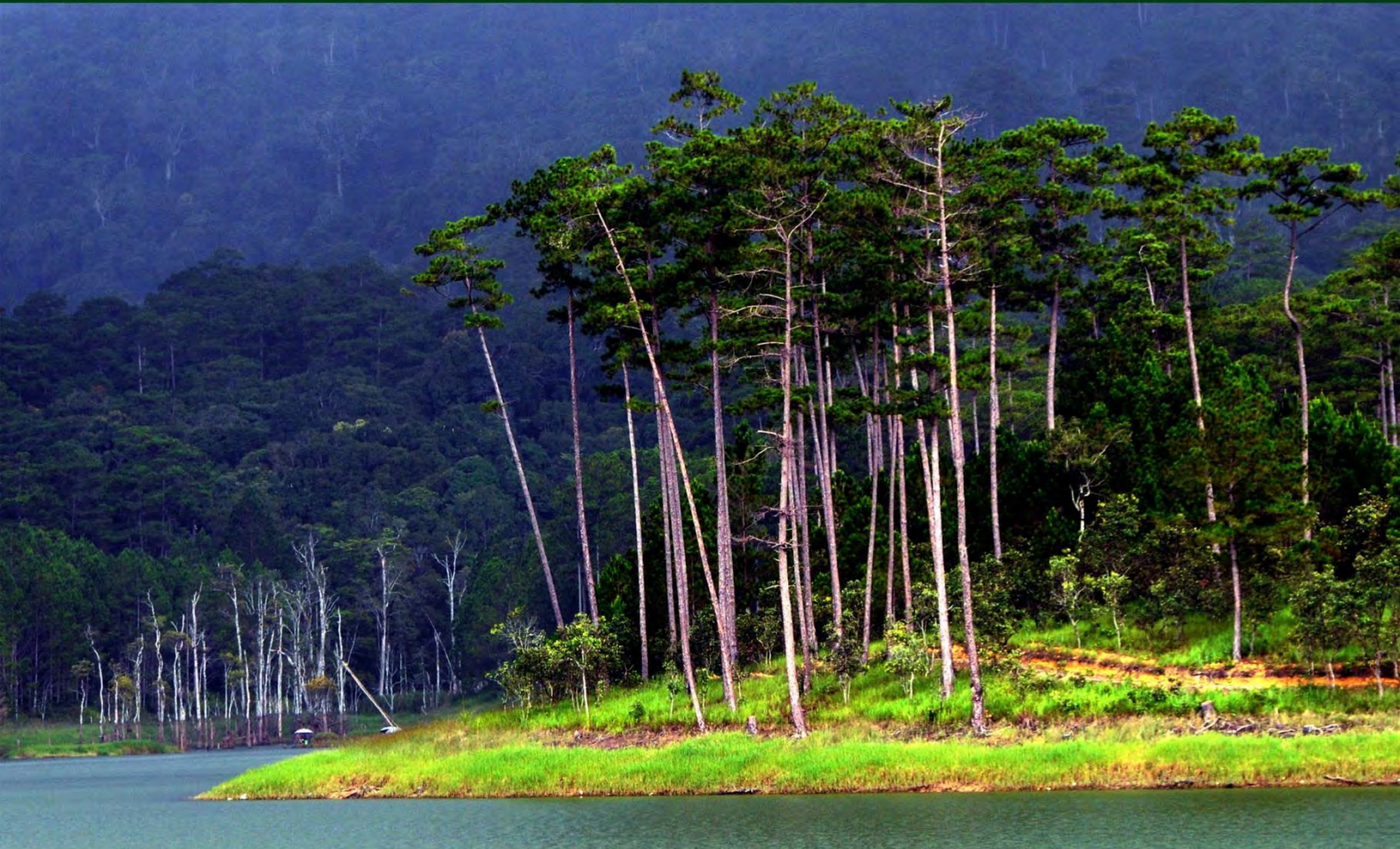




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Downscaling REDD Policies in Developing Countries: Assessing the Impact of Carbon Payments on Household Decision Making and Vulnerability to Climate Change in Vietnam

Pam McElwee, Nghiem Phuong Tuyen, Le Hue, and Vu Huong



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March, 2015

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The Economy and Environment Program for Southeast Asia (EEPSEA) was established in May 1993 to support training and research in environmental and resource economics. Its goal is to strengthen local capacity in the economic analysis of environmental issues so that researchers can provide sound advice to policymakers.

To do this, EEPSEA builds environmental economics (EE) research capacity, encourages regional collaboration, and promotes EE relevance in its member countries (i.e., Cambodia, China, Indonesia, Lao PDR, Malaysia, Myanmar, Papua New Guinea, the Philippines, Thailand, and Vietnam). It provides (1) research grants, (2) increased access to useful knowledge and information through regionally known resource persons and up-to-date literature, (3) opportunities to attend relevant learning and knowledge events, and (4) opportunities for publication.

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DOWNSCALING REDD POLICIES IN DEVELOPING COUNTRIES: ASSESSING THE IMPACT OF CARBON PAYMENTS ON HOUSEHOLD DECISION MAKING AND VULNERABILITY TO CLIMATE CHANGE IN VIETNAM

Pam McElwee, Nghiem Phuong Tuyen, Le Hue, and Vu Huong

EXECUTIVE SUMMARY

Forecasted global climate changes have the potential to exacerbate existing social vulnerabilities, especially in poorer developing countries. The ability to cope with these future changes are often conditioned by the communities' and individuals' ability to access and mobilize natural resources, particularly forests. A new global policy, known as Reduced Emissions from Deforestation and Degradation (REDD), stipulates that countries that "avoided deforestation" would be paid. However, rules on access, use rights, and local governance to forest changes under REDD's implementation may render some households and communities *more* vulnerable to the effects of climate change in the long-term. That is, if REDD policies reduce the households' and communities' adaptive capacity by restricting their access to and local management of the needed natural resources.

This report presents findings from a field study in an early REDD development site in Vietnam to test several important questions about local forest governance and REDD. The objectives of the study were the following: (1) to determine ways in which payments for forest protection might alter the land-use decision making of smallholder households, especially those who use forests for supplementary food production and income diversification, (2) to evaluate if these changes in land use might increase or reduce the overall social and biophysical vulnerability to projected future climate changes, and (3) to assess how understanding the local forest governance and land use is influencing the development of subnational and national policies. Qualitative and quantitative methods were used to collect data from three provinces.

Changes in forest use, precipitated by forest protection payments, have not been significant because the existing forest payments lack conditionality. More attention should be paid to the poverty and social aspects of REDD implementation, as well as to the potential risks when poor people are induced to make land-use changes in response to carbon markets.

1.0 INTRODUCTION TO THE RESEARCH PROBLEM AND PROJECT

1.1 Research Approach and Goals

One of the most discussed options for the next phase of the Kyoto Protocol, which sets targets for global greenhouse gas (GHG) emission levels for signatory countries, are measures for Reduced Emissions from Deforestation and Degradation (REDD). Because forests store around 45% of total terrestrial carbon and serve as a sink for the absorption of around one-third of anthropogenic carbon emissions, including these measures in global climate planning makes good sense to many (Gullison et al. 2007; Bonan 2008). The fundamental premise of REDD is that if households and governments are given payments that equal or exceed what could be raised by cutting down forests, then forests will be better protected and carbon conserved.

As the global architecture for REDD develops, and as programs are piloted to prepare countries for "REDD readiness," questions have been raised about how REDD will actually work. Major questions surround these key issues, including (1) how forests will be defined and measured; (2) how baselines against which the process in halting deforestation will be measured; (3) how financing will be used to fund REDD activities and if it will involve aid-type funds or a market-based mechanism; (4) how such benefits will be shared with beneficiaries and how safeguards will be put in place to protect their interests, particularly the indigenous

peoples; and (5) what activities in forested areas need to be altered in response to payments and if these changes in land use will be permanent and additional to what forest management is already achieving (Corbera and Brown 2010; Agrawal, Nepstad, and Chhatre 2011).

One particular area of concern is how the livelihoods of local forest-dependent peoples will be affected in the implementation of REDD. Will actions to increase mitigation of GHGs—particularly policies related to land-use change and forest use—have unintended consequences? For example, will land-use and forest-use changes (as a result of REDD) affect the ability of forest-dependent people to adapt to future climate impacts in the long-term?

Such concerns are valid. Previous research studies have shown that the ability of communities and individuals to cope with forecasted climate changes—such as localized changes in rainfall timing and the amounts, frequency, and intensity of strong events like floods and storms; and changes in water availability, among other impacts—are highly likely to be conditioned by the communities' ability to access and mobilize resources like land, trees, water, fish, and other means of livelihood (Leach, Mearns, and Scoons 1999; Ribot and Peluso 2003).

If access rights to these resources were to change under REDD policies and traditional “banks” of assets (e.g., forest resources) become inaccessible, communities and households may become more vulnerable to the effects of climate change at the local level. On the other hand, REDD could potentially strengthen local access rights to forests through increased financing to ensure their protection from outside deforestation pressures, thus possibly increasing communities' resilience to climate change. Therefore, this research was done to understand how policies like REDD may restructure access to entitlements and resources at local levels, and if there will be changes in local social vulnerability. In particular, it examined the development and implementation of REDD and REDD-like payments for environmental services (PES) in the country of Vietnam.

Vietnam is one of the few countries that are preparing for REDD through the support of the World Bank's Forest Carbon Partnership Facility (FCPF) and the United Nations' REDD Readiness program (UN-REDD), as well as several local and international nongovernmental organizations (NGO) (e.g., World Wildlife Fund, Netherlands Development Agent) and private companies (e.g., Honda and IKEA). In addition, Vietnam is likely to be one of the most vulnerable nations in the world to climate change because of its long coastline (>3,000 kilometers [km]), dependence on agriculture (~70% of its population is rural), and low levels of development (per capita income in rural areas area is still relatively low as compared to neighboring countries in Asia). Without attention to the existing social vulnerabilities that underpin resource use within Vietnam, new policies for climate mitigation such as REDD can exacerbate inequalities. Thus, understanding how REDD policies might alter land-use frameworks is necessary before large-scale global programs get underway.

The research project's overall goals were the following:

1. To understand the ways in which PES, such as carbon, can alter the land-use decision making of smallholder households in forested areas;
2. To evaluate if land-use decisions influenced by these payments increase or reduce overall social and biophysical vulnerability to forecasted climate changes;
3. To assess how local policy makers' understanding of household decision making and land use influence policy-making processes that implement global goals like REDD; and
4. To contribute to research cooperation and exchange between Vietnamese and US institutions on a pressing issue like climate change.

This research report outlines the findings of the project implemented by the Center for Natural Resources and Environmental Studies (CRES) of Vietnam National University from 1 March, 2011 to 31 March, 2012. This project was supported by the Economy and Environment Program for Southeast Asia with a grant of CAD 32,100. In addition, the US National Science Foundation (NSF) supported the project with a grant of USD 74,899 over a three-year period to enable the Rutgers University in the US and Tropenbos International in Vietnam to participate in the project (part of the NSF money was designated for CRES to continue working on the project even after the EEPSEA funding ended in March 2012). Although the budgets were kept separate for administrative purposes, the project was jointly carried out by all three institutions.

1.2 Research Questions

The research project was carried out in several local field sites, which were selected based on the type of forest and forest policy. These included existing and proposed PES/REDD projects that could be assessed and tested, which enabled the research team to assess the impact of payments for forest protection on household livelihoods and on climate vulnerability. The team also conducted research at the national level by interviewing policy makers and by attending workshops and meetings on the development of REDD at the national policy levels and at the local REDD pilots. The project's main research questions were the following:

1. *How do household payments for forest environmental services (carbon or otherwise) impact household decision making, and subsequently, livelihoods?*

In assessing the impacts of forest protection payments, the following factors were considered:

- Did the most socially vulnerable households receive forest protection payments (either from PES or REDD or other policies), and if so, how did they access them?
- How did the more vulnerable households use forest payments as compared to the less vulnerable households?
- How did the timing, size, and form of payment affect household monetary and land-use decision strategies?
- How did payments affect gender-based decision making about how household income will be spent?

2. *How do land-use changes instigated by payments affect households' social and biophysical climate vulnerability?*

To study land-use changes, the project looked at the following factors:

- Did PES/REDD contracts require restrictions on forest use that might change resource access and control, such as increasing food vulnerability for some households?
- Did PES/REDD contracts provide sufficient incentives and support so that forests were better protected from overexploitation?
- Did the PES/REDD contracts for households change forest use management regimes from communal to individual management, and did this weaken communal risk reduction and risk pooling to climate events?

3. *How do changes in vulnerability as a result of shifting access to resources caused by PES/REDD align with long-term climate forecasts?*

In the study of climate vulnerability, the research looked at the following factors:

- How did households use long-term climate forecasts to influence short-term land-use and household-livelihood decisions, if at all?
- Did PES/REDD contracts alter long-term adaptive capacity to climate change by reducing access to subsidiary income sources or by reducing incentives to diversify production?
- How did external factors that are difficult to predict or control, such as changes in food prices, have an impact on household decision making regarding land-use conversion, and how effective were PES payments in countering unpredictable or high-risk impacts?

4. *How do policy makers use social and biophysical data and understandings of vulnerability in developing subnational REDD and PES programs?*

In the study of policy development for REDD, the following factors were considered:

- What were the key indicators used by policy makers to determine sites and benefit distribution systems as they develop localized REDD policy?
- What assumptions did policy makers make about household decision making and vulnerability?
- Can REDD development try to establish baseline reference standards on social indicators, as is being developed for carbon emissions baselines?
- What data do local officials want to know but do not have access to, especially on social indicators?

1.3 Structure of the Report

Section 1 of this final technical report presents the main activities and findings from the past year. Section 2 presents the background on the development of payments for forest protection and important issues about the REDD policy in Vietnam. Section 3 presents data on the three main local study areas and the methodologies used by the team to collect primary data. Section 4 presents the key findings of the household survey. Section 5 analyzes and discusses the findings and answers some of the main research questions. Section 6 presents the conclusion of the report and the future work under the continued financing of other donors.

2.0 DEVELOPMENT OF PES AND REDD IN VIETNAM

2.1 Payments for Environmental Services (PES)

Given the strong role that the state has played in forest management, the adoption of more market-oriented approaches has been surprisingly rapid in Vietnam. PES (known as *phí chi trả dịch vụ môi trường* in Vietnamese) has been practiced in Vietnam only during the last five years (Hoang Minh Ha, Noordwijk, and Pham Thu Thuy 2008).

