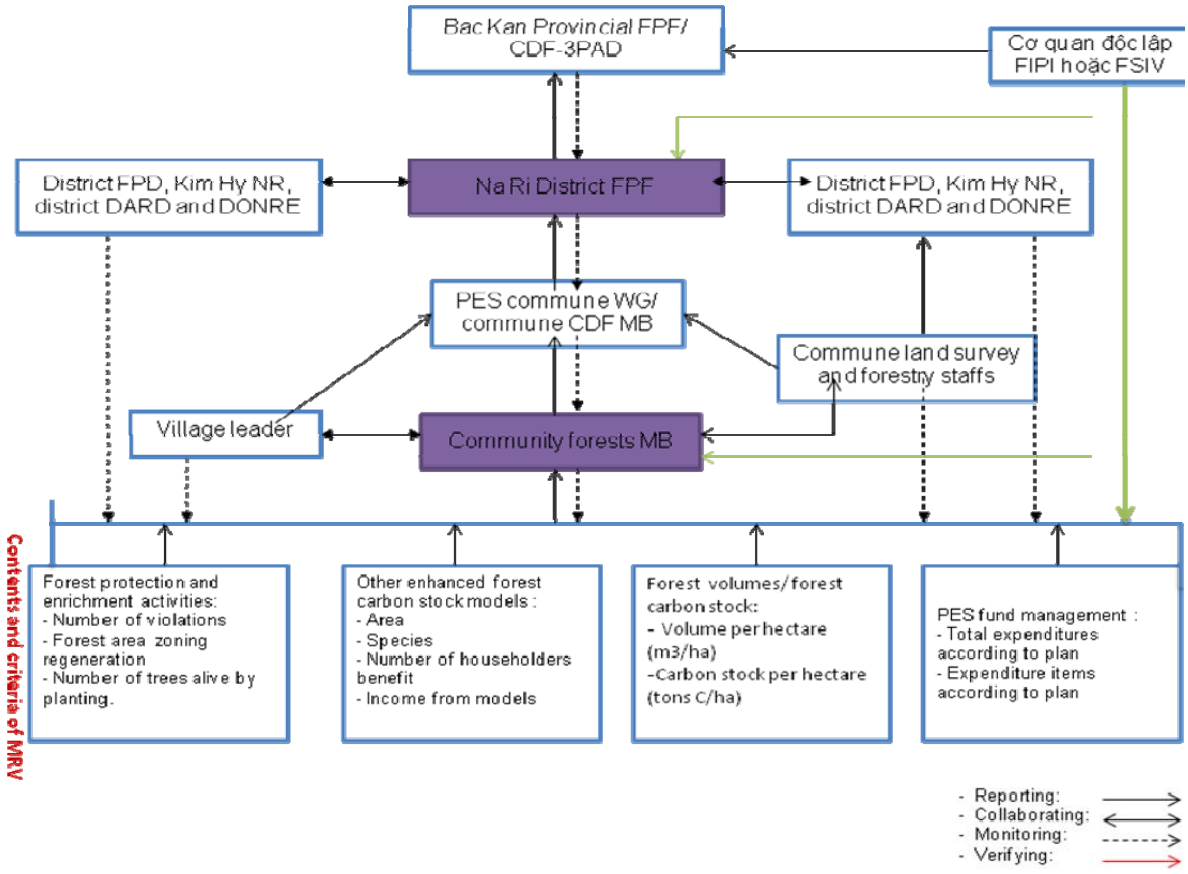

Figure 16. Proposed implementation of monitoring, reporting and verifying for To Dooc community forests

Content, criteria and methods for MRV

Developing a replicable monitoring, reporting, and verification system should follow international guidelines yet be adaptable to our local context. At the community level, the system should focus on participatory carbon-stock assessment, monitoring and landscape analysis. The tools used will balance the use of remote sensing with participatory methods to be conducted by local communities.

The content of the system in To Dooc village community forests was identified by stakeholders and local community to be specifically as follows.

- Forest protection and management
- Forest enrichment and forest zoning regeneration
- Results of agroforestry model development and grass planting for improve livelihoods
- PES for carbon sequestration fund management of community forest groups.

Criteria, methods and implementing of the system were consulted through focus group discussions. The results are summarised in Table 31.

Table 31. Criteria, methods and implementation of a monitoring, reporting and verification system for PES for carbon in To Dooc community forests

Contents	Criteria	Methods	Implementing organizations	Monitoring schedule
1. Forest protection and enrichment activities	• Number of violations • Additional forest plantation area • Number of trees growth/ alive	• Checking of forest protection patrol plan and recording violations from patrol teams • Field surveys	District monitoring group, community forest management board, village leader	Annual report of community forest management board
2. Forest carbon-stock/forest capacity	• Forest capacity per hectare (m3/ha)/ carbon stock per hectare (tC/ha) • Forest area (ha)	• Forest inventory method of MARD • RaCSA	Department of Finance, FPD, DONRE, commune land survey officer, community forestry management board	Every 5 years
3. Agroforestry models and livestock grass planting	• Area • Species • Income from these models	• Field survey • Check reports from community forest management board and commune people's committee	District DARD, commune land survey and agriculture officers, community forest management board	Annual report of community forest management board
4. PES for carbon fund management	Expenditure according to items and total amount of expenditure	Cross-check cash book and other relevant financial reports	District FPDF, district monitoring group, commune working group	Annual report of community forest management board

Experience related to forest carbon-stock monitoring shows that local people can be involved with such activities as choosing the location of the measurement plots, defining sizes of plots, estimating the volume of trees in plots by visual observation and defining tree species in local names. Therefore, participatory monitoring of forest carbon-stock using RaCSA (Hoang and Nguyen 2011) is an appropriate method in PES for carbon for community forests.

REPORTING SYSTEM OF PES FOR CARBON

It was recommended in consultations with local stakeholders that the reporting system of PES for carbon should start from the community level (forest owners, community forest

groups) submitting to the commune then district level. For To Dooc village community forest, the team leader of the community forest and the community forest management board should have responsible for preparing reports as required and with support from the village leader and commune forestry staff (Table 32).

Table 32. Report system of PES for carbon sequestration in To Dooc village community forest

Report contents	Responsible body	Collaborating/supporting	Submitting to	Report schedule
Forest protection and enrichment work	Community forest management board, CM team leader	Village leader, commune forestry staff/ rangers	- CPC/commune CDF management board - District FPDF	Annually
Forest inventory/forest carbon-stock measurements		Village leader, district FPD	- District FPDF - District monitoring group	Every 5 years
Other enhanced forest-carbon models (agroforestry)		Village leader, commune agriculture staff, extension staff	-District FPDF - District DARD, FPD	Annually
Management of PES for carbon payment funds		Village leader	- CPC/ commune CDF management board - District FPDF	Annually

THE VERIFICATION SYSTEM OF PES FOR CARBON SEQUESTRATION

Verification of PES for carbon sequestration should focus on verifying forest volumes or carbon stocks according to assessment reports prepared by forest owners and intermediaries. The verification means suggested by relevant stakeholders were reports, statistics and records related to forest inventories and forest carbon-stock assessments with associated field surveys.

Most stakeholders thought that an independent national or regional organization, like the Forest Inventory and Planning Institute (FIPI) or the Forest Science Institute of Vietnam (FSIV), should be hired by the provincial FPDF for verification. Stakeholders' recommendations for PES verification are summarised in Table 33.

Table 33. PES for carbon verification means and implementing organization for PES in To Dooc

Verification contents	Verification means	Responsibility agencies	Verification schedule
Forest protection and enrichment works	Review annual reports on forest protection and enrichment activities combined with field surveys' direct observation	FPD FD PFPDF	Annually
Results of forest inventory/forest carbon-stock measurement	Review forest inventory and carbon-stock measurement reports combined with field surveys directly measuring carbon stock randomly	Independent organizations from national level (FIPI, FSIV)	Every 5 years
Other enhanced forest-carbon models	Review report on implementing enhanced carbon-stock models combined with field survey directly observing the models	- PFPDF or DFPDF - District DARD, FPD	Annually
PES for carbon payment funds management	Review financial reports and cash books	- PFPDF or DFPDF - Department of Finance.	Annually

Funding for the proposed system could be taken from the 10% assigned for administration of PES funds. This fund will be allocated from the Provincial Forest Protection Fund by the Vietnam Forest Protection and Development Fund. Of the 10%, there should be extracted about 5% for the monitoring, reporting and verifying system according to the district FPD, DARD and DONRE's FDGs.