The first actual PES project, however, was the Rewarding Upland Poor for Environmental Services (RUPES) project funded by the International Fund for Agricultural Development and carried out by the World Agroforestry Center (ICRAF). RUPES was designed to introduce the policy for PES in Asia at the local, national, and international levels by using several small pilot schemes connecting service providers (primarily poor upland communities in forested areas) and buyers (primarily downstream water users); hence, enabling positive win-win outcomes (Leimona et al. 2008). Although RUPES was carried out in Indonesia, Nepal, and the Philippines, an ICRAF office in Hanoi brought the findings of the project to Vietnam, and also funded small research projects to assess if PES would work in the country (Bui Dung The and Hong Bich Ngoc 2008).

Since the RUPES project, several pilot PES projects have been implemented, including those for landscape protection, ecotourism user fees, and carbon sequestration (Pham Thu Thuy, Hoang Minh Ha, and Campbell 2008). One of the largest PES projects began in 2007 as part of the Asia Regional Biodiversity Conservation Program (ARBCP), which was funded by the United States Agency for International Development (USAID) and implemented by Winrock International.

ARBCP included several traditional integrated conservation project approaches. One of these was the provision of seedlings to poor households to increase their income. Another was a pilot project in which households got land titles in exchange for agreeing not to plant cash crops but protect certain forest species instead. However, ARBCP is better known for its PES components in various project sites in Southern Vietnam. The project also promoted the results to officials of the Prime Minister's office, sponsored workshops for officials, and conducted a field trip to PES sites in the US.

In 2007, the Ministry of Agriculture and Rural Development (MARD) was commissioned to design and formulate a document that constitutes the main input to build an official PES policy for Vietnam. The Prime Minister approved on 10 April, 2008 the Decision No. 380 QD-TTG entitled "On the Pilot Policy on Forest Environment Service Charge Payment." The Decision formally recognized the establishment and monitoring (for two years) of two PES pilot projects in Lam Dong and in Son La provinces, as well as the future replication of the project to other sites if successful.¹ These pilot projects formed the basis for Decree No: 99 /2010/ND-CP entitled "On the Policy for Payment for Forest Environmental Services," which now extends nationwide (See Appendix 1 for a copy of the Decree).

¹ The USAID and Winrock project provided technical and financial assistance to the pilot in Lam Dong, and the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) assisted in the pilot project in Son La province, where they have had a long-standing donor project on land allocation.

Decree No. 99 indicates that five types of forest PES payments are legal for the following:

1. land protection, such as soil erosion;
2. watershed protection and water regulation;
3. carbon sequestration;
4. landscape and biodiversity protection for tourism purposes; and
5. protection of the spawning grounds and source of seed/feed for aquaculture.

The decree indicates that required buyers will include hydropower companies, water companies, industrial facilities that use water, tourist companies, and others to be determined. Both direct user to seller contracts and indirect ones between sellers and intermediaries are allowed. In indirect cases, payments go to a Forest Protection and Development Fund set up in each province, and payments are transmitted via these provincial funds to recipients of the PES contracts.

Decree No. 99 also sets the exact market price for some of the payments. Hydropower companies must pay VND 20/kWh (USD 0.0013/kWh) of electricity; water users must pay VND 40/m³ (USD 0.0025/m³); and tourism companies are assessed 1%–2% of their total revenues. Further, assignment and development of fees is given over to the provincial government committees (MARD 2010a). Even in cases where there is direct user to seller contracting, the decree requires that projects use the established prices as the required minimum.

The first PES pilot projects have been implemented for years now. Both pilots involved a process of (1) identifying the mechanism for service management and use, (2) identifying the value of PES and rates to be paid through the development of what are known as K-coefficients, (3) reviewing the allocated forest areas and forest service providers, and (4) reviewing the service payees such as agriculture, clean water supply companies, hydro power plants, etc.

In Lam Dong province, the pilot primarily links water users in southern Vietnam to households living in an upland watershed (Peters 2008). On the other hand, the Son La pilot links hydropower companies of the northern mountains to communities and households in that watershed.² So far, the buyers of environmental services in the Lam Dong pilot area have been the Water Supply Company of Ho Chi Minh City (SAWACO), the water supply company of Bien Hoa City, two hydropower companies (Da Nhim and Dai Ninh), and five tourism companies. In Son La, the payees included small hydropower operators and the water supply company of Son La town. All of these entities pay into a newly set-up Provincial Forest Protection Fund, which operates as an entity under the MARD office of each province, with a few staff members on secondment from MARD.

So far, fees collected have totaled nearly USD 5 million in Lam Dong since the beginning of the pilot in 2009, and nearly USD 3 million in Son La (Table 1).

Table 1. Fees collected under PES policy pilots

| Payee | Total payment | Rates based on | % of total fund for province |
|-------------------------------|-------------------------|---|------------------------------|
| Lam Dong, 2009–2010 | | | |
| Da Nhim Hydropower plant | VND 40.5 billion | VND 20/kWh produced | 41 |
| Dai Ninh Hydropower plant | VND 47.6 billion | VND 20/kWh produced | 48 |
| Water supply company (SAWACO) | VND 9.9 billion | VND 40/m ³ supplied to consumers | 10 |
| 5 Tourism companies | VND 0.6 million | 1% of profits | Less than 1 |
| <i>Total</i> | <i>VND 98.6 billion</i> | | |

² According to Decree No. 99/2010/NĐ-CP that authorized these pilots, the term Payment for Forest Environmental Services (PFES) is used. For ease of understanding we have used the term PES rather than PFES in this report.

Table 1 continued

| Payee | Total payment | Rates based on | % of total fund for province |
|---|--------------------------|---|------------------------------|
| Son La, 2009–2010 | | | |
| Hoa Binh and Suoi Sap hydroelectric companies | VND 62 billion | VND 20/kWh produced | 99 |
| Water supply company of Son La city | VND 34 million | VND 40/m ³ supplied to consumers | 1 |
| <i>Total</i> | <i>VND 62.06 billion</i> | | |

Forest service suppliers in the two pilot sites included households and individuals near forestlands who have contracts or red books, and the Forest Protection Management Board (FPMB) and State Forest Enterprise (SFE) operating in the area. In the Son La pilot site, most of the participants were small household forest owners, which have increased transaction costs considerably. A total of 52,000 individual owners have been paid in Son La where 45,000 individual households are forest owners; 6,000 are community or groups of households; and 1,000 are communal social organizations.

In Lam Dong, suppliers are primarily state-owned FPMBs (13 in all) with a few individual households (around 500). The participating FPMBs have, in turn, contracted out to individual households the task of protecting the areas under their control using protection contracts. These protection contracts are signed yearly with households; so in fact, there were around 8,000 households benefiting from the pilot site.

Participating households in Lam Dong have an average of 10–30 hectares (ha) to protect, although these households do not have land tenure rights. Son La household members are generally land owners with secure tenure but very small landholdings (an average of under 5 ha per household). Some communities in Son La also participated as a group, although this was not common in Lam Dong. The local authorities in each area, such as the forest protection rangers (*Kiem Lam*) of the district, monitor the participating households to ensure that they fulfill their contracts.

As to how much money from PES payments should go back to the local people was a considerable debate during the pilot project. Conversations with forestry officials in Lam Dong province indicated that government officials had conflicting ideas on how the payments should be allocated to local people and organizations. There were arguments in favor of the SFEs, national parks, and other state protection entities; not just for individual households.

Out of the 2010 fees collected in Lam Dong (VND 47 billion or USD 2.61 million), 10% of the fund were kept in the provincial fund to cover expenses; 9% went to 13 large forest owners (such as SFEs and FPMBs) to cover their costs; and 81% went to household payments. For a household, this amounted to around VND 280,000 (USD 15) per ha payment in 2010 and VND 400,000 per ha in 2011. Son La collected VND 60 billion in fees in 2010, but only paid VND 10 billion. Natural watershed forests were paid at a rate of VND 140,243 per ha per year; plantation watershed forests received VND 126,219 per ha per year; natural production forest received VND 84,146 per ha per year; and planted production forest received VND 70,121 per ha per year. In comparison, the previous 5 Million Hectare Reforestation Project (5MHRP) paid similar rates of between USD 3–10 per ha for protection.

There is still no clear mechanism to ensure that the fund payouts really go to those who have actually protected the forests the best. Currently, a simple formula (known as the K-coefficient) is being used to calculate payment schedules from the provincial funds based on broad categories of type of forest, origin of forest, quality of forest, and level of impact on forest resources (Pham Van An 2009). K-coefficient is then applied to land maps of the area, and payments are calculated from that.

However, this has been a cumbersome process. For example, in the first phase in Son La's pilot, nine communes of nine districts were paid for PES that applied four different K-coefficients. The K-coefficient was identified according to the types of forest such as natural protection forest ($k = 1$, which means around USD 7/ha per year); planted protection forest ($k = 0.9$, equivalent to USD 6.3/ha per year); production forest

($k = 0.6$, which means that the payment is around USD 4.2/ha per year); and planted production forest ($k = 0.5$, relevant to USD 3/ha per year).

However, the fragmented and small allocated forest plots led to complicated calculations of PES payments. Hence, in Phase 2, only one K-coefficient was used with a payment of around USD 6.8/ha per year. Further, no spatial data have been collected on changes in land use in either pilot projects; so there is no firm conditionality yet in the PES payments.

2.2 Lessons from PES Policy

The market-oriented aspect of PES has been downplayed in Vietnam in favor of a continued strong role for the central and local governments, both as buyers and as sellers and as formulators of the basic parameters for the PES market. For example, tax codes that specify the rates, fees, and charges for environmental problems still remain; natural resources can only be set by the state, not by the market. The latter has been reinforced by the recent MARD policy that sets the exact PES charges for water and electricity users nationwide (Hoang Minh Ha, Noordwijk, and Pham Thu Thuy 2008; MARD 2010a).

One study that interviewed officials involved in PES noted that most did not really see PES as a business transaction involving buyers and sellers (Pham Thu Thuy, Hoang Minh Ha, and Campbell 2008). In reality, such fees bear no resemblance to a free-market pricing mechanism; rather, the fee of VND 20/kWh for hydroelectric plants was based on one hydrologist's study in Lam Dong. The hydrologist estimated the approximate absorption of water by forest soils and the costs of soil erosion in deforested land. The VND 40/m³ to be paid by water companies was based on one economist's study on the willingness to pay of water users in urban areas of Ho Chi Minh City (Pham Van An 2009; ARBCP 2009).

The fact that national fee levels have been set somewhat randomly based on very narrow local studies is a source of concern for many participating officials in PES programs. In one interview with a hydropower company that uses water from Lam Dong, a manager pointed out that different hydropower plants use water more or less efficiently, and that his particular plant used much less water per kWh produced. Yet, the latter plant received no reduction in its fees as compared to a plant that used twice as much water to produce the same amount of electricity.

The state is also involved as buyers of services, on a compulsory basis, such as the case of hydropower companies and water supply organizations that have been targeted in the recent PES law and pilots. Indeed, government officials have indicated that "voluntary participation in PES was impossible in Vietnam, and that it needed to be associated with rules and regulations to ensure compliance with payment conditions" (Pham Thu Thuy, Campbell, and Garnett 2009, p. 127). These organizations are not private. For example, SAWACO, the water supply company of Ho Chi Minh City, is a joint venture in which the government still owns a 51% share. Another major buyer of forest services, as indicated by MARD's recent decree, is Electricity of Vietnam, which is a government monopoly.

Tourism companies are often state-owned companies or joint stock ventures run by provincial governments. Water companies and hydropower companies have primarily passed these additional fees onto their consumers in the form of higher water and electricity bills. In some cases, these companies simply refuse to pay the additional PES fees altogether. One is the massive Hoa Binh hydropower station in the north of the country that is refusing to pay the Son La province pilot project due to objections about the type of environmental services they are supposedly buying. Thus, to date, there is little private participation in PES; nearly all money is being moved around from development aid agencies (which subsidize many PES projects) and individual consumers through state-owned companies to other state intermediaries. One representative of a state forest farm receiving PES credits noted that PES is primarily about "taking [money] from the right pocket of the government and putting it in the left pocket."

Further, because the government is playing such a big role, buyers and sellers of services do not have a chance to meet or negotiate directly. Interviews with sellers (such as forest-protecting households) indicated their great interest in being able to visit buyers of services so that they might see for themselves the links between upstream and downstream environmental services. Buyers (such as hydropower companies) were less interested in working directly with forest protectors because of the many potential sellers. It would have been complicated for them to coordinate themselves. The buyers preferred to rely on

government offices such as the provincial forest protection fund to do most of the dealings with sellers. However, the buyers wanted more information on land-cover change to ensure that they were paying for a service that they would actually get.

To date, the buyers have received no information about where their money goes and if this is being used effectively. In addition, there is no mechanism for either the seller or buyer to give feedback and comments in the PES pilots. One buyer (a hydropower company) gave some suggestions on how to assess water pricing that would more accurately reflect the local situation.

In terms of sellers of services, the government continues to play a large role in land and forest management through the continued existence of many SFEs and FMPBs. The SFEs and FMPBs still control significant areas of the forest estate; hence, these are likely to be important providers of PES services, either as direct land managers or as intermediaries.

The new national PES policy allows up to 20% of PES payments to be kept by intermediate bodies for administrative costs. However, in interviews in 2011, officials from several SFEs and FMPBs in Lam Dong said that the PES policy was similar to the 5MHRP that came before it, but was simply repackaged with a new name. In both projects, money comes from outside the province and goes to provincial entities, which allows the latter to continue existing and to pay their workers' salaries, even if one policy (i.e., PES) was supposed to be a market policy, not a state subsidy policy. Hence, to the SFEs, these policies were one and the same.

In fact, in several pilot projects, Pham Thu Thuy, Campbell, and Garnett (2009) found that PES payments never made it to the service sellers; instead, they ended up being kept by provincial authorities. Hence, the lack of a transparent benefit-sharing mechanism was identified as the major barrier to participation by sellers.

In a further study by Petheram and Campbell (2010), local households professed skepticism toward PES as they saw significant changes in forest policies. Their distrust toward government officials indicated their worry of ever actually receiving PES payments should they participate in the process.

Finally, there is no evidence that the pilots have changed the existing land tenure for forests in either test site. In both sites, land is considered to have already been allocated and is unlikely to be significantly changed in the future. For Lam Dong, this means that most forests remain under state control in National Parks and FMPBs. For Son La, this means that most forests have been allocated in the 1990s and are already being managed by households and communities, with only small areas of forest under Nature Reserves or FMPBs.

For PES participants, Lam Dong uses protection contracts between forest owners (the state) and individuals. In Son La, forest owners (households) contract directly with the PES provincial fund. Lam Dong has been able to keep PES payments rather high due to large areas of forest that are contracted to households (an average of 30 ha per household). Nationwide, however, the average size of forest holdings per household is only 2.91 ha, and many millions of households have no holdings at all (MARD 2010b).

Lam Dong province has the largest sizes of forest plots in the whole country. In fact, 65% of the forestland tenure certificates in the province have been given to households that have more than 5 ha. The other provinces with large forest plots are Ninh Thuan with 44% of the households owning more than 5 ha, and 36% of the households for Kontum. In comparison, only 5% of households in Ha Giang, which is located in Vietnam's northern mountains, own more than 5 ha in 2006 (MARD 2010b).

The figures above indicate that Lam Dong may be an exceptional site for PES and could not easily be replicated in other parts of the country. The skewed land tenure situation in Vietnam implies that PES may be a viable a project only for a minority of forest user rights holders in a few specific provinces. While PES programs could sign up participants who have less than secure tenure rights (i.e., protection contracts with owners of land like SFEs or FMPBs as is done in Lam Dong), these participants are less likely to be able to make independent decisions about land-use practices as they are on short-term payment contracts.

Could the PES programs encourage the distribution of land tenure certificates for those who do not have them, and thereby be a driver of change to help the poor get tenure access? In theory this is possible.

But none of the three sites visited for field research in this study had linked their PES development to increasing land allocation rights.

2.3 Development of REDD Policy in Vietnam

Vietnam is estimated to have a range of over 700–1600 million tons of carbon stored in existing forests and soils, making it a low- to moderate-level country in terms of global impacts (Gibbs et al. 2007). The possible economic benefits of REDD to Vietnam have been estimated at a minimum of USD 60 million per year (Ebeling and Yasué 2008). Vietnam would particularly benefit most from REDD policies that include the possibilities for “enhancement” of forests (i.e., regeneration, restocking, reforestation) as forests in Vietnam are relatively poor and have low carbon density.

REDD projects have built on the existing PES approaches, and REDD readiness is proceeding within the country (IIED 2011). A new national REDD steering committee was established by the government in early 2011 within the Vietnam Administration of Forestry. This committee is coordinated by MARD and by a special Vietnam REDD office that coordinates with the United Nations Framework Convention on Climate Change (UNFCCC). The steering committee is also getting input on REDD development through a national REDD Network, which was set up in 2009 for NGOs and donors offering advice into the process.

The REDD Network has several subcommittees, which have been tackling issues such as governance; monitoring, reporting, and verification (MRV); financing and benefit distribution mechanisms; and local implementation. For example, the subcommittee on local implementation of REDD is working on capacity building for local pilot projects and on information sharing among communities that are involved in the REDD pilot projects. Within the REDD Network are international and national NGOs and donors who are implementing different projects to prepare Vietnam for REDD readiness.

2.4 Lessons from REDD Readiness

Several key issues based on the initial pilot projects on REDD readiness in Vietnam are being discussed. Most of these issues deal with policy development and capacity building as there have not been much action on the ground. The two key issues tackled in this research were the following: (1) what will the benefit distribution system (BDS) look like, and (2) how will tenure and local rights be protected in any REDD policy? So far, suggestions from the BDS have primarily focused on a national REDD fund, which would disburse finances downward to provincial funds. This, in turn, would decide how to distribute to local beneficiaries (UN-REDD/MARD 2010). The primary focus appears to be on “conditional cash transfers” that link payment to performance. Local decisions on cash versus in-kind transfers will likely be left to local authorities taking into account local conditions (UN-REDD Vietnam 2011a).

However, this is not a simple thing to calculate. “Local-level payments to avoid deforestation and forest degradation, to ensure sustainable forest management, as well as to enhance carbon stocks, should ideally compensate for the direct and opportunity costs incurred and provide clear incentives to land and resource users. Current procedures for calculating payments for forest conservation and the provision of environmental services in Vietnam do not reflect the variation in supply costs or balance the need for monetary and nonmonetary incentives. Due to the highly specific nature of opportunity costs, there are practical limitations on making these estimates for all REDD+ participants” (UN-REDD/MARD 2010, p. 173).

How to ensure conditionality (i.e., that payees only get the money if the forest is protected) remains problematic in national discussions. So does the question of who would monitor forest cover changes—Vietnam itself or a global authority such as a UN agency? It is not yet clear how REDD payments will be made; and if the models of the PES pilots using K-coefficients will be adopted, or if an entirely different model will be used.

The experiences from the PES projects highlighted earlier have shown that local authorities would use the simplest calculation possible for forest payments, which may not reflect actual opportunity costs or the efforts of participating households. *No actual REDD payments have been made yet to anyone in Vietnam; so it is still an open question how this will be handled in the future.* Thus, there is still no practical and empirical research available in Vietnam to show the relationship between carbon payments and poverty alleviation.

Additionally, many questions remain about local rights under REDD. Although Vietnam had been lauded as the first country to develop processes for the Free, Prior, and Informed Consent (FPIC) under UN-REDD, questions remain about how transparent and fair such consultations have really been (UN-REDD Vietnam 2010). The concept is very hard to understand in Vietnamese (usually translated as “*Đồng thuận, tự do, được thông báo đầy đủ và trước*” but really meaning something more like community consultation or “*tham vấn cộng đồng*”).

In the pilot trials in Lam Dong province, for example, village-level meetings were held to obtain consent; but these meetings were very short. These lasted for only two hours; only 45 minutes were allotted for questions and answers after the awareness-raising activities and before the villagers would have to decide to either consent or not to consent to the REDD’s activities (Nguyen Quang Tan 2010). Further, it appeared that the villagers were not presented with any information on the possible risks and costs of participation (i.e., changes in their agricultural practices in response to REDD). Rather, participants were asked general questions like “Do you want your forests to be conserved?” Not surprisingly, since the question did not refer to any costs that might be incurred in forest conservation or how the forest will be conserved, the concept was supported by most of the villagers.

In addition, the FPIC process appeared disconnected from the actual issues on land-tenure rights. Nowhere in the FPIC documentation from UN-REDD was there any indication that the consulted villages owned lands or have been granted tenure rights. Indeed, the PES experience in Lam Dong showed that individual households usually contracted their labor with an intermediary such as a FMPB, which holds the land tenure rights. In this case, it was not clear how the FPIC was protecting the households if these did not have secure land tenures.

A final concern that was discovered during the interviews with some policy makers or local officials was that climate adaptation must still be incorporated into either PES or REDD policies, or that they must still be linked. This was primarily because PES/REDD development is being led by the Ministry of Agriculture and Rural Development (MARD), while climate forecasting and adaptation is being handled by the Ministry of Natural Resources and Environment (MONRE). As a result, climate adaptation policies are still being developed separately from PES/REDD policies.

3.0 BACKGROUND ON THE STUDY SITES AND METHODOLOGY OF THE STUDY

The present project was carried out in three provinces, namely, Lam Dong, Son La, and Thua Thien Hue. The provinces were selected based on the type of forest and on the type of forest policy, particularly existing and proposed PES/REDD projects.³ The original intent of the project was to look at REDD carbon payments because on-the-ground development has been slow, and no REDD payments have actually been made in any area of Vietnam.

However, the study used other forest protection payments as a similar proxy to the type of issues that REDD payments would likely encounter when these are finally developed. These “proxy” payments included payments for forest protection under the 327 and 661/5MHRP programs from 1992 to 2011 and payments made for PES in the two pilot provinces that have been carried out PES since 2009.

The study sites are briefly described below (Table 2):

- **Lam Dong province** in the central highlands area (pine forest, 661 and PES projects, this is the pilot site of the UN-REDD project);
- **Son La province** in the northern mountains (limestone forest, 661 and PES payments); and
- **Thua Thien Hue** in the central coastal area (deciduous upland forest, 661 payments, it has private pulp factories and a private Australian carbon-trading company project).

³ The project team also made a field trip to Nam Dinh province, a coastal site where mangroves are important. However, because there was little household participation in mangrove management and no direct payments for protection, the site was not chosen as a final site for research.

For each study province, five villages in two districts were selected for in-depth study. Villages where existing projects for payments for environmental protection have been operating were chosen. In Lam Dong, the districts of Lac Duong and Don Duong were chosen; Thuan Chau and Son La city districts in Son La province; and Nam Dong and Phu Loc districts in Thua Thien Hue. Hence, there were 15 villages chosen as sites for field research. Villages in these areas typically have between 200–500 households.

In each village, a random stratified sample of 15 households was drawn so that a survey sample of 75 households per province could be interviewed.

Table 2. Comparison of three study provinces

| Indicator | Lam Dong province | Son La province | Thua Thien Hue province |
|--------------------------------|--|--|---|
| Dominant forest type | Pine forest, deciduous broadleaved forest | Mixed coniferous-broadleaved forest, with significant bamboo stands | Subtropical moist broadleaved forest, acacia plantations |
| % forest cover (Natural) | 51% | 35% | 35% |
| % forest cover (Plantation) | 4% | 2% | 12% |
| Deforestation rates, 2000–2005 | –4.8% | +3.3% | +4.2% |
| Forest policies | REDD pilot, PES pilot, 5MHRP reforestation \$, mostly state forestland | PES pilot, 5MHRP reforestation \$, mostly household and community land | 5MHRP reforestation \$, mix of household, state, and unallocated (open access land) |
| Ethnic composition of province | 22% ethnic minority (Koho, Chil, Mnong) | 83% ethnic minority (Thai, Hmong, Tay, Dao) | 4% minority (Katu, Van Kieu) |
| Poverty rates | 32% | 53% | 24% |

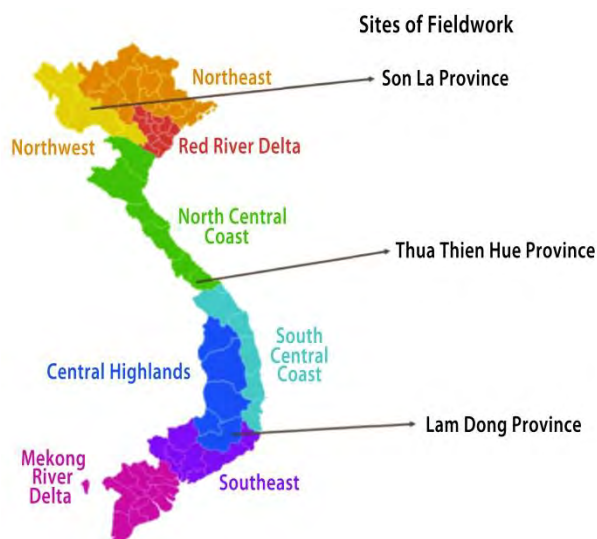


Figure 1. Sites of local fieldwork

3.1 Lam Dong Province

Lam Dong is a mountainous province located in the Central Highlands Region, which is entirely inland. Lam Dong is situated around 800–1,000 meters above sea level. It has a total surface of 9,772 km² (about 2.9% area of Vietnam). The area with sloping land at 25 degree or less occupies a little more than 50% of the total area. The remaining area is more sloping (above 25 degrees). The province has two cities (Da Lat

and Bao Loc) and 10 districts. Da Lat is the sociopolitical and economic center of Lam Dong. It is located 320 km north from Ho Chi Minh City.

Lam Dong's economy comes from agro-forestry-aquaculture (48.5%), services (31.6%), and industry (19.9%). The province has 255,400 ha usable for agriculture. Most of the lands in the central plateau of the province (Bao Loc and Di Linh districts) are used for long-term industrial crops with high economic value such as coffee, tea, and mulberry. The land in Da Lat City (the provincial capital) and its surrounding districts are used for vegetable and flower plantations. The province has prioritized in its economic development plan the production of industrial crops, forestry, minerals, tourist services, and livestock raising. Dairy production also has great potential for the province.

Because of its highland topography, Lam Dong has quite a few hydropower plants. These include Da Nhim hydropower with a capacity of 160 MW; Suoi Vang hydropower (3.5 MW); Ham Thuan-Da Mi hydropower (475 MW); and Dai Ninh hydropower (300 MW). These power plants service much of the surrounding regions and even transmit electricity as far south as Ho Chi Minh City.

Forest situation: Forest cover is reported at around 54%. As the climate is temperate, the local forests have a high diversity with more than 400 recorded timber species, of which many are of high value. Lam Dong has 345,003 ha of production forest (57% of total area), protection forests (172,800 ha or 29% of total area), and special-use forests (83,674 ha or 14% of total area).

Unlike in the other two provinces studied, household ownership of forests is very low in Lam Dong (around 1% of the forest estate) (Table 3). Because of this, "forest contracting" is the dominant model. Forest owners like FPMBs and SFEs contract on a yearly basis with individual households to provide protection services in return for a set payment. These contracts began under the 661/5MHRP in the late 1990s, and it was supplemented by additional funding allocated by the province itself. Both production and protection forests have been contracted out to households. For example, in 2004, a total of 301,836 ha of forest were under these types of contracts for protection, with 106,061 ha funded by the 5MHRP and 179,685 ha funded by the province (Nguyen Quang Tan 2011).

Table 3. Land ownership of forests in Lam Dong

| Land owners | % of provincial forest area controlled |
|------------------------------------|--|
| National parks and reserves boards | 17 |
| Watershed forest FPMBs | 24 |
| State forest companies and SFEs | 29 |
| Joint stock and private companies | 2 |
| Commune people's committees | 2 |
| Individual households | 1 |
| Military units | 14 |
| Others | 11 |

Source: Nguyen Quang Tan (2011)

Despite these policies for protection, natural forests in Lam Dong declined by around 5% from 2000 to 2008. According to officials in the province, the main drivers of deforestation have been over logging activities by SFEs; the expansion of cash crops like coffee, rubber, and cashew; free migration by people from other provinces coming to Lam Dong to claim land illegally; forest fires, either accidental or arson; and illegal logging (Nguyen Quang Tan 2011).

REDD is being developed in Lam Dong as the first pilot site of the UN-REDD project. Two districts (i.e., Bao Loc and Djiling) have been selected for preliminary capacity-building activities, such as awareness raising; participatory forest and carbon mapping; and methodologies for FPIC. However, no provincial decisions have been made on what REDD should be in policy, and payments have yet to be made to households through this program. The research team's work in Lam Dong was carried out in the eastern part of the province, in the surrounding forests managed by a FMPB (Don Duong district) and the Bi Duop National Park (Lac Duong district).

Demography: Lam Dong has a population of 1,198,261. The rural population is around 61.5%, while the rest are in the urban areas. The population density is recorded at 118 persons per km². The natural growth rate is 1.3% per year. Poverty rate is 4.9% (14,500 households). Further, the poverty rate among minority households is 14.8% (8,000 households). More than 40 ethnic minority groups are found living in the province. The largest ethnic group comprises the Kinh (ethnic Vietnamese) who are occupying 77% of the total population. K'Ho (also spelled Co Ho and Ko Ho) is the second largest group, making up to 12% of the population. Other groups include the Ma (2.5%), Nung (2%), Tay (2%), Hoa (1.5%), and Churu (1.5%). Other groups scattered around in remote areas make up less than 1% of the population.