4.3 Scoping study on potential of CDM project on efficient use of fuel wood in Pac Nam district

4.3.1 Introduction

Pac Nam district is among the poorest and least forested districts in Bac Kan province. The forests here have been heavily logged for timber products and agricultural extension, especially shifting cultivation, over the last five decades. Most local people belong to ethnic groups and depend largely on forests for their livelihoods. Therefore, protecting the remaining forest and promoting reforestation are considered very important by local leaders. For this reason, the district socio-economic development plan aims at combined efforts for environmental protection, food security and economic growth.

For Pac Nam district, CDM energy has been defined as one of the potential PES that is assumed to reduce carbon emissions by using improved cooking stoves and selling credits to carbon markets. Relevant experience exists from an efficient energy project in Quang Ba district, Ha Giang province, where use of improved cooking stoves created a 50% reduction of fuelwood used compared to the traditional cooking stove (Nguyen Duc Cuong, 2002). Furthermore, research by the Vietnam energy institute showed that there is the possibility to include the cooking habits of different ethnic groups into the design of improved stoves, thereby conserving the socio-cultural context if this energy-saving technology is applied. Furthermore, by avoiding cutting down more trees for fuelwood, we can assume this may lead to reduced deforestation and enhanced carbon sequestration.

4.3.2 Objectives of the study

- To review previous attempts to introduce improved cooking stoves in the uplands of northern Vietnam in order to develop appropriate options for improved stoves.
- To survey current sources and consumption of energy in the district.
- To estimate the potential amount of fuelwood saved and carbon credit generated through the application of improved cooking stoves in Pac Nam district.
- To gain a better understanding of current markets for CDM energy and the voluntary carbon market in Vietnam and globally that have potential to be applicable to Pac Nam.
- To identify market and/or investment possibilities for selling carbon credits, including a cost-benefit estimation of the options.

4.3.3 Methodology

DESK REVIEW

- Systematic, web-based review of information in English and Vietnamese related to CDM projects and the CDM process in Vietnam[18].
- Information on the socio-economic conditions of Pac Nam district
- Information on improved cookstove projects in other regions
- Designing a questionnaire on livelihoods and energy consumption at household level.

FIELD SURVEY

The field survey, which included a questionnaire for the head of the household, was conducted in three communes of Pac Nam district: Boc Bo, Xuan La and Giao Hieu. Interviewees were selected based on random sampling method from two target groups: three wealth groups (poor, near poor and average) and six ethnic groups (Tay, Mong, Dao, Nung, San Chi, Kinh). The total number of combinations was 18 sub-groups. For each sub-group, the research team randomly selected three households for the questionnaire survey. The Hoa group was not surveyed since their population was very small (only 11 households out of a total 5389 households in the district).

4.3.4 Current use of fuel sources

TYPES OF HOUSE AND KITCHEN: Most of the houses were stilt houses or other house type with soil foundation, wooden walls and fibrocement roof. For stilt houses, the improved cooking stove must be compact and light.

For most of the households, cookstoves were placed inside the house. The main fuel source used for the cookstove was fuelwood that causes smoke and dust and generally disturbs the lives and health of household members.

For cooking stoves placed in a kitchen separate from the house, it is convenient to replace currently used cooking stoves by an improved one since there is no ethnic tradition applied.

For households where the cookstove is placed in the house, installation of an improved cookstove will be obstructed by the location of traditional stoves. However, with increasing awareness of local people on health protection, it is expected that they will be willing to change their tradition if the advantages of the improved cookstove-such as reducing the amount of fuelwood used, reducing the time for fuelwood collection and cooking, and reducing smoke and dust-are made known to them.

Sources of fuel for cooking stoves

Many households combined different types of fuel for cooking stoves. The main fuel sources were wood (100%) and corn cobs (38%), as well as electricity (28%, mostly for cooking rice) and gas (10%). The use of electricity and gas were found mostly in average income households, while gas cookers were predominantly used by Kinh households.

Although most surveyed households had agricultural crops, such as rice (87%), maize (90%), cassava (44%), by-products such as bran or stems from the crops were used as animal feed or fertilizers rather than for cooking fuel and only corn cobs were used as fuel and only for 1-2 months/year (after harvest). Each household consumed one-to-two 5 kg baskets of corn cobs per day.

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[18] Availble from http://www.noccop.org.vn/, http://cdm.unfccc.int/

The fuelwood can be divided into three categories: big branches of 7-10 cm in diameter; small branches of less than 5 cm in diameter; and cleaved wood pieces. The typical length of a fuelwood bundle was about 1-1.5 m. The observed moisture content of fuelwood was high (> 20%), which increased the smoke. The use of poorly dried fuelwood for cooking implied that most households could not afford labour for collecting and storing fuelwood as in the past.

The forests are the main source of fuelwood. However, owing to over forest exploitation, the forest area has been recently decreased. Since most of the forest has been allocated to different owners, households have limited choices for fuelwood collection and usually have to walk a long distance to collect wood, sometimes over 5 km. For this reason, collecting fuelwood now takes up more time and effort compared to five years ago, even last year. This study shows that up to 87% of the households collected fuelwood by themselves and usually spent 10-15 person-days per month, collecting on average 15-17 kg of fuelwood per hour. According to the study, 71% of farmers used production forests while 29% used protected forests.

In the mid-term future, there will be no alternative sources of fuel for cooking. As there is only one source of energy for cooking (fuelwood), the design of an improved cookstove will be easier. The increasing time and distance to walk for wood collection indicates that in the near future there will be a shortage of fuelwood

Cooking stoves, pots and pans

Time spent for cooking a meal is about 1-1.5 hours using traditional cookstoves. These cookstoves waste energy, disturb the cook, and pollute the indoor environment.

More than 90% of surveyed households used the three-legged stove, either single (for one pan only) or multiple (two or more pans at the same time) in their daily cooking, for boiling water for drinking or bathing, and for cooking pig mash if the number of pigs was relatively small. Although the three-legged stove and homemade brick stoves are cheap and well-fitted to different sizes of pots and pans, they have poor performance, require a lot of fuelwood and cause smoke and dust pollution.

Overall, the study shows no significant differences between pots and pans used among different ethnic groups. Hence, cooking stove designs can be similar.

4.3.5 Current fuel consumption

The largest fuel wood consumption activity is pig mash cooking.

Aparting from cooking purposes, the indoor cookstoves are often also used as a heating device in the winter. This should be taken into account when designing an improved cookstove for these households.

One key driver to reduced fuelwood consumption is the shift to hybrid corn. In the past, corn was hung over cooking stoves to dry. With the shift to hybrid seeds, corn needs to be dried and packed immediately after harvesting, thus cooking stoves are no longer necessary for drying corn.

4.3.6 Solutions for designing improved cookstove in Pac Nam district

Based on the uses of fuel, types of kitchen and cooking stoves and cooking equipment in Pac Nam, criteria and solutions for improved cookstove were developed (Table 34).

Table 34. Criteria and proposed solutions for selecting an improved cookstove

No.	Criteria	Proposed solutions
1.	Fuelwood saving	+ The cooking stove should be well covered to reduce heat loss and enhance heat transmission + Make use of smoke heat, provide additional air for the combustion process. + Cooking stoves in optimal sizes
2.	Fast cooking	+ Simultaneous cooking with 2–3 pans + Heat conversion solutions as above + Using lids for pans and pots while cooking
3.	Less smoke/dust	+ Reducing smoke by reducing the amount of fuelwood (about 30%) + Improving combustion efficiency + Using dry fuelwood
4.	Drying and heating functions	+ Not to draw out the cooking stove's smoke + Flexible covering (open in winter, covered in summer)
5.	Durable cookstove	+ Using durable materials such as cement, iron, baked phosphate and bricks + Guidelines for the uses and maintenance of improved cooking stove
6.	Reasonable price	+ Use of locally available material such as clay, rock and sand mixed with some more advanced materials, such as cement, ash and phosphate, to form the cooking stove in order to strengthen durability + Use local labour
7.	Demonstration and expanding the use of improved cookstoves	+ Training to develop capacity of technical workers, monitoring and enhancement + Establishing improved cooking stove team: one team for each village (consisting of representatives of all mass organizations such as Women's Union, Youth Union) + Information using posters and radio + Study tour to good demonstrations

Based on these criteria and solutions, appropriate improved cooking stove models can be developed for Pac Nam district. Designing optimal models will require testing of fuelwood efficiency as well as the thermodynamic processes of the cooking stove. Based on the efficiency of the models, the amount of fuelwood saved and associated benefits will be calculated in different scenarios.

4.3.7 Scenarios for application of improved cooking stoves in Pac Nam district

Criteria for household selection and purpose for applying improved cooking stove

- Voluntary
- Low income, poor or near poor
- Number of family members > 4
- Use traditional cooking stove for daily cooking
- Cooking stove location is not regulated by ethnic tradition
- Large fuelwood consumption
- Cooking for food and feed
- Construction materials for stove are available locally or easily transported

Based on the above criteria, the following scenarios have been developed.

Scenario 1: Improved cookstove for Mong households

The survey results showed that Mong households have the biggest average fuelwood consumption in the district, with about 13 680 kg per year.

The 1451 Mong households account for 26.36% of the total number of households in the district. In addition, this ethnic group has the largest share of poor households (1149 or 38%)[19]. If all Mong households converted to improved cooking stoves, they could save up to VND 7 billion per year and reduce CO_2 emissions by 15 000 tonne (Table 35).

Table 35. Application of improved cooking stove for Mong households

Number of improved cookstove	Current consumption (kg/year)	Using improved cookstove (kg/year)	Amount of saved fuelwood (kg/year)	Money saved (thousand VND/year)	CO2 emission reduction[20] (tCO2/year)
1451	19 849 680	10 917 324	8 932 356	6 699 267	15 080

Scenario 2: Application of improved cooking stoves for poor households

The total number of poor households in Pac Nam district is 3026 (56%)[2]. The average amount of fuel wood consumption is about 15 000 kg/household/year.

Application of improved cooking stoves in poor households will save time and labour spent collecting fuelwood and cooking. If all poor households converted to improved cooking stoves, they would save up to VND 8.4 billion per year and reduce CO_2 emissions by 19 000 tonne (Table 36).

Table 36. Application of improved cookstove for poor households

Number of improved cookstove	Current consumption (kg/year)	Using improved cookstove (kg/year)	Amount of saved fuelwood (kg/year)	Money saved (thousand VND/year)	CO2 emission reduction[21] (tCO2/year)
3026	24 914 571	13 703 014	11 211 557	8 408 668	18 927

There is no CDM project on household fuelwood saving in Vietnam. The potential CO_2 emission reduction from fuelwood saving is 15 080 tonne/year (Scenario 1) and 18 927 tonne/year (Scenario 2). If such scenarios are developed into a CDM project, each average household ccould earn VND 3 million per year from selling carbon credits[22]. This indicates that Pac Nam district has a good potential for developing a CDM project on energy efficiency through application of improved cooking stoves. To identify the potential for selling carbon credits (CDM), a subsequent study on CDM energy markets is briefly introduced below.

4.3.8 Carbon market for improved cookstove projects

Improved cookstoves are a low-tech solution to burn biomass in an energy-efficient manner. Their social and environmental benefits are commendable. Household air pollution caused by smoke from traditional ways of cooking with firewood, charcoal and dried animal waste have profound environmental and health-related impacts. It is a major cause of chronic

[19] Source: proposal: 'Socio-economic development for fast and sustainable poverty reduction in Pac Nam district in the period of 2009–2020'
[20] Emission factor of fuelwood is taken from IPCC
[21] Emission factor of fuelwood is taken from IPCC
[22] The selling price is estimated at about USD 15/ton CO_2 in terms of CDM

respiratory illnesses, especially among women and children. It is bad for the climate not only because of deforestation but also because of emissions from the combustion of other non-renewable substances. Therefore, cooking with a cost-effective method that creates a healthier environment within households has all round positive impacts.

The potential for large-scale emission reductions from cookstoves has gone unrecognized despite significant experience of known positive impacts[23]. Revenues achievable from household emission reductions through cookstoves have been thought to be insufficient to cover transaction and project costs[24]. It was only after February 2008, with the approval of AMS II.G, that recognition of the notable potential of cook stoves to reduce carbon emissions began to grow, especially as a programmatic approach. It is the first small-scale methodology under the CDM to assess baselines and monitor activities promoting energy efficiency for biomass use[25]. In addition, the approval of a methodology for large-scale cookstove projects on the voluntary market by Gold Standard in June 2008 also reinforced attention to this in the carbon market[26]. Gold Standard is a premium quality label, which is widely recognized in the certified emission reductions and voluntary carbon markets.

In order to expand its presence in the carbon market and to promote sustainable development in host countries, Programmatic CDM was introduced. A Program of Activities is a structured group of many small projects known as CDM Program Activities, which are aggregated together in a formal program. It is designed to have low administrative overheads, where the pilot project and overall Program plan is approved and registered by the CDM Executive Board, but subsequent projects in the same Program only need approval from an independent third party auditor, the 'designated operating entity'. A registered Program may add CDM Program Activities without going through registration again. It combines the benefits of large-scale emission reductions through the aggregation of project activities whilst encouraging sustainable development benefits.

More cookstoves projects are being registered as Programs instead of individual projects or bundles. Normally, cookstove projects are smaller in number and scattered over a large area and long time period. The Program approach best suits cookstove projects as one small pilot project can be registered at first and the low administrative costs can be shared by similar ensuing projects.

The first cookstove project to be registered-in October 2009-under the CDM (also under the Gold Standard) was in Nigeria[27]. As of December 2010, there was one registered CDM and six Gold Standard verified emission reduction cookstove projects. All of these were in Africa. However, there are three CDM cookstove projects from Asia in the pipeline and more from Latin America in the form of Programs. Africa also leads the Gold Standard verified emission reduction pipeline chart, with 14 projects [21]

4.3.9 Carbon calculation from the survey

According to *Carbon finance: a guide for sustainable energy enterprises and NGOs* by GVEP International, a minimum size of emission reductions is essential to ensure the viability of the project. A rough rule of thumb is that at carbon credit prices of USD 7 per tonne of CO_2, the viability threshold of projects is around 10 000 tCO_2/year for voluntary market projects and twice or three times as high for CDM projects. As per the calculation below, if the project

[23] Carbon Markets for Improved Cooking Stoves: A GIZ guide for project operators- January 2011
[24] Carbon Markets for Improved Cooking Stoves: A GIZ guide for project operators- January 2011
[25] Carbon Markets for Improved Cooking Stoves: A GIZ guide for project operators- January 2011
[26] Carbon Markets for Improved Cooking Stoves: A GIZ guide for project operators- January 2011
[27] Carbon Markets for Improved Cooking Stoves: A GIZ guide for project operators- January 2011

covers 50% of Pac Nam district, it is sufficient to make it viable. However, more research needs to done on project planning and implementation, the choice of cookstove and its efficiency and verification of the sales assumptions made in the calculation in Tables 37, 38 and 39 below.

Table 37. From the survey of 39 households from Pac Nam district

Total population of Bac Kan province	306 000
Total population of Pac Nam district	29 098
Number of households in Pac Nam district	5389
Average wood consumption (tonne/year/household)	10
Willingness to switch to improved cookstoves	100%

Table 38. Author's assumptions

Cookstove sales target	80%
Total cookstove sales	4311 (80% of 5389 households)
Time period	2 years
Per year stove sales	2156 (4311/2 years)
Stove efficiency	Reduce 30% of wood consumption

With the limited data available and on the basis of the assumptions above, a tentative and simplified version of CO_2 emission reduction calculations is presented below, only for informational purposes at this stage. CDM carbon calculation will need to be more comprehensive and a prescribed methodology has to be followed if implementation was to proceed any further.