3.2 Son La Province

Son La is a mountainous province, located in the Northwest Mountain Region, 320 km from Hanoi. With a total area of 14,174.44 km², Son La is third in size among the 63 provinces in the country, and accounts for 4.27% of Vietnam's natural area. The province has 10 districts and one city. National highway No. 6 is the arterial route connecting the Northwestern region with Hanoi. Son La shares a border of 250 km with the Lao People's Democratic Republic.

The terrain of the province is very complex, heavily dissected by trough valleys and with steep slopes, hence limiting arable land. The average height is 600–700 meters above sea level. Only Moc Chau and Na San, two plateaus of the province, are relatively flat and convenient for the development of cash crops, perennial fruit trees, and cattle grazing. In other areas, wet paddy is grown in valleys with coffee, tea, and fruit crops planted on nearby slopes. Son La province has the potential to develop its comparative advantages in producing agricultural and forestry products, such as high-quality tea and coffee and dairy products and beef. Recently, some industrial zones have been established in the province, concentrated mostly along Highway No. 6 for agro-product processing of coffee, sugar, and tapioca.

Over 97% of Son La's natural area belongs to the watershed of the Da and Ma Rivers. In general, the rivers in the province have narrow side elevations, high slopes of river bed, and water levels that are lower than the surface of farm land. In addition, the province's rivers have many waterfalls from which hydropower can potentially be tapped. However, this also constrains the province's agricultural development, transportation, and irrigation. For instance, the dams will keep water, causing shortage of water in dry season and floods in rainy season. Furthermore, because of complicated climate regime and deforested slopes, the river flows often fluctuate depending on the season.

Forest situation: The province has a total of 588,763 ha of forested land, including 184,118 ha of production forest; 47,649 ha of special use forests; and 356,996 ha of watershed protection forest. Protection forest in Son La province plays an extremely important role in preventing erosion, landslides, and flash floods; and contributes to the regulation of the water levels of two very large downstream hydropower plants (i.e., the Son La and Hoa Binh dams). Deforestation had slowed down in this province, primarily because of limited high-quality forest areas; thereby, reducing the number of problems on illegal logging. Most instances of continued deforestation are a result of agricultural expansion (such as coffee) or loss of forests because of the development of hydropower reservoir.

Forestlands had been allocated to households in Son La starting in 1995, with partial financial support from The Song Da Social Forestry Program, which is funded by the German Technical Cooperation (GTZ). In some areas, collective forestland contracts were considered feasible and appropriate; collective contractees included community, schools, and government bodies. Both production and protection forests have been allocated to households and communities. However, forest laws allow only limited exploitation of watershed forest by contracting households when trees have reached biological maturity. Land allocation has largely been completed in the province since 2005.

Although REDD had been initiated in Lam Dong province, Son La has yet to follow. Several international organizations and NGOs have visited many field sites in Son La such as Muong La and Thuan Chau districts. Until now, however, no REDD or carbon payment program had been implemented. This study was conducted in the Thuan Chau district and Son La town in the western part of Son La.

Demography: The total population of the province in 2010 was 1,083,700. This figure included 12 ethnic groups; the Thai ethnic minority is the largest, accounting for 55% of the population. They are

followed by the Kinh (18%), Hmong (12%), Muong (8.4%), Kho Mu (1.89%), and Dao minorities (1.82%). The rural population was 87%, while the urban population accounted for 13% of the total population in the province. The average population density was 77 persons per km². The province had a rather high population growth rate of 1.69% a year. GDP per capita, according to the latest currency, was VND 12.4 million (equaling approximately to USD 650).

3.3 Thua Thien Hue Province

Thua Thien Hue is a coastal province located in the North Central Region. The province has nine administrative entities including Hue City, Huong Thuy town, and the seven districts. Thua Thien Hue has two sea ports, which are favorable for transportation, international trading, and tourism development. The provincial capital, Hue, is an old city where the last king of Vietnam reigned. The city holds a citadel and an imperial palace as well as numerous tombs and temples, which attract a lot of tourists.

Thua Thien Hue has a total land area of 506,259 ha. Its land-use system has been quite stable for the last few decades, as compared to the other provinces in Vietnam, for two reasons. First, there has not been a lot of immigration to the province due to the lack of industrial development. Second, the soil in the province is not fertile enough for cash crops such as coffee, rubber, cotton, etc.

Climatic conditions are difficult because of the province's geographical location in the monsoon region. The region has a season of high rainfall and tropical typhoons every year, causing serious damages to the livelihoods of the local people as well as to infrastructure. Typhoons normally strike around four or five times per year between July and November. The province also has a number of rivers that are short and steep as they run to the coast, which are prone to flooding and flash floods during the rainy season.

Forest Situation: Forestry land covers 307,201.8 ha or about 60.7% of the total area of the province. The percentages of the three types of forest are special-use forest (28.7%), protection forest (28.6%), and production forest (42.7%). Plantation forests are much more well developed in Thua Thien Hue than in the other two provinces studied. The primary species of plantation forests are acacias and eucalyptus. Deforestation continues to be a problem in natural forest areas, especially around Bach Ma National Park, because of illegal logging and forest product collection.

4.0 FINDINGS FROM THE HOUSEHOLD SURVEY

This section presents the findings of the quantitative household survey administered to 227 households representing more than 1,000 individuals in the three study sites. Additional information about key topics on livelihoods, land use and management, and policy, which were obtained from qualitative sources (e.g., interviews, focus groups, participatory rural appraisal, etc.) are addressed in Section 5.

4.1 General Household Indicators and Characteristics

Human indicators often play an important role in assessing the capability of the local people in adapting and responding to changes, not only in their physical living environment but also in their personal life. Community level, class, caste, gender, ethnicity, age, level of education, and access to resources have been cited as factors that determine vulnerability to climate change and other risks (IPCC 2007; Adger 1999). In this study, human indicators such as education, labor productivity ratios, access, and assets were analyzed to see overall trends and their relationships to understanding land management and climate vulnerability.

4.1.1 Household size

Results showed that the average household size in the study sites was 4.8 persons, with some variation among the study provinces—from 4.5 persons in Thua Thien Hue, 4.7 person in Lam Dong, and to 5.4 persons in Son La. The average household size in the study sites was nearly 1.3 times larger than the national standard. Of the three provinces, the gap between Son La and the national standard was even larger—1.4 times. Such findings were broadly consistent with trends that communities closer to urban areas, such as in Thua Thien Hue, tended to have smaller households and ethnic minority communities. The samples in Lam Dong and Son La, for instance, tended to have larger families. Le Van Duy (2009) explained that the average household size in Vietnam has dropped because of the significant decrease in birthrates and the shrinkage of traditional families with more than two generations living under one roof. Le Van Duy (2009) also pointed out that the percentage of single-headed households had increased significantly from 3.8% in 1994 to 5.7% in 2007, showing a “westernized” trend in Vietnamese demography.

The household demography in the sites primarily showed a dominant trend toward “nuclear” households of only two generations (parents and children), and away from more traditional family structures that include three or more generations in one household. In most of the study communities, more than 60% of the village households were “nuclear” households.

The shift in household composition can have major impacts on forest resource use. On one hand, large households with many members put pressure on lands and local forests, potentially causing overexploitation as people seek land to produce food to feed many mouths. The reduction in household size may then indicate less pressure on land for agriculture. But at the same time, the trend of young people separating from their parents’ households and living in their own households also puts pressure on forests. Each nuclear household now needs separate timber and land for its own residence rather than share with the parents’ household.

4.1.2 Ethnicity

Vietnam has 54 officially recognized ethnic groups, including ethnic Vietnamese (known as Kinh). In the study sites, the household sample in each province included both the majority Kinh and different minority groups, primarily Co Ho (Lam Dong), Thai (Son La), and Ka Tu and Van Kieu (Thua Thien Hue). Over one-fourth (26%) of the sample were Kinh, with the rest of the ethnic minority.

Ethnic background can play an important role in forest management. All the communes selected in the study have their own customary laws for their community forests. For example, the elderly Co Ho related during the interviews that they strongly believed in the supernatural power of nature that exists in remote and thick forests. Different clans choose different gods to worship residing in these forests. To the Co Ho, primary forests are sacred and in need of protection.

Key informants in Lam Dong, however, informed the research team about the movement of the Kinh people to places near local forests previously inhabited solely by ethnic minorities (Co Ho). This movement has put pressure on forests and constrained the Co Ho’s following of traditional beliefs. The Thai in Son La are also known for their community-based management of sacred forests. In Ka Tu communities, communal houses known as *guol*, are sites where traditional rules on forest management are discussed and violators of forest laws are punished.

4.1.3 Female-headed households

Male-headed households were more common in all the study sites, although the ratio varied among the sites. Female-headed households composed around 10%–15% of the sample. However, the ratio of female households was significantly different among Son La, Thua Thien Hue, and Lam Dong. The ratio of female households in Lam Dong was nearly three times larger than that in the other two provinces. The reason was that the Co Ho people traditionally follow matriarchy, which means that Co Ho women are often listed as household heads, even when the husbands are still present in the household. This social norm gives women the right to own lands. During the interviews, many women have confirmed that their names were listed in land certificates as household heads. This means that their husbands needed their approval for any

decision on land use. In Son La and Thua Thien Hue, female households were composed more of women who were widowed, divorced, or with husbands who work as migrant workers.

4.1.4 Educational level

Educational levels were directly related to the availability of livelihood options, the flexibility and creativity of livelihood alternatives, and the decision-making process of the local people themselves. The survey showed a mixed picture. More than 84% of the surveyed household heads had completed junior high school. However, the rate of household heads graduating from high school was fairly low in the three field sites.

Interestingly, the Thai ethnic minority group in Son La province had the highest rate of local household heads graduating from high school (10.5%). Even in Thua Thien Hue province, more than 50% of the surveyed households were Kinh. The rate of household heads having completed tertiary school was only 2.6%, which was much lower than that in Son La and Lam Dong provinces where ethnic minorities comprised majority of the sampled households. This indicated that past trends that associated lower educational levels with ethnic minorities were not necessarily accurate. The percentage of high school graduates appeared most related to distance to highways or a provincial/district city. Men at the three study sites had higher average-level of education than women.

4.1.5 Household labor productivity

Children aged 14 or younger and elderly individuals aged 60 or older are considered dependent members of a household. Dependency ratios are calculated in terms of the number of dependent members that must be supported by household members of working age. The labor productivity ratio (the number of household members of laboring age [15–59 years of age] as a percentage of the total household members) was highest in Son La (66.5%), followed by Thua Thien Hue (60.1%), and Lam Dong (53.7%). These rates were correlated with the educational rates of household heads noted earlier. In Son La province, more people graduated from high school, and this may have played a role in keeping household labor productivity higher in Son La than in the other provinces. Data analysis showed that, on average, each female-headed household adult worker was burdened by a higher dependency ratio as compared to the male-headed household across all three sites. Given the higher dependency ratio, the concern is that female households may be burdened not only by poor access to land and capital, but also by labor constraints.

4.1.6 Labor migration

Another factor influencing household labor productivity was the number of family member/s who had worked outside the local area in the past 12 months. This was highest in Thua Thien Hue (38%), followed by Son La (7%), and Lam Dong (5%). Note that majority of the family members working distant from home in Hue were young people. They usually went to large cities to look for jobs; some engaged in wage labor in industrial zones and in garment factories year-round; and others engaged in more seasonal wage labor.

In contrast, majority of the households in Lam Dong and Son La did not want to engage in migrant labor for three reasons. First, they often did not feel confident in venturing outside their village to look for jobs because of their low levels of education; they believed no one would hire them. Second, their culture has encouraged them to work very close to home for generations. Third, some had bad experiences with being migrant labors, which convinced them not to join the labor market.

4.2 Financial Indicators and Assets

Financial and economic indicators and assets were assessed in the study to see how levels of income and assets may have an impact on the households' vulnerability to climate change and levels of participation in forestland management and protection.

4.2.1 House types

Housing in the study sites was classified into four groups: permanent, semi-permanent, temporary, and others. According to the national standard, a house is permanent if it has three main parts (roof, walls, and poles) made of durable materials (such as concrete, brick, or metal); a semi-permanent house has two (out of three) parts; and a temporary house has one part only. Rather than make the classifications, the interviewees themselves were asked to classify their houses based on the national standards.

Permanent houses were the most common dwellings as mentioned by nearly 50% of the respondents. The Thai in Son La classified their wooden house-on-stilts as permanent. Semi-permanent houses were more common Lam Dong. The Lam Dong people probably did not invest as much in more durable housing because they experienced less typhoons and floods or other natural disasters as compared to those in Son La and Thua Thien Hue. The people prepared their housing to adapt to their particular situations. However, a storm in 2010 in Lam Dong damaged some houses, encouraging the villagers to build more permanent housing to adapt to any unusual climate events. The changes are discussed in the section on household expenditures.

4.2.2 Access to electricity and water

Almost all (95%) of the households had electricity. Based on the interviews, the local people in Lam Dong and Thua Thien Hue enjoyed electricity from the national power network. The households in Son La's remote communes, however, sourced their electricity only from small hydropower generators. Hence, power was weaker and not so reliable during the dry season.

Access to safe water was not as widespread as access to electricity in the study sites. Households having access to clean water was 32% in Lam Dong and 11.8% in Thua Thien Hue. Households in Son La got clean water directly from natural springs (60.9%) or stored in communal brick tanks (23.2%). The most important source of water for Thua Thien Hue villagers were wells; 44.7% of the interviewed households claimed that they used well water for cooking and washing.

4.2.3 Household assets

Modern facilities are becoming popular in the three study sites. Almost all of the interviewed households in Lam Dong and Thua Thien Hue owned TV sets. Villagers found TV to be a good source of important information such as announcements about influenza, blue-eared pig disease, and weather events. A male respondent from Son La said that TV was like a "window" that allowed him to see the outside world beyond his village. All the interviewed households in the three provinces also had motorbikes and mobile phones. Some households could even afford to buy a motorbike or mobile phone for each household member. They said that having motorbikes and mobile phones enabled them to transport their products and to communicate with traders directly, hence improving their lives.

4.2.4 Household debts and savings

Savings and debts were found in all the study sites. Debts outweighed savings in all the sites in terms of number of households being indebted and the amount of debts. More than 80% of the villagers were indebted because they had to pay for their children's education, buy rice, and purchase inputs for rice and coffee plantations. In some special cases in Lam Dong and Son La, a large amount of money was borrowed to buy small trucks to transport products to cities and towns. Savings varied greatly among the provinces, with Lam Dong having the highest ratio of households with savings (68%), followed by Son La (55%), and Thua Thien Hue (48%). Of the three sites, Son La had the highest amount of savings per household (VND 1.6 million) and the lowest mean debts. Therefore, the gap between debts and savings was smaller in Son La than in the other two sites. Most of the savings in Son La came from coffee, which they started planting some years ago.