Table 39. CO_2 calculation

No. of biomass stoves per year	2156
Biomass saved per year per stove per household	3 t (10 t per household*30%)
Total biomass saved per year	6468 t (30%*10 t per household*2156)
Wood and wood waste: Heat contenta	19 200 MJ/t
Total heat content of saved biomass	124 185 600 MJ (6468*19 200)
Wood and wood waste: CO2 contentb	0.000112 tCO2/MJ
CO2 reduction per year	13 909 tCO2 (0.000112*124 185 600)
Total CO2 reduction in 2 years	27 818 tCO2

a Wood Fuels Handbook: www.biomasstradescenters.edu
b 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 2, Table 2.5

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Appendices

Appendix 1.1 Roles of stakeholders in PFES implementation in Lam Dong Province

Lam Dong DARD played a role as the key agency implementing PFES under the direction and supervision of the Provincial People's Committee (PPC). The main tasks included 1) organizing awareness-raising and providing information on PFES policy implementation to local people; (2) determining beneficiaries and providers at the pilot sites; 3) planning and estimating funding of PES schemes and activities related to implementation of the PFES pilot policy in the province in collaboration with provincial departments, agencies, consultant organizations and institutions; 4) organizing pilot schemes in localities, under the guidance of MARD; 5) hosting and collaborating with the Department of Finance to advise the PPC in making decisions to establish the FPDF as well as issue regulations for FPDF operations; 6) hosting and collaborating with relevant departments and local governments in the districts of Lac Duong, Don Duong, Duc Trong, Da Teh and Dalat City to organize and guide the environmental services' providers and beneficiaries in implementation of PFES; 7) organizing quarterly evaluations of management and use of the PFES payment funds and; 8) advising the PPC on reporting to MARD on PFES implementation in the province.

Lam Dong Forest Protection Department had the tasks of 1) collaborating with relevant departments like DONRE and the Department of Finance to survey points for installing observation systems for water control services and erosion prevention in the Da Nhim Lake area. This was intended to gather data to help define the K factor that was to be applied in the calculation of payment rates for PFES; 2) implementation of land allocation, contracted forests and survey of boundaries and catchment areas for PFES pilot implementation; and 3) monitoring and evaluating the effectiveness of the PFES scheme relevant to forest cover, forest quality and household livelihoods.

The Department of Finance had the role of 1) advising the PPC in making decisions on the percentage of tourist sales in the special-use and protection forests areas; 2) determining the rate of entrance fees for visiting the special-use and protection forests as well as providing relevant information about eco-tourism revenues of tourist agencies or other environmental services' beneficiaries.

The provincial departments, district and city people's committees, such as the Department of Trade and Industry, DONRE, DoCIT, Department of Planning and Investment, district people's committees of Don Duong, Lac Duong, Duc Trong, Da Teh and Dalat City) had the role of coordinating with DARD to implement the PFES pilot policy. Also, they were responsible for providing information for identification of environmental services' beneficiaries and providers and the basin area included in the scheme at the pilot sites.

The Lam Dong provincial FPDF had the task of collecting money from environmental services' beneficiaries and transferring it to forest owners, who would then allocate it to households who had contracted to protect forests. The provincial FPDF also coordinated relevant departments and agencies to disseminate PFES information and to monitor and evaluating the scheme according to regulations.

Lam Dong Television collaborated with DARD to disseminate information on the PFES policy through media at district and provincial levels.

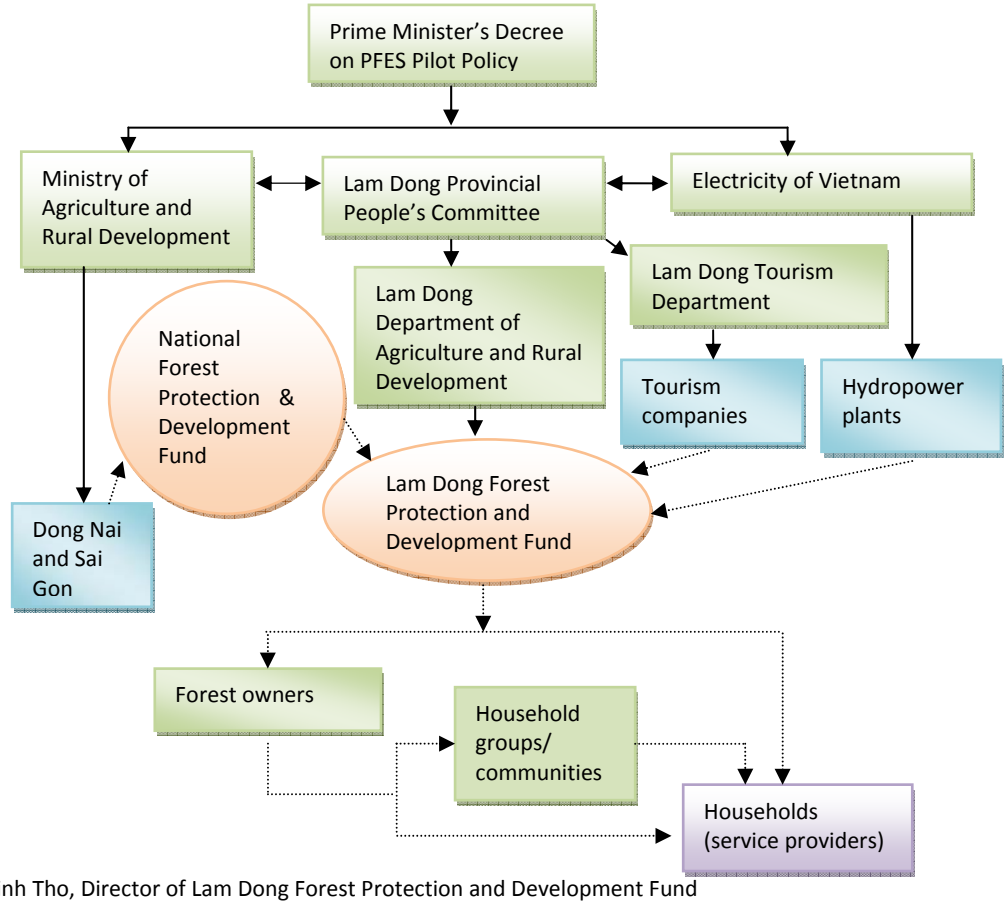
The district FPD collaborated with forest owners to patrol forests to prevent violations. Also, the district FPDs participated in the local monitoring system

Forest owners (including protection forest management boards, national parks and forestry enterprises) were responsible for allocating forests to households under contract and transferring money to those households. In addition, the forest owners collaborated with relevant departments and agencies to disseminate information and monitor and evaluate the scheme according to the regulations.

Beneficiaries (hydropower plants, water supply companies and tourist agencies) made prescribed payments to forest owners/environmental services' providers and monitored activities related to finance and forest services. Da Nhim hydropower plant was responsible for payments for the Da Nhim River basin, including Lieng Bong village.

Households contracted for forest protection were to receive money in accordance with tasks related to protection and management of forests in Lieng Bong village, as assigned by the forests' owners (Da Nhim Watershed Forest Management Board and Bidoup Nui Ba National Park).

Figure A1. Organisational structure of PFES pilot policy in Lam Dong province



Source: Vo Dinh Tho, Director of Lam Dong Forest Protection and Development Fund

Appendix 1.2 List of stakeholders' consultation workshops and findings

No.	Date	Workshop and location	Workshop contents and findings
1	14 February 2011	Stakeholder consultation workshop in Ba Be district Workshop organized by ICRAF Vietnam and 3PAD project and chaired by Dr Hoang Minh Ha and Mr Hoang van Giap	* The objectives of the workshop were to inform and discuss with stakeholders how to implement Decree 99 within Bac Kan province and to plan further activities on PES design. * The workshop outcomes: - Forest environmental services in Ba Be district defined as water supply for hydropower plants, landscape beauty for ecotourism, reducing soil erosion, biodiversity, and carbon sequestration. - To improve both local income and forest protection, it was recommended that PFES should focus on special and protection forest. - Payment mechanisms should be designed to maximise the effectiveness of PFES by supporting the local community in planning and implementing forest protection activities rather than paying money directly to individuals and households. - Community Development Funds and community interest groups established under 3PAD will play an important role in piloting PFES.
2	31 March–1 April 2011 (indoor) 4–8 April 2011 (outdoor for PaLa practice) 23–28 April 2011 (outdoor for RaCSA practice)	Training of Trainers in "TUL-Vietnam**"** in Hanoi and Bac Kan province. Organised by ICRAF Vietnam and 3PAD project. Chaired by Dr Hoang Minh Ha, Dr Rohit Jindal, Dr Elisabeth Simelton	* The objective was to train four vital tools useful for developing PES/RES mechanisms, namely: 1) Participatory Landscape Analysis (PaLA); 2) Participatory analysis of Poverty, Livelihoods and Environment Dynamics (PaPOLD); 3) Reverse Auction for Payment of Environmental Services (RA); 4) Rapid Carbon Stock Appraisal (RaCSA). * The training was divided into indoor and outdoor activities - Lectures focused on definitions, objectives, principles, as well as implementation steps for each tool. Group discussions were carried out to link theory to real examples from ICRAF when applying these tools in Bac Kan. - Participants practised the tools in the field to better understand the methods as well as to evaluate their appropriateness when applied to the PES project in Bac Kan. The training resulted in 23 staff trained in participatory methods in the different contexts of where they work.
3	30 June 2011	Stakeholder consultation workshop at provincial, district and commune levels in Bac Kan province. Workshop organized by ICRAF Vietnam 3PAD project and chaired by Dr Rohit	*The objective was: - To share initial findings on PES mechanism development for water and carbon and get feedback from local stakeholders including 3PAD project. - To introduce Project Ideal Note and Project Design Document for carbon environmental services to be developed at a site in Na Ri district. *The workshop outcomes were: -It was agreed that the same K factor should be applied from national to village level in the first 2–3 years of PES implementation, but adjusted later on the basis of the type, origin and quality of forest. Land allocation and payments to community or groups can help to make PES reach the poorest groups. Community payments can be done to community forest groups and community interest groups. If paying to interest groups, the