4.2.5 Household income and income sources

There is a distinct difference in household income per year between Son La and the other two sites (Table 4). Son La has an income of about VND 90 million per household, almost double than that of Lam Dong and Hue (more than VND 45 million per household). This was unexpected because Son La is often listed among the poorest regions of the country. The primary explanation is that the price of coffee in the world market has increased over the past five years, and people in Son La have been reaping the benefits. Lam Dong also had many households planting coffee, but most of them were new cultivators of the crop and have yet to receive high income from it. However, sustaining the high price of coffee over time is needed, as the coffee price is driven by the world market and too dependent on weather conditions. Previous price shocks, such as in the mid-1990s, had negative effects on Vietnamese coffee growers.

Table 4. Average household income (VND) per year

| Sources | Lam Dong | | Son La | | Thua Thien Hue | |
|--------------------|-------------------|--------------|-------------------|--------------|-------------------|--------------|
| | VND | % | VND | % | VND | % |
| Agricultural crops | 10,681,867 | 23.4 | 44,587,593 | 47.5 | 9,846,447 | 20.4 |
| Livestock | 948,000 | 2.1 | 29,582,052 | 31.5 | 9,834,210 | 20.4 |
| Forestry | 9,954,641 | 21.8 | 3,119,184 | 3.3 | 4,988,553 | 10.3 |
| Aquaculture | 18,800 | 0.01 | 908,026 | 1.0 | 321,053 | 0.7 |
| Nonfarm jobs | 9,939,733 | 21.8 | 3,595,053 | 3.8 | 8,750,000 | 18.1 |
| Remittances | 9,333 | 0.001 | 47,368 | 0.1 | 1,589,474 | 3.3 |
| Salary and pension | 6,645,333 | 14.6 | 4,674,053 | 5.0 | 3,343,421 | 6.9 |
| Loans | 5,909,333 | 12.9 | 6,572,368 | 7.0 | 8,094,079 | 16.8 |
| Government aid | 214,400 | 0.5 | 535,658 | 0.6 | 66,316 | 0.1 |
| Others | 1,311,867 | 2.9 | 231,954 | 0.2 | 1,475,000 | 3.1 |
| Total | 45,633,307 | 100.0 | 93,853,309 | 100.0 | 48,308,552 | 100.0 |

As shown in Table 4, household income sources in the study sites were diverse, with households having at least nine or 10 sources of income in each site. Yet, the overall contribution from each source differed in each province. In Lam Dong, agricultural crops, forestry, nonfarm activities, salary and pension, and loans were the main sources of income, while remittances were insignificant.

In Son La, agricultural crops (primarily coffee) were the main sources of household income, which generated about half (47.5%) of the total income. Livestock contributed 31.5% to the total income as well. As in Lam Dong, remittance made up the smallest share in the household income in Son La. As mentioned earlier, the fact that households depended on coffee, yet had limited knowledge and technology needed for the business, was a big risk. As many household heads recalled, they suffered a big loss when the coffee price plummeted two to three years ago. As a result, many of them fell into serious debts as they had to borrow money to buy rice, household necessities, and production inputs. Livestock generated a significant amount of income; the local people in this province raised ducks, chicken, and pigs. However, livestock raising also carried risks. Many of the interviewees complained that they lost their flocks of poultry due to influenza.

Household income in Thua Thien Hue came from the following sources: agricultural crops, livestock, nonfarm activities, loans, and forestry. Contribution from these sources was relatively equal. Household loans in this province (16.8%) were higher than that in Lam Dong and Son La. Government aid contributed the smallest share in household income.

To summarize, agricultural crops generated the most income in all the study sites, but households in Son La depended more on this source than in Lam Dong and Thua Thien Hue. Son La had the highest household income coming mainly from two sources, which were coffee and livestock. Lam Dong and Thua Thien Hue had lower incomes, but their households were significantly more diversified. Livestock was a significant source of income for Son La and Thua Thien Hue but not for Lam Dong. Income from forestry was significant to households in Lam Dong (22%), but not for households in Son La (3%) and Thua Thien Hue (10%).

4.2.6 Household income diversification

Household income sources were generally diverse in all the study sites, although it was less diverse in Son La than in Lam Dong and Thua Thien. In Son La, 79% of the household income came only from the agriculture and livestock sectors. In the other two sites, but especially in Thua Thien Hue, income was spread across a various sources (Figure 2).

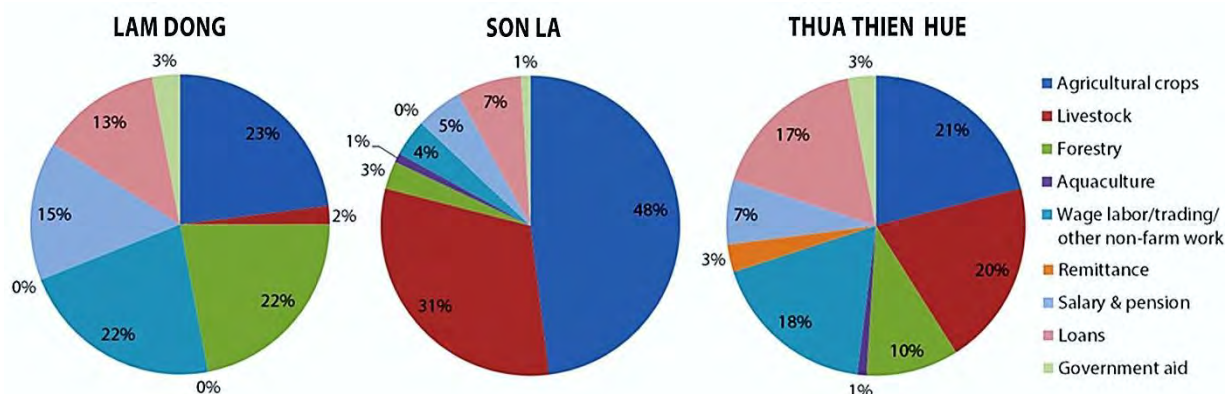


Figure 2. Income diversification across study sites

The following discussion shows diversification within specific sources such as agricultural crops and forestry.

Agricultural crops. As mentioned earlier, agricultural crops generated the most important income for the households. Common crops included irrigated rice, corn, cassava, vegetable, fruits, coffee, rubber, cashews, tea, and so on. Coffee was the most important crop in Lam Dong and in Son La, contributing more than half of the income (60.3% in Lam Dong and 56.7% in Son La) generated by agricultural crops. Meanwhile, irrigated rice gave the largest share of the income (37.1%) generated by agricultural crops in Thua Thien Hue. The second largest source of income generated by agricultural crops was from persimmons for Lam Dong, plums for Son La, and rubber for Thua Thien Hue.

As a matter of fact, rice (both irrigated and rain fed) was a rather small part of household incomes (nearly 7% for Lam Dong and Son La). Even for Thua Thien Hue, where rice was significant, its share was only 30% of the income generated by the category “agricultural crops.” This was consistent with the information collected for food security and food shortage in the study sites, which showed that a large percentage of households had to buy rice. Those who grew rice complained that they had too little rice fields, and water was not sufficient for rice growing; thus, rice productivity was low. Many households said that they would rather do some other work to earn money and buy rice. Rice growing is a tough work. Moreover, rice is now being transported up from the lowlands, thus, it is available all-year round and easy to buy. This move away from rice production by many households is a major trend in Vietnam’s upland regions.

Forestry. As shown in Figure 2, forestry contributed more than 20% to household incomes in Lam Dong, 10% in Thua Thien Hue, and only 3% in Son La. Forestry income was assessed in categories like fuel wood, timber, livestock fodder, vegetables, honey, medicinal plants, wild animals, and payments for forest protection. Contribution from these sources varied significantly among the study sites. In Lam Dong, payment for forest protection contributed 82.8% (more than VND 8 million per household per year) of forest income; whereas payments contributed 3.7% in Son La, and none in Thua Thien Hue (Table 5). In Thua Thien Hue, most forestry income came from planted acacia trees, which were sold to a pulp factory.

Table 5. Income from forestry

| Sources | Lam Dong | | Son La | | Thua Thien Hue | |
|----------------------------|------------------|--------------|------------------|--------------|------------------|--------------|
| | VND | % | VND | % | VND | % |
| Fuel wood | 420,000 | 4.2 | 1,752,382 | 56.2 | 1,260,527 | 25.3 |
| Timber from planted forest | 0 | 0.0 | 0 | 0.0 | 2,667,105 | 47.1 |
| Timber from natural forest | 0 | 0.0 | 39,474 | 1.3 | 0 | 0 |
| Tree leaves as fodder | 32,000 | 0.3 | 265,263 | 8.5 | 0 | 0.0 |
| Honey | 0 | 0.0 | 82,895 | 2.7 | 0 | 0.0 |
| Forest fruits/vegetables | 732,934 | 7.4 | 822,368 | 26.4 | 0 | 0.0 |
| Bamboo and rattans | 0 | 0.0 | 658 | 0.0 | 34,868 | 0.7 |
| Medicinal plants | 198,667 | 2.0 | 0 | 0.0 | 0 | 0.0 |
| Leaves | 21,067 | 0.3 | 39,066 | 1.3 | 25,263 | 0.5 |
| Wild animals | 217,067 | 2.2 | 1,316 | 0.0 | 0 | 0.0 |
| Forest protection payment | 8,251,573 | 82.8 | 115,763 | 3.7 | 789 | 0.0 |
| Others | 81,333 | 0.8 | 0 | 0.0 | 0 | 0.0 |
| Total | 9,954,641 | 100.0 | 3,119,184 | 100.0 | 4,988,553 | 100.0 |

Payments for forest protection in Lam Dong were significant because the area allocated to households was large, and each household had signed an individual contract with the responsible organization. Meanwhile, Son La used a community management model in which communities were paid to protect the forests. Thus, the payment in Son La was generally used for collective activities, such as building community houses or buying facilities for community houses. Each household in Son La received only VND 10,000–20,000 in 2011 for their forest protection activities.

In terms of dependency on forests, 153 households (67%) received some income from forest production or collection. These included 42% of households in Lam Dong, 70% of households in Son La, and 75% of households in Thua Thien Hue. A total of 27 households, all living in Lam Dong, got more than 50% of their income from forestry.

Household income from nonfarm sources. Income from nonfarm activities (primarily wage labor) contributed 22% to the total household income in Lam Dong, 18% in Thua Thien Hue, and only 4% in Son La (Figure 2). In Lam Dong, working as a wage laborer by harvesting coffee was the most common nonfarm activity. Family members reported that after they finished collecting their own coffee beans, they went to work for wages to earn some money. Others did this job because they did not have land to grow coffee themselves. Payment for a labor day picking coffee was around VND 70,000, with a maximum of VND 100,000.

In Son La, nonfarm activities included rice milling and selling daily necessities in small shops at home. These activities were not significant in generating household income in this province. When asked why not many households had off-farm income, many household heads said that there was not much demand for wage labor in the area. Collecting coffee beans was a new activity, and not many people were enthusiastic to leave their village for wage labor jobs. Nevertheless, it was observed that many households in the same village started hiring their neighbors to do quite a few coffee-related activities, such as collecting coffee beans, weeding, and watering coffee fields. In Thua Thien Hue, nonfarm activities included working as wage laborers by cutting and stripping acacia bark from poles, weeding and working on rice fields for others, constructing work building houses and other infrastructure, and sending children in the household to Ho Chi Minh City to work as maids and do other jobs. Almost all the households (99%) in Thua Thien Hue said that they had at least one family member working in the southern part of the country as a migrant laborer.

4.2.7 Major sources of expenditure

While household income is very important, it does not present the whole story of household well-being as clearly as household expenditure does. Results showed that the household expenditures in the past 12 months in Son La were around VND 72 million, almost double the expenditure in Lam Dong (VND 43 million) and in Thua Thien Hue (VND 45 million). Household expenditures primarily served

household needs more than household production. In Lam Dong, the expenditure on household needs took up 84% of household budgets, while expenses for production activities used up only 5%. This gap between the expenditure on household needs and production was six times. In Son La, 67% of the household budget was spent on household needs, and 32% on production. The gap between these two expenditures was only two times. In Hue, the expenditure on household needs was 83% and 16% on production. The gap between these two categories was five times.

Household necessities. Nearly one-third (29.7% in Lam Dong, 19.2% in Son La, and 30% in Thua Thien Hue) of household expenditures was on food (both rice and other foods). The second most important expenditure varied by province. Lam Dong's household expenditure on repairing houses was quite large (22%), because the local housing was damaged by a typhoon in 2011. A major source of expenditure that had been significantly rising for local people is petroleum for motorbikes. It cost nearly 10% of the household budget, and it was the second largest expenditure in two provinces. In the past, motorbikes were a luxury for the rich, but they are now widespread. People are now going to their swidden fields or patrolling forests by motorbikes. The long distance, plenty of slopes, and cheap engines have increased their spending on gas drastically. During interviews in Lam Dong, the research team was surprised to learn that the villagers drove their motorbikes to get to their coffee fields located at a very high mountain about two hours away, and such a long drive was repeated every day during coffee season. Some of them had to pay VND 200,000 (USD 10) per day to buy gas for their motorbikes.

The list of household expenditures on production was rather long, but the major expenditure categories were fertilizer, hiring labor, animal feed, and breeding stocks. However, the specific spending amount was different among the three provinces. In Lam Dong the greatest single expenditure was on fertilizer for coffee (69% of production expenses) and hiring labor to collect coffee beans (11%). Households in Son La spent 62% of their production expenses for animal feed, and 19% for fertilizer for coffee plantations. In Thua Thien Hue, fertilizer was the greatest expense (27% of costs), and animal feed was the second most important (19%).

4.2.8 Poverty rates

Authorities rank households in Vietnam into one of six types of households (i.e., hungry, poor, nearly poor, average, well-off, and rich) as part of its yearly poverty measures. Each household was asked what their most recent ranking was. Majority of the households were ranked as average. Poverty was highest in Lam Dong province, with 44% of the surveyed households being ranked as hungry, poor, or near poor. Some of the poor households actually said that they preferred being in the list of "poor households." Being classified as such, they were entitled to some support from the government, such as support in securing loans with low interests, or gaining financial support to fix their houses.