		Jindal and Mr Hoang van Giap	Community Development Fund (CDF) can be used. Involvement of CDF investment streams in the PES scheme would promote a multi-targeted poverty approach. - Satellite/remote forest monitoring is not accurate enough at the local level; therefore local people need to be involved in participatory carbon measurements after receiving sufficient training and incentives.
4	23 September 2011	Stakeholder consultation workshop at community, Leo Keo village, Ba Be district. Workshop co-organized by ICRAF officers and 3PAD project management board in Ba Be district	* The objective was to share the initial findings with local stakeholders in Leo Keo village, Quang Khe commune, on a potential mechanism for bundling PES for water supply, carbon sequestration and landscape beauty services. * The outcomes were consensus on: • PFES money will be paid to the community in two ways: 1) Technical support like seed, seedlings, animals, fertilizer and improved cooking stoves; and 2) public construction work such as a village meeting hall. • Conditionality in PES should be an agreement between the Ba Be National park (forest owner) and Leo Keo community (forest user) on the management and protection of the adjacent area (30.6 ha). • Forest protection regulations should be reviewed by the commune people's committee and revised by district Forest Protection Department and Judicial Department. Thereafter, it should be submitted to the district provincial people's committee for approval and promulgation. • The Forest Protection Team should be divided into small groups and then paid for days of patrolling. The team leader will assign and monitor the forest protection groups' patrol activities and outcomes.
5	21 September 2011	Stakeholder consultation workshop with community, To Dooc village, Na Ri district. Workshop co-organized by ICRAF officers and 3PAD project management board in Na Ri district	* The objectives were to share the initial findings of the PES for carbon sequestration mechanisms under REDD+ for the pilot site at To Dooc village, Lang San commune. *Consensus was reached on : • Forest enrichment activities in To Dooc community forest. A group will be established for monitoring PES for carbon at district level with involvement from district agencies such as FPD, DARD and DONRE and headed by vice-chairman of district people's committee. The main tasks of this group are to monitor PES for carbon at commune level and solving problems relating to forest inventory and assessment of forest owners. • The local district and commune governments will support the implementation of this pilot model in To Dooc community forests in order to gather lessons learnt for later expansion.
6	1 October 2011	The final stakeholder consultation workshop in Bac Kan province. Organised by ICRAF and 3PAD project and chaired	The objective was to share the proposals for PES mechanism for the pilot sites in three districts of the 3PAD project. It was agreed that: - PES mechanisms to be piloted should be done in close consultation with the 3PAD project's activities on land allocation and income generation (component 1 and 2) through the CDF. - Before piloting PES proposed models, it is necessary that local stakeholders, including communities and forest owners

		by Dr Elisabeth Simelton and Mr Hoang van Giap	at all levels, receive enough understanding and capacity building on PES policy. - The 3PAD project will allocate budget for implementing the PES piloting for 2012. Thereafter, the outcomes will be evaluated for wider applications within Decree 99. -Bac Kan province will soon establish the Forest Protection Fund which will be responsible for that PFES, including PES for carbon sequestration. The province will accelerate forest and land allocation processes as well as develop a strategy for determining targets for environmental services' providers and users for implementing the PES policy under Decree 99.

Appendix 1.3. List of stakeholders participating in the six consultation workshops

Ord. No.	Name	Position and Institution	Telephone number
Workshop 1. Consultation workshop in Ba Be District, 14/1/2011			
1	Hoang Van Giap	Director of 3PAD Bac Kan Project Management Board (PMB)	0915 601 587
2	Luong Chi Cong	3PAD Bac Kan PMB	0912 664 499
3	Nong Thi Thuy	3PAD Bac Kan PMB	
4	Tran Thi Phuong Thanh	3PAD Bac Kan PMB	
5	Ly Van Linh	Head of District DoNRE, Ba Be	0915 494 229
6	Hoang Van Hai	Vice Head of Bac Kan Forest Protection Department (FPD), DARD	0988 754 444
7	Trieu Duc Canh	Quang Khe's Farmers' Union	01655 349 037
8	La Thi Thuyen	Head of Ba Be Agricultural Extension Station	
9	Dam Thi The	Head of District DARD, Ba Be	0982 876 753
10	Nguyen Thi Nghia	Vice-Director, Bac Kan Agricultural & Forestry Extension Centre	0983 351 349
11	Le Cam Long	Head of Department of Planning and Finance, DARD	0913 351 349
12	Nong Van Hoan	Bac Kan Agricultural & Forestry Extension Centre	
13	Dang Thi Anh Tho	Project coordinator, 3PAD Ba Be PMB	0915 201 954
14	Do Thi Minh Hoa	Vice chairman of Ba Be DPC	0912 539 818
15	Nong The Dien	Director of Ba Be National Park	0912 145 001
16	Loi Viet Nghi	Ba Be District Division of Culture, Sports and Tourism	
17	Pham Huu Tang	Chairperson of Quang Khe CPC	01686 331 898
18	Hoang Thi Viet	Chairperson of Hoang Tri Women Union	01275 343 699
19	Hua Van Chu	Leo Keo Village's leader, Quang Khe commune	01698 483 291
20	Vi Thi Dung	Chairperson of Nam Mau commune Farmer Union	0943 916 426
21	Ly Nguyen Bao	Chairperson of Dong Phuc commune Farmer Union	01687 010 206
22	Hoang Sy Luan	Ta Lang Hydropower Plant	0986 320 404
23	Ngo Ly Khac	Ta Lang Hydropower Plant	
24	Dam Thi Tho	Chairperson of Quang Khe Commune Women Union	01693 467 260
25	Hoang Van Tuan	Chairperson of Bang Phuc CPC	0915 494 229
26	Nguyen Van Dang	Chairperson of Nam Mau Boat Co-operative Management Board	0915 601 587
27	Nong Van Dung	3PAD Bac Kan PMB	0912 664 499
Workshop 2. Training of trainers in toolbox in natural resources management and payment for environmental services in Vietnam (TUL-Vietnam), in Hanoi, 31/3/2011			
1	Amanda Esons	3PAD Bac Kan PMB	02165608428
2	Rohit Jindal	ICRAF Vietnam	
3	Nguyen Van Tri Tin	ICRAF Vietnam	0914 236 901
4	Do Hoang Chung	Thai Nguyen University of Agriculture and Forestry	0989313129
5	Nancy Ibuna	3PAD Bac Kan PMB	0122791862
6	Marc Dumas	ICRAF Vietnam	01242 304 431
7	Do Trong Hoan	ICRAF Vietnam	0904 264 814
8	Dam Viet Bac	ICRAF Vietnam	0915 483 939
9	Bui Van Vu	3PAD Pac Nam PMB	0986 671 560
10	Hoang Van Giang	3PAD Na Ri PMB	0975545485
11	Nguyen Minh Duc	3PAD Ba Be PMB	0936 968 583
12	Ma Van Tieu	Ba Be District Forest Protection Division	01665994409
13	Dang Anh Tuan	3PAD Bac Kan PMB	0976 696783

14	Dam Thi Thu	3PAD Ba Be PMB	0919 670 211
15	Nong Thi Thanh Hao	3PAD Bac Kan PMB	0979 014114
16	Nong The Quy	Na Ri Agricultural & Forestry Extension Station	0915 198 222
17	Ngoi Quang Nam	Na Ri District Forest Protection Division	01685 564 648
18	Nguyen Thi Lieu	Bac Kan Agricultural & Forestry Extension Centre	0977 528 547
19	Hoang Thi Thao	Ba Be Agricultural & Forestry Extension Station	0975 081 977
20	Duong Thi Anh	Bac Kan Forestry Department, DARD	0984 233 912
21	Ly Thi Hong Chinh	Pac Nam Agricultural & Forestry Extension Station	0988 117 242
22	Le Xuan Dieu	Bac Kan Forest Protection Department	0988 658 165
23	Nong Quoc Toan	Pac Nam District Forest Protection Division	01235 762 833
24	Nguyen My Hai	Bac Kan Agricultural & Forestry Extension Centre	0912 912 311
25	Elisabeth Simelton	Deputy Country Representative of ICRAF Vietnam	01204 491 965
26	Hoang Van Giap	Director of 3PAD Bac Kan PMB	0915 601 587
27	Luong Chi Cong	3PAD Bac Kan PMB	091 266 4499
28	Hoang Minh Ha	Country Representative, ICRAF Vietnam	
29	Kira de Groot	Wageningen University	
30	Pham Ngoc Kien	Vice-head of Finance and Planning Division, Bac Kan DARD	0983 173 006
31	Duong Viet Phan	3PAD Na Ri PMB	0975 025 125
32	Nong Van Dung	3PAD Bac Kan PMB	0914 406 568
Workshop 3. Provincial, district and commune consultation workshop, 30/6/2011 in Bac Kan Town			
1	Ha Nhu Hoi	3PAD Bac Kan PMB	0985 792 017
2	Nong Thi Thanh Hao	3PAD Bac Kan PMB	0979 014 114
3	Nguyen Huu Nguyen	3PAD Bac Kan PMB	0946 095 883
4	Duong Viet Phan	3PAD Na Ri PMB	0975 025 125
5	Nguyen Viet Trung	Chairman of Nghien Loan CPC	0919 367 225
6	Ban Van Chan	Khuoi Tuon's village head, Nghien Loan commune, Pac Nam	0977 388 615
7	Pham Huu Tang	Quang Khe, Ba Be CPC	01686 331 898
8	Nguyen Dinh Thoa	Ba Be District Forest Protection Division	0983 163 507
9	Hoang Be Binh	Bac Kan Provincial DONRE	0912 504 370
10	Nguyen Tien Dung	Director of Kim Hy Natural Reserve Area	0915 589 435
11	Tran Van Nam	To Dooc Village, Lang San commune, Na Ri	0976 351 208
12	Nguyen My Hai	Bac Kan Provincial Agricultural & Forestry Extension Centre	0912 912 311
13	Hoang Van Giap	Director of 3PAD Bac Kan PMB	0915 601 587
14	Trieu Duc Thong	3PAD Bac Kan PMB	0948 228 288
15	Luc Van Luyen	Na Muc Village, Van Minh Commune, Na Ri	01244 503 688
16	Vi Quoc Tuan	Chairman of Nghien Loan CPC, Pac Nam	01639 548 993
17	Ngoi Quang Nam	Na Ri Forest Protection Division	01685 567 648
18	Nong Thi Thuy	3PAD Bac Kan PMB	
19	Hoang Duc Tam	Chairman of Lạng San CPC, Na Ri	0914 804 441
20	Pham Van Trai	3PAD Bac Kan PMB	0989 645 781
21	Pham Quoc Hung	VN FOREST	0166 562 3461
22	Luong Thanh Loc	Deputy Chief Officer, Na Ri DPC	0912 557 211
23	Hua Van Chu	Head of Leo Keo Village, Quang Khe Commune, Ba Be	01698 483 291
24	Trieu Duy Thiet	Leo Keo Village, Quang Khe Commune, Ba Be	01678 361 425
25	Nong The Dien	Director of Ba Be National Park	02813 894 127
26	Dam Thi Thu	3PAD Ba Be PMB	0916 975 633
27	Nong Van Chi	Vice Chairman, Bac Kan Provincial People's Committee	0913 270 061
28	Hoang Anh Tuan	Kim Hy Natural Reserve Area	0915 600 138
29	Pham Van Oanh	District DoNRE, Ba Be	0945 977 722

30	Hoang Van Dinh	To Dooc Village, Lang San Commune, Na Ri	0904 54 77 14
31	Le Xuan Dieu	Bac Kan Forest Protection Department, DARD	0988 65 81 65
32	Do Thi Tuyet Nga	3PAD Bac Kan PMB	0978 261 666
33	Luc Van La	Na Muc Village, Van Minh Commune, Na Ri	0944 268 356
Workshop 4. Community consultation workshop and villages of To Dooc, Na Muc in Na Ri district, 21/9/2011			
1	Hoang Van Do	147 PMB	0948 444 067
2	Ha Ngoc Bao	Head of Na Ri District Forest Protection Division	
3	Ngoi Quang Nam	Na Ri District Forest Protection Division	01685 567 648
4	Hoang Duc Quyet	Cadastral staff, Lang San Commune, Na Ri	0946 214 783
5	Luc Quang Phong	Na Muc Village, Van Minh Commune	0942 742 045
6	Luc Van Luyen	Na Muc Village, Van Minh Commune	01244 503 688
7	Hoang Anh Tuan	Kim Hy Natural Reserve Area	0915 600 138
8	Hoang Van Giang	3PAD Na Ri PMB	0975 545 485
9	Nong Danh Hien	Vice-chairman, Na Ri DPC	0912 027 794
10	Hoang Huu Van	District DARD, Na Ri	0915 954 121
11	Dang Van Thang	3PAD Na Ri PMB	0972 267 548
12	Pham Ngoc Thinh	Project Coordinator, 3PAD Na Ri PMB	0915 696 182
13	Tran Van Nam	To Dooc Village, Lang San Commune, Na Ri	0976 351 208
14	Tran Van Manh	To Dooc Village, Lang San Commune,- Na Ri	
15	Ha Thi Nguyen	To Dooc Village, Lang San Commune,- Na Ri	01652 900 120
16	Hoang Van Dinh	To Dooc Village, Lang San Commune, Na Ri	0944 547 714
17	Hoang Duc Tam	Chairman of Lang San CPC	0914 804 441
18	Tran Van Bang	To Dooc Village, Lang San Commune, Na Ri	
19	Ly Van Trong	3PAD Bac Kan PMB	0904120354
Workshop 5. Community consultation workshop and Leo Keo Village in Ba Be district, 23/9/2011			
1	Bui Van Quang	Vice-director of Ba Be National Park	0948 444 067
2	Hua Dinh Lam	Head of Science and Technology Division, Ba Be NP	0976 549 107
3	Duong Van Mao	Ba Be District DARD	01685 567 648
4	Bui Manh Cuong	Ba Be District Forest Enterprise	0946 214 783
5	Pham Huu Tang	Chairman of Quang Khe CPC	0942 742 045
6	Ma Van Tieu	Ba Be District Forest Protection Division	0915 600 138
7	Tran Thi Linh	3PAD Ba Be PMB	0975 545 485
8	Nguyen Minh Duc	3PAD Ba Be PMB	0912 027 794
9	Dang Thi Anh Tho	3PAD Ba Be PMB	0915 954 121
10	Nong Thi Mien	Ba Be District DoNRE	0972 267 548
11	Truong Thi Nho	Cadastral cadre, Quang Khe Commune	0915 696 182
12	Hoang Thi Hiep	Agroforestry cadre, Quang Khe Commune	0976 351 208
13	Hoang Van Giap	Director of 3PAD Bac Kan PMB	0915 601 587
14	Ly Van Trong	3PAD Bac Kan PMB	01652 900 120
15	Trieu Duc Thach	Head of Ba Be District Forest Protection Division	0914 804 441
16	Ma Thi Toi	Leo Keo Village, Quang Khe Commune	
17	Hua Van Chu	Leo Keo Village, Quang Khe Commune	0904120354
18	Trieu Duy Thiet	Leo Keo Village, Quang Khe Commune	0948 444 067
19	Ma The Quyen	Leo Keo Village, Quang Khe Commune	
20	Luong Van Thoa	Leo Keo Village, Quang Khe Commune	01685 567 648
Workshop 6. Provincial final consultation workshop, 1/10/2011			
1	Ly Van Trong	3PAD Bac Kan PMB	0904120354
2	Nguyen Duc Cuong	Institute of Energy, Ministry of Industry and Trade	
3	Duong Van Huan	Chairman of Pac Nam DPC	
4	Nguyen Van Dong	Vice Chairman of Ba Be DPC	
5	Dang Thi Anh Tho	Project coordinator of 3PAD Ba Be PMB	0915 201 954
6	Nguyen Tien Dung	Director of Kim Hy Natural Reserve Area	0915 589435
7	Nong Thi Thanh Hao	3PAD Bac Kan PMB	0979 014114