4.2.9 Household self-assessment of well-being

Households were asked to put themselves in one of three categories—poor, average, and better-off—and to compare themselves with the relative well-being of their neighbors. In Lam Dong, 37% of the surveyed households listed themselves as "poor," 30% "average," and 12% "better-off." In Son La, 25% said that they were "poor," 39.5% "average," and 28.9% "better-off." Thua Thien Hue classified 13.2% of the households as "poor," 59.2% as "average," and 14.5% as "better-off." What was interesting was that most of the households went easy on themselves when they made the self-assessments. However, when asked to compare themselves with their neighbors, they became tougher on themselves. Hence, there was an increase in "poor" and a drastic decrease in "better-off" categories. For example, 37% of the households in Lam Dong ranked themselves as "poor," but when comparing with their neighbors 48.6% thought they were "poor." The percentage increased from 25.1% to 30.3% in Son La, and from 13.2% to 36.8% in Thua Thien Hue.

4.2.10 Households reporting improved living conditions in past five years

Perception about improvement of household status in the past five years showed that the people in Lam Dong were not as positive as those living in the other two provinces. Only one-third of the households

in Lam Dong thought their life had become better. The rest thought they were the same (44%) or even worse (13.3%) than five years ago. Son La people seemed the most positive with 71.1% of the households thinking that their living condition had improved. The perception in Thua Thien Hue also seemed positive with more than half (52.6%) of the household believing that they now had better living conditions. The remaining households thought that they were in the same or even worse conditions. Those who thought that their conditions were the same or worse had often recently suffered from loss in production activities (e.g., livestock disease) or had family members who were sick.

4.2.11 Food security

As discussed earlier, household expenditure on rice was one of the highest expenses in all the study sites. This was consistent with questions asked concerning household subsistence and food security. More than half (51.4%) of the households in Lam Dong were not able to produce any rice for themselves, hence they had to buy it in the market. Only 13.5% of the households could produce more than half of their rice. The situation in Son La appeared better with only a few households (6.6%) not being able to produce any rice. Nearly one-third of the surveyed households (26.3%) produced more than half of their rice. Thua Thien Hue had more income from rice; on the other hand, 43.2% of the households claimed that they were not able to produce any rice. Only 18.9% of the households could manage to have more than half of the needed rice. The remaining households lacked 25%–50% of their rice needs.

4.3 Land and Natural Resources Use

Access to land and forests is important in order to understand how households make use of natural resources and the impact this may have on forest protection activities. Many households were increasingly involved in PES projects. This study assessed their levels of participation and satisfaction with these programs.

4.3.1 Landholdings

There was a wide range of types of land and area in the three study sites (Table 6). The most significant type of land was based on the percentage of households that reported having ownership or use. The average area of land used per household was largest in Lam Dong (165,305 m² per household). Households in this province had the largest total land area primarily because many households had labor contracts to protect forestland. Son La had the second largest land per household with 68,517 m² per household. Son La households owned three significant land types, including swidden/coffee fields (96.1%), irrigated rice fields (77.6%), and industrial cropland (15.8%) and forestland for plantations (28.9%). Thua Thien Hue had the smallest area per household (15,152 m² per household). Households in Thua Thien Hue had much less land as compared to the other two sites. The most important land types in this site were rice fields and home gardens as claimed by 84% of the households for each type of land. Forestland for protection, rice swidden fields, and rubber plantation/industrial cropland were also significant in this site. Residential land existed in all the study sites. Only 80% of the respondents in Lam Dong reported having residential lands because those who lived in their parent's lands did not have their own land certificates.

Table 6. Landholdings in the study sites

| Type of Land | Lam Dong | | Son La | | Thua Thien Hue | |
|------------------|------------------------|----------------------------|------------------------|----------------------------|------------------------|----------------------------|
| | Area (m ²) | % households who used land | Area (m ²) | % households who used land | Area (m ²) | % households who used land |
| Irrigated rice | 172 | 10.7% | 13,638 | 77.6% | 1,340 | 84.2% |
| Rain-fed rice | 117 | 6.7% | 396 | 26.3% | 32 | 5.3% |
| Cash cropland | 627 | 16.0% | 19 | 9.2% | 819 | 26.3% |
| Swidden field | 2,226 | 41.3% | 5,708 | 96.1% | 1,865 | 30.3% |
| Grassland | 0 | 0 | 50 | 2.6% | 0 | 0 |
| Industrial crops | 2,855 | 53.3% | 40,544 | 15.8% | 1,224 | 13.2% |

Table 6 continued

| Type of Land | Lam Dong | | Son La | | Thua Thien Hue | |
|-------------------------------------|------------------------|----------------------------|------------------------|----------------------------|------------------------|----------------------------|
| | Area (m ²) | % households who used land | Area (m ²) | % households who used land | Area (m ²) | % households who used land |
| Other agricultural lands | 22,000 | 8.0% | 158 | 7.9% | 0 | 0 |
| Forestland allocated for plantation | 267 | 1.3% | 6,666 | 28.9% | 6,436 | 52.6% |
| Forestland allocated for protection | 157,808 | 36% | 9,614 | 17.1% | 263 | 1.3% |
| Other land allocated for forestland | 0 | 0 | 4,211 | 2.6% | 0 | 0 |
| Forestland - used but not allocated | 0 | 0 | 21 | 1.3% | 309 | 3.9% |
| Other forestland | 120 | 2.7% | 0 | 0 | 924 | 5.3% |
| Aquaculture land - owned | 0 | 0 | 105 | 39.5% | 134 | 18.4% |
| Residential land | 243 | 80% | 240 | 98.7% | 281 | 98.7% |
| Home garden | 443 | 25.3% | 534 | 68.4% | 1,493 | 84.2% |
| Other residential lands | 0.6 | 1.3% | 26 | 1.3% | 33 | 2.6% |
| Total | 165,305 | NA | 68,517 | NA | 15,152 | NA |

As mentioned earlier, Lam Dong had the largest area of forestland per household (15 ha on average), and this is strictly for protection. One-third of the interviewed households had been given this type of land. However, households in Son La and Thua Thien Hue were given forestland for plantation. The number of households participating in forest plantation was larger in Thua Thien Hue (52.6%) and smaller in Son La (28.9%). Yet, compared to Lam Dong, the size of allocated forestland was much smaller in Son La and in Thua Thien Hue.

4.3.2 Use of swidden fields

A total of 147 households (65% of the sample) reported having upland or swidden lands (*dat nuong ray*). This figure was highest in Son La, where 96% of the households used swidden land, as compared to Lam Dong (41%) and Thua Thien Hue (30%). A slightly larger percentage of swidden fields (62% of the total fields) were said to be devoted to annual crops, while the rest were devoted to cash cropping (especially coffee).

For most households, their swidden fields had not changed in size in the past five years. This is important as many organizations and government in the region often falsely accuse smallholders of forest destruction by expanding swidden lands. In fact, in Lam Dong, three households reported smaller swidden sizes in the past five years, while six households expanded their swidden lands. In Son La, four households had smaller swiddens, while nine households had larger swiddens. Meanwhile, in Thua Thien Hue, three households had smaller swiddens, while only one household had expanded its swidden. Some of the households had smaller swiddens because of labor and conflicts with neighboring villages. Only one household reported losing swidden lands to tree planting or forest protection programs.

For those who had reported increasing swidden lands, the primary way to increase swidden fields was to clear land themselves (as reported by 10 households), by buying land (as reported by two households), and other reasons such as inheritance (as reported by three households). The average size of land clearance was 1,996 m² (less than 0.2 ha), with a maximum size of 7,000 m². In Lam Dong, new swiddens were primarily planted with cash crops (coffee), while in Son La and Thua Thien Hue, these were used for annual crops (cassava and corn). Only one person in Lam Dong reported clearing a natural forest for new

swidden, three people in Son La and Thua Thien Hue reported clearing regeneration or planted forests, and two households reported planting on bare hills. Six households reported clearing other lands such as old swiddens they had once used or forestry land that their household owned.

4.3.3 Use of fuel wood

Majority of the surveyed households (179 or 60%) reported using fuel wood. Use of fuel wood was significantly lower among households in Lam Dong (64%), many of whom had purchased gas stoves because of the restriction in fuel wood collection in nearby protected forests. In Son La, 92% of households used fuel wood, while in Thua Thien Hue, 80% of the households used fuel wood. Many households reported shortages of fuel wood and longer time to collect the wood. For majority, fuel wood collection now took more time than in the past. Only in Thua Thien Hue did a significant number of households report having more access to fuel wood. This was a result of planting acacia trees in the farms. As the acacia trees grew, stems and leaves could be used as fuel by the household until the pole was large enough to be sold.

For those households that were finding it harder to collect fuel wood, their main solution was to reduce demand, either by buying a gas stove or by conserving wood. Other solutions were to spend more time collecting wood or to use agricultural wastes as substitutes. Planting trees solely for the collection of fuel wood was not a popular strategy.

4.3.4 Participation in forest projects

In recent years, some government-sponsored forestry and tree-planting projects have been implemented in Vietnam. A total of 94 households reported participating in some sort of tree planting during the past five years. The households' reasons for participation reflected general trends in each province. For example, in Thua Thien Hue, there was a strong market for acacia poles from pulp factories in the area, which was their primary reason for participating in tree planting in the area. In Lam Don and Son La, wood for sale was also noted, but at lower rates. Subsistence wood use and environmental benefits were also important in Son La. No households mentioned planting trees for carbon benefits.

In addition to the tree-planting projects above, almost half of the 120 households reported having participated in a forest protection project, either at present or in the past. Of those who had participated in a protection project, the 5MHRP was the most popular, with 98 households reported participating in it. A total of 95 households participated in the 327 project, a reforestation project predating 661. The current PES pilot projects had attracted the participation of 96 households (42%). Eight households reported having been part of some other type of forest protection project. Only three households reported having taken part in a co-management or community management project.

Several models of organization were used in the forest protection projects. More than half (55%) of the households who had participated in a forest protection project had participated or were participating as individual households. On the other hand, 43% had participated as part of a group: 44 households as part of a small group of around 10 people, 1 household as part of a larger neighborhood, and 7 households as part of a whole community.

Of the 115 households that reported having been allocated an area of forest to protect, 34% did not know the exact area, while 11% reported protecting over 100 ha as part of a group. These figures were divided by 10 (the average size of a group) to give individual figures. The 76 households protected an average of 26 ha of forestland, with a minimum of less than 1 ha to a maximum of 74 ha (Table 7).

Table 7. Average area of forestland protected by households in the study sites

| Protected Forest Area | Lam Dong (N=39) | Son La (N=29) | TTH (N=8) | Total (N=76) |
|---|-----------------|---------------|-----------|--------------|
| Average protected per household (in ha) | 37.2 | 14.5 | 16 | 26.3 |
| Minimum | 2 | 0.10 | 1.5 | 0.10 |
| Maximum | 74 | 43 | 40 | 74 |

In terms of the average time spent on protection, 118 households responded that they spent some time on forest protection activities. Of this number, 35% checked once a week, 15% checked monthly, 14% checked fortnightly, 11% checked bi-monthly, and one checked only once a year. Five households said they had forest protected contracts, but they never directly checked these. On average, a household participating in forest protection projects spent about 32 days in a year on forest protection activities, including on-field checking, going to meetings, etc.

Gender in forest activities: When respondents of the household survey were asked “Which household members participated the most in forest protection meetings or activities?”, most of the time, the husbands participated in forest protection meetings or activities in all three sites. Note that the wives in Thua Thien Hue did not participate at all in forest protection meetings or activities. The percentage for participation in Son La (more than 5%) and Lam Dong (more than 4%) were also very low. According to the respondents, forest protection was a male’s job. Since men were physically stronger than women, they were in charge of the hard jobs.

Main reasons for participating: Households were asked why they decided to participate in forest protection activities. The most common reason was to improve forests to get long-term environmental benefits as mentioned by a third of the households. The second most popular reason was financial: 28% reported participating because they were paid to do so. Most of these respondents were in Lam Dong where the PES project gave significant payments. The third most popular reason was to have access to information and experience. A total of 12% of the households reported feeling personal responsibility or obligations to protect forests. Only two households reported participating to gain stronger access to land rights, two households participated to improve social relations, and four reported participating to ensure government benefits. Additionally, 10 households reported feeling forced to participate, either from government officials or because of pressure from neighbors.

Participants had generally positive things to say about their participation in forest protection projects. A total of 76 households reported positive benefits from forest protection. Of this number, 45 reported general environmental benefits such as water and flood prevention, while 34 households cited the cash payments. Other reasons included better access to other non-timber products (9 households), increased access to timber (8 households), access to land rights (2 households), increased voice and participation (2 households), and gaining more friendly neighbor relations (5 households).

A total of 24 households reported having negative experiences with forest protection projects. Of these households, 16 felt the labor requirements for protection were too onerous, 4 thought the forest protection caused conflicts between neighbors and communities, and 9 gave other answers.

4.3.5 Impact of payments for environmental services

Since the implementation of PES policies, payments for forest protection have increased. However, previous programs such as 5MHRP and the 327 project also had payments as part of the programs, although the payments were much lower than the current. A total of 94 households reported receiving payment of some kind for forest protection in the past. Of this, 91 households reported receiving cash, while the rest did not know or reported in-kind payments of food or other supplies.

The size of the payments varied significantly among the study sites (Table 8). Payments in Lam Dong were much higher than in the other two sites for two reasons. One, the provincial level of payment was much higher (VND 400,000/ha) and two, households were often contracted to protect large amounts of forest (between 20–40 ha). In Son La, payments were much smaller (between VND 50–100,000 per ha) and were often made to communities, rather than to individual households. Households in Son La either received very little money from PES on the land that has been allocated to households through the 661 program, which did not serve as an incentive for them to participate actively in PES, or did not get paid at all for the protection of the community forest. In Thua Thien Hue, there was not yet any PES project, so payments there tended to be from 5MHRP and 327 projects, which usually averaged around VND 100,000/ha a year.

Table 8. Average size of forest protection payment received per household

| Payment | Lam Dong | Son La | TTH | Total |
|--|----------------|---------------|---------------|----------------|
| Average amount of forest payment per household | VND 8,919,307 | VND 120,092 | VND 108,158 | VND 3,023,326 |
| Minimum | 0 | 0 | 0 | 0 |
| Maximum | VND 39,200,000 | VND 2,700,000 | VND 2,400,000 | VND 39,200,000 |

Protection payments were also paid at different times among the three study sites. In Lam Dong, most payments came every four months on set dates, while in Son La, the most common payment was only once a year. Households in Lam Dong said the quarterly payments were convenient as they often came at times of the year when cash was desperately needed, such as in fall at the start of the school year and in January before the start of the Lunar New Year.

Gender and payments: Respondents of the household survey were also asked “Who decided how the forest protection money would be spent?” The dominant tendency in Son La and Thua Thien Hue was the husband at more than 85% and 50%, respectively. The exceptional case was Lam Dong where almost 48% percent of the wives decided how the protection money would be spent. This was due to the persistent matriarchal norms in the village. The percentage of both husband and wife who equally decided how the protection money would be spent was also high and almost the same for Thua Thien Hue and Lam Dong, whereas it was very low for Son La. This was partly due to persistent patriarchal norms in the village level in the northwest of Vietnam where the Thai ethnic minority groups reside.

The forest protection money for the household was mostly spent on food, household goods, schooling fees, and expenses for the children. Only a few households in Lam Dong used part of the protection money on direct forest activities, such as buying gasoline to run their motorbikes while patrolling the forest.

Once households had participated in payment projects, there were various changes in how they managed their forestlands (Table 9). In Lam Dong, majority of the changes involved preventing forest fires (by 29 households) and keeping outsiders out of the forests (by 26 households). However, nine households did not do anything at all. Preventing logging was a less important change (6 households). In Son La, majority of the households had not done anything different, while some prevented forests fires or outsiders or restricted fuel wood collection. In Thua Thien Hue, households prevented fires and others from using the forest.

Table 9. Activities after receiving a forest payment

| Activities | Lam Dong | Son La | Thua Thien Hue | Total |
|---|----------|--------|----------------|-------|
| No changes in forest practices | 9 | 24 | 0 | 23 |
| No land conversion | 0 | 1 | 0 | 1 |
| No logging | 6 | 6 | 0 | 12 |
| No fuel wood | 1 | 9 | 0 | 10 |
| Replanting/regeneration | 1 | 3 | 2 | 6 |
| Preventing others from using the forest | 26 | 12 | 6 | 44 |
| Preventing forest fires | 29 | 18 | 4 | 51 |
| Others | 7 | 2 | 0 | 9 |

Note: Multiple responses

Some households reported dissatisfaction with the amount of payment from forest protection projects; 67% felt that the payment was too small for the amount of time they put into forest protection. Suggested amounts to pay (per ha) ranged from VND 50,000/ha in Son La that were not receiving any payments. Several households suggested VND 5 million per year per ha. The average suggested amount was VND 781,750/ha, which was almost double the current amount of payment in Lam Dong (VND 400,000) and significantly higher than Son La’s payments of VND 100,000/ha per year. Thua Thien Hue residents suggested the largest amounts, while Son La residents requested the smallest amount. Other suggested

benefits in addition to payments included red books of permanent land rights (13 households), community infrastructure investment (6 households), and in-kind payments of rice (6 households).

4.3.6 Reasons for nonparticipation in forest protection projects

Slightly less than half of the sample reported not taking part in protection projects. Their most common reason was that the household had not been asked to participate by local authorities or by community members. This was most common in Thua Thien Hue, which had the least numbers of households participating in forest protection. The second most common reason (also mostly in Thua Thien Hue) was that there were no forest protection projects in the local area to participate in. No household said they were worried about restrictions on forest use as a reason not to get involved in a forest protection project.

4.3.7 Awareness of REDD/PES and role of carbon

While knowledge of general forest protection policy was high in the study sites, more detailed knowledge about PES was low. Almost a third (34%) of respondents reported hearing of PES, while the rest had not or were not sure. Of those who had heard about PES, half thought that it was a government program for forest protection. Only 10 respondents knew that it was a market-based program that primarily received payments from users of environmental services such as hydropower. The remaining respondents either did not know any details about PES or thought it was something else entirely. Awareness of carbon sequestration and REDD was especially low. Only 12% of the respondents reported that they have heard of or knew something about the roles of forests and trees in carbon sequestration. The rest of the respondents had no idea what carbon sequestration was about.

4.4 Social Capital Indicators

According to much recent work, social capital can be defined as “networks together with shared norms, values, and understandings that facilitate cooperation within or among groups” (Foxton and Jones 2011, p. 1). These networks are defined as personal relationships that are accumulated when people interact with each other in families, work places, local associations, and meeting places; and the networks can be formal or informal. In this study, social capital and community relations among local people within the researched villages were assessed through a variety of approaches.

4.4.1 Indicators of trust

Community relation among local villagers could be illustrated by the trust built through their daily lives. To be able to understand whether local villagers had close or distant relationships, the study looked at supporting activities and trust among local villagers. The level of community relationship among villagers varied among the three research sites. In Son La, 95% trusted strongly their neighbors and households within their village. Only 88% in Thua Thien Hue trusted their neighbors. In Lam Dong, only 67% trusted strongly their community members, while 28% trusted a little, and 4% did not trust at all. This situation should be improved to avoid the negative impact on the responding and coping capacity of people in suffering from any climate change events.

4.4.2 Support among communities

Similar to the Lam Dong field site, Thua Thien Hue had the same rate of people who did not know whether they could trust their neighbors or not. However, this field site had more people (79%) receiving support from their neighbors. Meanwhile, the survey in Son La field site shows a very bright picture of community social relations. Only 1.3% of the interviewed people did not receive help/support from their neighbors, while the rest (98.7%) reported always getting help from their neighbors.

In the three sites, relatives and neighbors served as key sources of support that the local people could turn to during urgent events. However, local people in Son La (53.9%) and in Lam Dong (34.7%) ranked relatives as the first source of support. More people (69.7%) in Thua Thien Hue put neighbors in the first rank. The role of local authorities in the local people's point of view was still somewhat limited. More than 60% of the people had not requested local officials support for any reason. This situation implies the limited trust and respect of local people on the local authority. This should be improved, especially if the local government wants to apply policies relating directly to local livelihood such as forest conservation, payment for forest environmental service, REDD, etc., for which they need to seek for the support of local peoples.

Households were also asked what kinds of support they both received and provided to others in recent years. In Son La, people believed that they gave more than what they received. For example, in Son La, 31.6% of the households said they gave money to other villagers when needed, but only 18.4% of them received financial support from others. In contrast, 11.8% of the people provided financial support, but the rate of people receiving support from others in money was surprisingly higher (15.8%). Similarly, in Lam Dong, 12% of the people provided their support in terms money; in return, 22.7% of the people received support in money from other community members.

Local people in the research sites often mentioned about non-tangible types of support. Examples included: sharing sadness or happiness with neighbors, visiting neighbors when they were ill, helping to take neighbors to the hospital when they were ill, buying neighbors' beef when the cow died because of cold weather, giving medical advice to neighbors so they could save money on doctor visits, etc.

4.4.3 Village meetings

One of the variables used to measure the level of social relation in a community was the involvement of local people in village meetings and the number of meetings held. The more people got involved in village meetings, the more social issues are presumed to be solved peacefully, and the closer would be the social relationship among community members.

Although everyone in Son La reported attending village meetings, some reported not attending at all in Thua Thien Hue and in Lam Dong. The high rate of non-attendees implies that many did not see any benefit from getting involved in this kind of community activity. In Son La, over 70% said that the village meeting was organized once a month. However, in the other two sites in Thua Thien Hue and Lam Dong, only 28.9% in Thua Thien Hue and 30.7% in Lam Dong mentioned the same frequency of village meetings.

4.4.4 Involvement in social organizations

Commonly, civil society plays an important role in encouraging local people to become involved in policy-implementation activities. These associations provide social space for local people to activate their voices as well as to share their knowledge and experiences, daily concerns, and satisfactions. The local people were involved in formal civil society organizations in the three sites. The women's association (26%) and farmers' association (39%) seemed to operate better in Thua Thien Hue than in the other two sites. However, the veterans' associations seem to work best in Son La site with the involvement of 18% of the interviewed people.

In Son La, people had high involvement in "other" categories, predominantly the forest protection associations organized by forest protection programs such as the 327 and 661 programs, and recently, the PES. The second association that involved the most local people was the women's association. These associations provided local women their own space where they could share ideas, opinions, and experiences, and solicit help from other women. They also can access other public services such as a credit fund with low interest rates or other state programs.

The involvement of local people in informal clubs was relatively weaker than in formal civil society organizations due to several reasons such as the difficulty of officially registering in informal clubs and especially coping with economic constraints. They did not see any economic benefit from joining these clubs. Majority of the local people were not involved in any informal groups in Thua Thien Hue (75%) or in

Son La (92%). Only 3% of the local people in Son La participated in an “other” club, which was an informal credit club where local women could borrow money.

4.5 Climate Change Awareness, Vulnerability, and Adaptation

To help villagers prepare for future climate changes, it is important to note how they perceived their current and future risks, and how they have experienced and coped with damages caused by climate change. This section discusses the impacts of climate events in recent years on households, and how the households have coped (or not) and practiced adaptive activities in response to these climate events.

4.5.1 Awareness of climate change

More than three-quarters of the survey respondents thought that the climate was changing, although climate changes were less recognized in Lam Dong than in the other two research sites. Local phenomena associated with climate change differed among the sites. In Lam Dong, changes in climate have primarily been described by more rain and increasingly higher temperatures. In addition, 11% of the people reported increases in tornadoes as well as a longer dry season. Similarly, in Thua Thien Hue, 78% of the local people expressed concern over the increase of rain, and 37% of them felt that the weather had become hotter. Also, 29% of the villagers in Son La reported that the weather had become colder in winter, and 34% of them recognized the irregularity of some weather phenomena such as longer cold spells, more frosts, more heat waves, etc. The irregular weather had negative impacts on their coffee production, particularly the increasing frequencies of hoarfrost.

4.5.2 Sources of information on weather and climate

The main source of information on weather and climate was TV. On average, 80% of the households used TV to get information on the weather in their locale. The use of radio was very low. The most number of people (17%) who did not listen to any weather forecast was in Lam Dong.

Generally, neighbors were not the main source of climate information, implying that climate was not really a major daily concern or a key topic for regular discussion. Only a few of them (21%) discussed about the weather with neighbors; 48% “sometimes” discussed about the weather. This indicates a rather limited information exchange, particularly in Lam Dong in which 24% said that they never discussed about the weather at all.

The exchange of information on crops cultivation, cattle raising, etc. would potentially help local people adapt to future climate changes. However, majority of the respondents said that they did not regularly exchange information about cropping with one another. Interestingly, more respondents in Thua Thien Hue (58%) discussed about crops even though Section 4.4 showed that this area had lower indicators of social capital and social relations. Meanwhile, 33% in Son La and 36% in Lam Dong site discussed about crops with their neighbors. This indicated that information sharing was not necessarily related to social relationships. Also, even less tight-knit communities may be able to regularly share information with one another if they have access to ways to share and obtain information.

Households were asked to assess their access to information before severe and extreme climate events. The most common response was that households (30% for all three sites) usually received severe weather information only 24 hours before events happened. It was worrisome that a quarter (25%) of local people in Lam Dong and 18% in Son La said they usually received **no** information before climate events. Another 30% in Lam Dong were not sure how much in advance they usually received information. This highlights the problem of ensuring that weather forecast information gets to the right people at the right time to ensure their preparedness to respond to climate change. Only in Thua Thien Hue were most people (46%) informed from 24 hours to even several days (24%) before a climate event. This can be explained by the high frequency of storms happening in this area, thus, weather forecasts were more important in this site than in the other two.

Preparedness of local people in the three field sites for climate events should be improved to increase the local people's adaptive capacity and to reduce the events' negative impacts on local livelihood. Currently, local people seem to be more preoccupied with urgent things in life. However, emergency warnings as well as longer-term forecasts on climate change and its impacts should be actively shared by local authorities to the local people.

4.5.3 Climate damages and costs

Many of the households have been affected by major climate changes in the past five years, including 81% in Thua Thien, more than 78% in Son La, and only 32% in Lam Dong. Lam Dong is well known for its more temperate climate as compared to Son La and Thua Thien Hue.

The main types of climate change events that people in the study sites experienced varied based on their geographical locations. Being located along the coast, Thua Thien Hue people primarily experienced storms and floods. In Lam Dong, the main effects were tornados, droughts, and storms. In Son La, the northern mountainous area of Vietnam, majority of the households experienced low temperatures and hoarfrost, which reportedly killed their agricultural crops, including coffee. Many people reported losing large amounts of money in years when hoarfrost occurred.

When asked to calculate their household income and assets lost in major climate-induced events in the past five years, more households in Thua Thien Hue (83%) had the most damage, followed by Son La (79%) and Lam Dong (29%) (Table 10). On average, each household in Son La reported the most damage (more than VND 12 million), followed by those in Thua Thien Hue (more than VND 11 million), and in Lam Dong (around VND 1.9 million). The major types of damages included damage to houses from winds and rain (e.g., loss of roof, damaged windows); damage to trees (trees blown over or branches lost); and damages to crops (crops flooded or killed by frost, crops with low productivity, higher pest outbreaks, etc.). Damage to crops incurred the highest amount of damage. Son La reported the most crop damage (more than VND 10 million), followed by Thua Thien Hue (VND 8.5 million), and Lam Dong (VND 1.7 million).

Table 10. Total household income and assets lost in climate events in the past five years

| Study site | Average household loss/damage (VND) | % total households reporting monetary damage |
|----------------|-------------------------------------|--|
| Son La | 12,440,000 | 79.0 |
| Thua Thien Hue | 11,119,934 | 83.0 |
| Lam Dong | 1,934,267 | 29.3 |

In summary, while Thua Thien Hue appeared to be one of the most vulnerable places in Vietnam as it is located along the coast, the households in Son La actually lost more than their counterparts in Thua Thien Hue. On the other hand, Lam Dong seemed to be relatively well protected from major climate events. Households in Lam Dong reported much less damage, and fewer households were vulnerable to and affected by climate events.

Recovery from climate events: The time needed to recover from climate events varied across the field sites, from five months to over three years. On average, people in Thua Thien Thune needed the shortest period of recovery (five months), followed by people in Son La who needed almost 14 months. Meanwhile, people in Lam Dong needed the longest time to recover (i.e., more than three years). The people of Lam Dong explained that they needed to replant the key staple cash crop (i.e., coffee) after climate events, and coffee would produce beans only after three years or so. Hence, although Lam Dong is less vulnerable to climate events and it lost the least compared to the other two sites, the residents here needed more time to recover from climate events.

4.5.4 Vulnerabilities to climate change

The survey looked at two key factors that assessed overall vulnerability to climate change: household water shortages and household food shortages. Respondents of the sampled households were asked “Has your household experienced water shortage in the past five years?”

The Son La people have experienced shortages of water more than their counterparts in Thua Thien Hue and in Lam Dong. More than 20% of households in Son La experienced shortages of water, while the figure for Lam Dong was 12%, and Thua Thien Hue was less than 5%. According to key informants and the results from the group discussions, one of the surveyed villages in Son La (Hom village) experienced serious water shortages; hence, villagers had to spend their meager cash income on water. Since Thua Thien Hue is located along the coast, the households there experienced more floods than droughts, hence only a few (5%) experienced water shortages.