8	Nguyen Van Kien	Bac Kan Forest Protection Department, DARD	0984 849 078
9	Chu Van Truong	Project coordinator of 3PAD Ba Be PMB	01687 012 054
10	Tran Van Nam	To Dooc Village, Lang San Commune, Na Ri	0976 351 208
11	Nong Kinh Xuan	Bac Kan Department of Finance	
12	Luong Chi Cong	Thai Nguyen Department of Home Affairs	0912 664499
13	Nguyen Van Kien	Thai Nguyen Department of Home Affairs	
14	Do Xuan Viet	Bac Kan Agricultural & Forestry Extension Centre	
15	Hoang Duc Tam	Chairman of Lang San CPC, Na Ri District	0914 804 441
16	Ha Duc Nguyen	3PAD Ba Be PMB	
17	Be Quang Huy	3PAD Na Ri PMB	
18	Pham Thi Thuy Ha	3PAD Bac Kan PMB	0912 919 260
19	Dang Huu Phong	3PAD Pac Nam PMB	
20	Do Hoang Chung	Thai Nguyen University of Agriculture and Forestry	0989313129
21	Tran Thi Phuong Thanh	3PAD Bac Kan PMB	0982 682 338
22	Hoang Van Giap	Director of 3PAD Bac Kan PMB	0915 601 587
23	Quach Xuan Giao	Pac Nam District DoNRE	01682 423 707
24	Vu Manh Nghia	Head of Forest Protection Unit, Bac Kan FPD	0912 559 811
25	Hoang Anh Tuan	Forest ranger, Kim Hy Natural Reserve Area	0915 600 138
26	Hoang Van Dinh	To Dooc Village, Lang San Commune, Na Ri	0944 547 714
27	Pham Ngoc Thinh	3PAD Na Ri PMB	0915 696 182
28	Nong Danh Hien	Vice-Chairman of Na Ri DPC	0912 027 794
29	Bui Quoc Hoi	Na Ri District DONRE	
30	Nguyen Minh Thi	3PAD Bac Kan PMB	0982 580 143
31	Trieu Duc Thach	Head of Ba Be District Forest Protection Division	0914 804 441
32	Luong Van Thuong	Bac Kan Department of Planning and Investment	
33	Nguyen Thi Hang	Chairman of Nam Mau CPC, Ba Be	
34	Nong Van Chi	Vice Chairman of Bac Kan Provincial People's Committee	0913 270 061
35	Pham Van Oanh	Ba Be District DoNRE	
36	Hua Van Chu	Leo Keo Village, Quang Khe Commune	01698 483 291
37	Ma Thi Toi	Leo Keo Village, Quang Khe Commune	

Appendix 2.1. Land-use and land-cover classification system

FOREST	**Rich timber forest**
	Medium timber forest
	Poor timber forest
	Recovered timber forest
	Bamboo forest
	Mixed forest
	Forest on rocky mountain
	Planted forest
MOSAIC	**Shifting cultivation**
NON-FOREST VEGETATION	**Rocky mountain without forest**
	Bare land with grass and shrub
	Bare land with scattered trees
Agriculture	**Industrial perennial crop**
	Mixed fruit garden
	Annual crop: rice
	Annual mixed crops
Non-vegetated	**Settlement**
	Specially used land
	Water surface

Appendix 2.2. Carbon stock and net present value of land uses

Land-use type	Carbon stock (tonne)	Net present value/rotation (USD)	Rotation (year)
Rich timber forest	202.60	21.50	Not defined, calculated for last 7 years
Medium timber forest	156.50	46.00	As above
Poor timber forest	117.90	36.00	As above
Recovered timber forest	93.20	21.50	As above
Bamboo forest	13.00	27.50	As above
Mixed forest	85.20	27.50	As above
Forest on rocky mountain	116.80	13.00	As above
Planted forest	85.20	385.00	10
Rocky mountain without forest	13.19	0.00	NA
Bareland with grass and shrub	6.41	0.00	NA
Bareland with scattered trees	16.85	0.00	NA
Industrial perennial crop	11.37	8830	20 (tea)
Mixed fruit garden	9.70	4275.00	30
Annual crop: rice	5.00	1479.00	1
Annual mixed crops	5.00	1578.00	1
Shifting cultivation	3.54	2436.00	1
Settlement	0.00	0.00	NA
Specially used land	0.00	0.00	NA
Water surface	0.00	1576.70	2 (aquaculture)

Appendix 3. List of reviewed policies and regulations

- Land Law 2003 (Law No. 13/2003/QH11 dated 26/11/2003)
- Decree No. 181/2004/ND-CP dated 29/10/2004 of the Government on implementation of the Land Law;
- Forest Protection and Development Law (Law No. 29/2004/QH11 dated 3/12/2004)
- Decree no. 23/2006/ND-CP dated 3/3/2006 of the Government on the implementation of the law on forest protection and development
- Decision No. 380/2008/QD-TTg dated 04/10/2008 of Prime Minister on pilot policy for forest environmental services;
- Decree No. 99/2010/ND-CP dated 24/9/2010 of the Government on policy of payment for forest environment services
- Decision No. 2284/QD-TTg dated 13/12/2010 of the Prime Minister approving the scheme on implementation of the Government Decree No. 99/2010/ND-CP on the policy on payment for forest environment services
- Circular guiding Decree 99/2011/ND-CP on implementation on payment for forest environmental services (5th draft dated 16/6)
- Inter-ministerial Circular on guiding the PFES management mechanism and validation procedures (8th draft dated 21/10/2011)
- Decree No. 120/2008/ND-CP of the Government on river basin management
- Decree No. 117/2010 dated 24/12/2010 of the Government on organization and management of special-use forest system
- Decision No. 799/2003/QD/UBND of People's Committee of Bac Kan province on the regulation on management and organization of Ba Be National Park
- Decision No. 186/2006/QD-TTg of Prime Minister on promulgating the Regulation on forest management;
- Directive No. 38/2005/CT-TTg dated 5/12/2005 of Prime Minister on resurveying and re-planning three types of forests (protection forests, special-use forests and production forests)
- Circular No. 34/2009/TT-BNNPTNT dated 10/6/2009 of Ministry of Agriculture and Rural Development on criteria for forest identification and classification
- Decree No. 99/2009/ND-CP dated 02/11/2009 of the Government on sanctioning administrative violations in forest management, forest protection and forest product management
- Circular No. 35/2011/TT-BNNPTNT dated 20/05/2011 of the Ministry of Agriculture and Rural Development on guiding the exploitation of timber and non-timber forest products;
- Decree No. 05/2008/ND-CP dated 14/1/2008 of the Government on Forest Development and Protection Funds
- Decision No. 114/2008/QD-BNN dated 28/11/2008 on establishment of Vietnam Forest Protection and Development Fund;
- Decision No. 111/2008/QD-BNN dated 18/11/2008 on promulgating the sample regulation on organization and operation of provincial forest protection and development fund

- Decision No. 178/2001/QD-TTg dated 12/11/2001 of Prime Minister on the benefits and obligations of households and individuals assigned or leased or contracted forests and forest land
- Inter-ministerial circular No. 80/2003/TTLT/BNN-BTC of Ministry of Agriculture and Rural Development and Ministry of Finance dated 03/9/2003 on the "Guide to the implementation of Decision No. 178/2001/QD-TTg dated 12/11/2001 of Prime Minister on the benefits and obligations of households and individuals assigned or leased or contracted forests and forestry land
- Circular No. 70/2007/TT-BNN dated 01/08/2007 guiding the development and implementation of forest protection convention in rural communities
- Decision No. 661/QD-TTg dated 29/7/1998 of Prime Minister on the objectives, tasks, policies and implementation of the project on planting 5 million hectares of new forests
- Decision No. 100/2007/QD-TTg dated 6/7/ 2007, amending and supplementing a number of articles of Decision No. 661/QD-TTg dated 29/7/1998 on the objectives, tasks and policies and implement the project on planting 5 million hectares of forests
- Inter-ministerial circular No. 58/2008/TTLT-BNN-KHDT-TC of the Ministry of Agriculture and Rural Development, Ministry of Planning and Investment, Ministry of Finance dated 02/05/2008 guiding the implementation of Decision 100/2007/QD-TTg of Prime Minister
- Decision No. 147/2007/QD-TTg of Prime Minister on a number of policies on production forest development in the period 2007 - 2015
- Decision No. 135/1998/QD-TTg of Prime Minister approving the program on socio-economic development in mountainous and remote communes with special difficulties
- Decision No. 134/2004/QD-TTg of Prime Minister approving the program in supports of productive land, residential land, housing and clean water for poor ethnic minorities
- Decision No. 167/2008/QĐ-TTg dated 12/12/2008 of Prime Minister on the policy to support the poor on housing
- Resolution No. 30a/2008/NQ-CP of the Government on the support program for fast and sustainable poverty reduction in 61 poor districts.
- Decision No. 174/2006/QD-TTg of Prime Minister approving the overall scheme on protection and sustainable development of ecological environment and landscape of The Cau River basin (six provinces, including Bac Kan province)
- Decision No. 1890/2010/QD-TTg of Prime Minister approving the master plan on socio-economic development of Bac Kan province up to 2020

Appendix 4. List of interviewees

Name	Position/Organization	Contacts
Mr Pham Xuan Phuong	Deputy Director General, Department of Legislation, MARD	pxuanphuong@fpt.com xuanphuong_p@yahoo.com
Mr Le Manh Thang	Division of Forestry, Department of Agriculture and Rural Development of Son La province	thanglnsl@gmail.com
Mr Nguyen Truc Bong Son	Division of Forestry, Department of Agriculture and Rural Development of Lam Dong province	ldcptlln@hcm.vnn.vn
Mr Vu Tan Phuong	Director of Research Centre on Forest Ecology and Environment, Forest Science Institute of Vietnam	phuong.vt@rcfee.org.vn
Mr Duong ThanhTuyen Mr Bui Van Minh	Deputy Director of Na Hang Hydropower plant Director of Ta Lang Hydropower plant	Na Hang Hydropower plant, Na Hang district, Tuyen Quang province Ta Lang Hydropower plant, Bang Phuc commune, Cho Don district, Bac Kan province
Mr Tran Cao Khai Ms Trieu Thi Toan	Head of Tourism Division, Department of Culture, Sport and Tourism of Bac Kan province Vice-head of Division of Culture, Sport and Tourism of Ba Be district, Bac Kan province	Department of Culture, Sport and Tourism of Bac Kan province Division of Culture, Sport and Tourism of Ba Be district, Bac Kan province
Mr Nong The Dien Mr Nguyen Van Dang	Director of Ba Be NP President of the Boat Cooperative	Ba Be NP, Na Mam village, Khang Ninh commune, Ba Be district
Ms Pham Minh Thoa	Director of UN-REDD Programme in Vietnam	thoa.dof@gmail.com
Mr Pham Manh Cuong,	National focal point on REDD+	cuong.pham.rs@gmail.com
Mr Phạm Xuan Hoan,	Deputy Director General, Xuan Mai University of Forestry	hoansilv@vnn.vn
Ms Do Thi Ngoc Bich	Head of Division of International Cooperation and Science, Xuan Mai University of Forestry	bichthien@yahoo.com
Mr Hoang Ngoc Duong	President of People's Committee of Bac Kan province	Office of Bac Kan PPC, Cluster 1A, Phung Chi Kien Ward, Bac Kan town, Bac Kan province
Mr Nong Van Chi	Director of Department of Agriculture and Rural Development of Bac Kan province	Cluster 4, Duc Xuan Ward, Bac Kan town, Bac Kan province
Mr Hoang Van Giap	Director of 3PAD project	hvgiap.bk@gmail.com
Mr Nguyen Ba Ngai	Deputy Director General of VNFOREST, MARD	nguyenbangai@gmail.com
Mr Hua Duc Nhi	Vice-Minister of MARD	No.2 Ngoc Ha street, Ba Dinh district, Hanoi
Mr Nguyen Tuan Phu	Director General of Department of Sectoral Economics, Government Office	No.1 Hoang Hoa Tham street, a Dinh district, Hanoi. Tel: 091 320 6114

Appendix 5. List of stakeholder interviewees in PES for landscape beauty

Level	Name of interviewee	Affiliation	Place
Ba Be Village			
	Mrs Chi Hoa (2 meetings)	Homestay owner	Bo Lu
	Mr Du	Homestay owner	Bo Lu
	Mr Linh (2 meetings)	Tour guide (+ small tourist office)	Bo Lu
	Mr Hoan	Homestay owner	Pac Ngoi
	Mr Mien	Homestay owner	Pac Ngoi
	Mr Thu (2 meetings)	Homestay owner	Pac Ngoi
	Mrs Hoa	Farmer	Pac Ngoi
	Mrs Dung	Handicraft seller	Pac Ngoi
	Mr Hoang	Hotel manager	Cho Ra
	Mr Thu	Guesthouse owner	Cho Ra
	Mrs Tu	Head of Women Association	Bo Lu
	Mrs XY	Vice-Village leader Bo Lu	Bo Lu
	Mr Hua Van Canh	Village leader Pac Ngoi	Pac Ngoi
	Mr XY	Village leader Leo Keo	Leo Keo
Institutions			
Ba Be Commune	Mr Nong Van Hoanh	Head of CPC Nam Mau Commune	Bo Lu
	Mr Tran Van Lap	CPC Vice-Chairman Nam Mau Commune	Bo Lu
	Mr Pham Huu Tang	Head of CPC QuangKhe Commune	Cho Leng
	Mr Ha Van Thuong	Head of CPC Dong Phuc Commune	Ban Chan
Ba Be Institutions	Mr Pham Duc Toan (3 meetings)	National Park Vice-President of Ba Be Ecotourism and Environmental Education Center (EEEC)	Ba Be NP
	Mr Hieu (2 meetings)	National Park EEEC staff	Ba Be NP
	Mr Quang	National Park Administration and Planning Office	Ba Be NP
	Mr Hoang Van Kien	National Park Forest Protection Department	Ba Be NP
	Mr Dang	Head of Ba Be Lake Management Cooperation (boat cooperative)	Bo Lu
Ba Be District Level	Mrs The	Dpt. of Agriculture & Rural Development	Cho Ra
	Mrs Cu, Ms Toan, Mr Hai	Division of Culture & Information (DoCST)	Cho Ra
BacKan Province Level	Mr Dao Duy Duc	Vice-Director of Department of Culture, Sport & Tourism	Bac Kan
	Mr Tran Cao Khai (2 meetings)	Department of Culture, Sport & Tourism - officer	Bac Kan
	Mr Pham Ngoc Kien	Dpt. of Agriculture & Rural Development	Bac Kan
General Institutional Level	Mrs Minh Ha Hoang	Head of ICRAF Vietnam office	Hanoi
	Mr Dam Viet Bac	ICRAF- PES program officer	Ba Be
	Ms Alba Saray Perez Teran	ICRAF - PES program officer	Hanoi
	Dr Delia Catacutan	ICRAF Headquarters staff	Hanoi
	Mr Luong Chi Cong	IFAD-3PAD program officer	BacKan
	Mr Dinh Thanh Thanh	Department of Culture, Sport & Tourism - PES coordinator	Da Lat
	Mrs Ly Thi Minh Hai	IUCN - Vietnam PES coordinator	Hanoi
	Mrs To Thi Thu Huong	GIZ- Vietnam PES coordinator	Hanoi
	Mrs Nguyen BichThuy	Winrock International - PES coordinator	Ho Chi Minh City