The households were asked to self-assess their households’ well-being in food security compared with their situation five years ago. More households in Thua Thien Hue (more than 18%) reported having had less food security, followed by Lam Dong (more than 13%), and then Son La (only 8%).

How did they cope with food shortages? Contrary to expectations, only a few households resorted to cooking smaller meals, eating less, or eating other emergency foods. Rather, majority of the households in Lam Dong and Thua Thien Hue looked for wage labor opportunities distant from home. The households also purchased food on credit from local shops especially those from Lam Dong (52%), Thua Thien Hue (almost 37%), and Son La (more than 53%).

4.5.5 Climate adaptation responses

As discussed earlier, local people in the three sites have coped with numerous climate risks that have made them more vulnerable in recent years. These risks included droughts, floods, storms, typhoons, landslides, land erosion, cold weather, hoarfrost, and epidemics. People in the surveyed areas were also asked what changes in agriculture they have made in the past five years as a response to climate change. Son La reported having the highest (44%) percentage of households that reported changes, followed by Lam Dong (more than 32%), and then Thua Thien Hue (more than 26%).

In terms of the changes they have made in their agricultural practices, over half (55%) of the households in Thua Thien Hue reported changing the seeds that they have been planting in the past five years. A quarter of them changed the timing of sowing and harvesting crops. Almost half of those in Son La (almost 46%) also changed agricultural practices. But only a few (8%) did so in Lam Dong. These changes included planting more flood- and drought-tolerant varieties of rice and switching to hybrid corn seeds. A quarter of the households in Son La and Lam Dong reported changing crops, mostly from annual crops to coffee. They shifted to coffee hoping that with the crop’s high market price, they could earn more income for their families. Unlike large coffee plantations in the Central Highlands of Vietnam where coffee plants need to be watered, the coffee fields in Lam Dong and Son La do not need irrigation. The coffee varieties that they planted—Latimore and Robusta—do not require intensive cultivation such as Arabica. In Lam Dong, coffee fields are located very close to the natural forest, while coffee is planted under the shade of older trees in Son La.

Other climate responses: This section discusses the coping actions of households during and after climate change events. Almost all the residents of Thua Thien Hue took preparatory actions before the event (85%) and after the event (81%). In Son La, 48% of the households prepared for the event, while 54% did so only after the event. Only 17% in Lam Dong, took action before the event, and 46% after the event. Majority (59%) of the 139 households that reported impacts from climate change made preparatory actions before the events. This varied by site: 68% of all households in Thua Thien Hue reported taking advance actions, while only three households in Lam Dong did so.

The households’ primary activities before the climate events depended on the event itself. The respondents from Thua Thien Hue gave the most diversified actions, such as planting drought-resistant crops to diversifying income sources. The respondents from Son La shifted to planting drought-resistant crop varieties and to storing of food in case of floods/storms or landslide. More than 96% of the Son La

people also used canvases to cover their animals to keep them warm during cold weathers. Only two households in Lam Dong reported moving household goods to a safer place/roof in case of floods or landslides. As for post-event preparations, 58% of the households took necessary actions. Respondents from Thua Thien Hue engaged in the most post-event activities. They reinforced their houses after the floods and storms, and they paid more attention to weather forecasts. Majority of the respondents in Son La (88%) prepared livestock for cold events by buying canvas or better livestock pens to protect their animals. The Lam Dong people engaged in only a few activities that were particularly widespread.

4.5.6 Future concerns of households

Research revealed that climate disasters and health problems were the main worries of the households that would affect their well-being in the next 12 months. The percentage of households that were worried about climate disasters was highest in Thua Thien Hue (43%), followed by Son La (39%), and Lam Dong (8%). For “health problems,” more households in Lam Dong were worried (50%), followed by Thua Thien Hue and Son La (almost 39%). In addition, households in Lam Dong were also worried about the poor infrastructure that would constrain local socioeconomic development, thus contributing to poverty.

5.0 DISCUSSION AND ANALYSIS OF RESULTS

The study tried to answer the original research questions with the data gathered. Sufficient data for some of the questions are still being gathered for the next two years, with funding from the NSF.

5.1 Impact of Household Payments for Forest Environmental Services (e.g., carbon) on Household Decision Making and Livelihoods

The study determined whether or not the most socially vulnerable households received forest protection payments. One way to measure vulnerability is to look at income categories. The sample households were divided into three income categories, namely, poor (near poor, hungry, and poor), average, and well-off. Subsequently, the forest payments that each category received were compared. Overall, the poor households did access forest payments, and on the whole, appeared to receive larger payments than those in average and well-off categories. This provides some support to the contention that PES projects have been targeted well to the poorest households.

Table 11. Average size of forest protection payments received by income groups

| | Poor (N=73) | Average (N=104) | Well-Off (N=42) |
|-----------------------------------|-------------|-----------------|-----------------|
| Average forest protection payment | 4,497,780 | 2,335,403 | 2,301,785 |

Sig=0.20

The qualitative focus groups, however, revealed that some households in each area were not able to participate in the PES project; hence, they would never be able to use forest payments as a means to escape poverty. These included (1) households with older members, hence lacking labor to regularly patrol forests; (2) households headed by females, hence having no male laborers as forest protection was seen as a male job; and (3) households that were away from the area often while doing migrant labor, hence they were not able to devote sufficient time for forest protection and therefore were not usually selected to receive payments. For these categories of people, forest protection payments may not be the appropriate way to transfer social support; other means may be necessary.

Use of forest payments by vulnerable households as compared to less vulnerable households

Overall, most households used the forest payments for the same expenses: food, household goods, and school fees. Only a minority actually spent forest protection payments on forest protection activities. There was very little variation as to where money was spent among the households, but there was a great variation in the size of payments. Many households said that they used the extra cash from forest protection to help buffer against the rising costs that have hit Vietnam in the last few years due to inflation. Many households in the three sites noted the very high cost of gasoline, hence they used the forest protection payments to ensure their continued access to gas and transportation.

At the same time, there was still a great deal of indebtedness in the study sites. As noted earlier, between 7%–17% of the households' incomes came from loans. The indebtedness, combined with their problems of being unable to produce enough rice for their families, meant that they could resort to subsistence farming in times of hyperinflation or failure of cash payments. The households were integrated into the cash economy at all field sites. Only in Son La, the remotest site, were households confident that they could resort to subsistence farming and forest product gathering should disaster strike. Therefore, it is hard to say that the payments (even in Lam Dong where payments were high) have enabled people to move out of their state of poverty.

Effect of the timing, size, and form of payment on household monetary and land-use decision strategies

In Lam Dong, the forest payments were generally large (up to USD 1,000 per year) and paid in quarterly installments. In Son La, on the other hand, payments were much smaller (between USD 2.5–10 per hectare) and were often made to communities, rather than to individual households. Therefore households in Son La either received very little money from the PES on the land allocated to them through the 661 Program or some did not get paid at all. Such a situation was a disincentive for them to participate actively in PES. Not surprisingly, most households in Son La said that the payments had not yet had an impact on their land-use decisions.

In Lam Dong, payments were higher, and people who had received payments were more likely to have changed their forest management in response. The most common action was to prevent outsiders from going inside the protected forest and to patrol the latter more frequently. However, many households that have signed the contract agreement to "protect" forests did not really change their overall land-use strategies. They simply shifted those activities to other lands for which they did not have a PES contact. An example of this was that some protection activities on PES lands displaced other activities of the households to other areas.

In the village of Hamasing in the Lam Dong province, the Koho ethnic minority households signed forest protection contracts with the District Forest Management Board. The Board had long-posted rangers to interdict village forest use in the area, and the ranger became responsible for distributing forest protection payments to participating households. The households had agreed to the forest protection contracts because they essentially saw it as free money. They were already supposed to be prohibited from using the forest for swiddens or for logging because they lived near the state forest, and the rangers made it difficult to conduct other practices. Hence, many of the households simply continued to use agricultural fields that had been cut in forests in the next province (around 10 km away) and those which have not been included as PES/REDD pilot sites.

As for the timing of the payments, the households in Lam Dong preferred receiving quarterly payments (as they were already doing) rather than yearly payments. This ensured that they had cash for important times of the year when they needed the funds, such as the start of the fall school years (when school fees are paid) and in January when households are preparing for the New Year's holidays. The focus group discussions revealed that the most important factor in the timing of payment was its regularity and not its lateness. The households wanted to know that they could depend on the payments to arrive at a set time. In several villages, the forest owners had been distributing the payments rather late, and this had caused trouble for some indebted households that needed to pay off these debts at certain schedules.

Finally, only 10 (4%) of the surveyed 227 households knew that the PES payments that they had been receiving were not from the government. In reality, the PES were payments made by hydropower or

tourism companies to the provincial government, which then disbursed these funds to local forest owners like SFEs and FMPB. The latter then contracted out the work of forest protection to the local households.

The rest of the households believed that since the payments came from officials of the FMPB/SFEs or from other local government offices, then these were a form of state subsidy. They saw the PES payment as yet another state “charity” type program, which some of them were enjoying (e.g., free education and health care cards provided by the state to any ethnic minority, free salt and radios to people classified as poor, etc.). Hence, the households found it difficult to connect the idea of “conditionality” of protecting the forest as payment to the PES.

Effect of payments on gender-based decision making about how to spend household income

So far, the payments appeared to have the potential to change household dynamics in the two sites, except in Lam Dong where there was more gender parity. In the other two sites, more men participated in forest management; hence, they were the ones who decided how the forest payments would be spent. Focus group discussions with women showed that while there had not been major arguments between husbands and wives over how to spend the money, some men had “wasted” money on alcohol or tobacco, which the wives disagreed with. This aspect of the study will be followed up to monitor how household budgeting may be changing because of the payments.

5.2 Effects of Land-Use Changes Instigated by Payments on Households’ Social and Biophysical Climate Vulnerability

Existing statistics kept by local authorities have shown little land-use change in response to PES/REDD during the survey. The NSF money will be used to purchase land cover maps of the study areas to monitor forest changes over time.

PES/REDD contracts requiring restrictions on forest use that may change resource access and control, such as increasing food vulnerability for some households

In many areas, the forestry sector is an important informal safety net, particularly for the poor (Sunderlin and Huynh Thu Ba 2005; McElwee 2008). Previous studies have shown that “rural households and governments use forests to prepare for and mitigate the impacts of climate variability” (Fisher et al. 2010, p. 1243). If households begin to experience crop losses, then they may turn to forest resources to help them find alternative income.

People in each study area had different forest products that they could occasionally turn to sell. These include mushrooms and medicinal plants in Lam Dong; tubers, roots, and fuel wood in Son La; and rattans and bamboos in Thua Thien Hue. However, because the enforcement and checking of PES contracts have been rather loose, most households felt that they were not restricted from continuing to collect these products, even if they were not given explicit permission in their protection contracts.

Swidden fields have also expanded or contracted in recent years. Only one household said that their upland fields had been restricted because of forest policies. In most cases, other land conflicts or insufficient labor were the reasons why households might have experienced smaller land use for upland agriculture. The implementation of the PES/REDD seemed not to have prevented households from practicing their usual food production activities. Hence, although such food insecurity still exists, changing land use has not contributed to food vulnerability in the study sites.

Provision of sufficient incentives and support from PES/REDD contracts to better protect forests from overexploitation

As mentioned earlier, there have not been much land-use changes in response to the payments. Authorities in Lam Dong asserted that they perceived considerably less forest violations (e.g., illegal logging or forest encroachment) since the PES pilots began. However, this needs to be validated by systematic data collection. Further, forest monitoring systems at the provincial level and below in each site were rather weak. Forest authorities could not also point with certainty that better forest protection was being reflected in the

expansion (or even retention) of existing forest cover. These aspects need to be monitored over a longer time period to produce research-based results.

Change of forest-use management regimes for households (from communal to individual management and weakening of communal risk reduction and risk pooling) because of PES/REDD contracts

The major factor that has influenced how forests were managed in the study areas had been how land was allocated, and this process was completed in the 1990s and 2000s. Currently, forest policy is primarily about paying for protection and enforcement of existing tenure rules. Therefore, PES/REDD appears to play a rather small role in changing communal forest management regimes. Communal management is still strong in places where communal tenure is recognized such as in Son La. However, it remains weak in places like Lam Dong where communal land tenure has not been supported by authorities.

Changes in Vulnerability as a Result of Shifting Access to Resources Caused by PES/REDD' Alignment with Long-Term Climate Forecasts

This has been one of the most difficult research questions in the study because the team had yet to see major land-use changes in response to forest payments. There seemed to have been little attention paid at the policy level to understand the linkage between climate vulnerability and the development of forest policy. In no site were forestry officials able to state how they had built climate forecasts as basis for developing PES contracts, allocating payments, or protecting forestland.

Households' use long-term climate forecasts to influence short-term land-use and household-livelihood decisions

Climate forecasting is still weak in Vietnam. Most households used short-term weather forecasts to know about upcoming events. Most cropping decisions were also made in response to market demands, rather than on understanding of climate impacts. While climate appeared to be changing in the study areas, the households were slow in responding to these changes, as indicated by only a few making major changes. Although some changes had been noted in agriculture (e.g., changing seeds grown), there was not much that the households felt they could do in changing their livelihood strategies because of climate change.

Alteration of long-term adaptive capacity to climate change (reducing access to subsidiary income sources or reducing incentives to diversify production) because of the PES/REDD contracts

There has been no indication that the households became "dependent" on cash payments rather than diversifying their livelihoods. Livelihoods in the study areas were already generally diverse, with households sourcing their income from up to 9 or 10 different livelihoods.

Impact of external factors that are difficult to predict or control (changes in food prices) on household decision making regarding land-use conversion, and the effectiveness of PES payments in countering unpredictable or high-risk impacts

The main "shock" in recent years had been the high price of gasoline as a result of inflation. Some households needed motorbikes to reach and protect these distant forestlands, and the high price of gas was preventing them from patrolling as often as they used to. Hence, the forest payments, especially in Lam Dong, were seen as helpful in ensuring that they could buy gasoline. Given the situation, however, inflation may weaken forest enforcement in some areas.

Policy Makers' Use of Social and Biophysical Data and Understanding of Vulnerability in Developing Subnational REDD and PES Programs

Key indicators used by policy makers to determine sites and benefit distribution systems as they develop localized REDD policy

One of the surprising findings of the study was that most local officials did not see PES or REDD as different from already existing policy. Many local forest officials were hoping that PES/REDD subsidies could

be used to replace previous government forest subsidies such as the 661 reforestation program; hence, they applied the PES policy in places where the 661 program was expiring.

Although the officials were initially enthusiastic about REDD, their support often waned when they learned that REDD payments may only be made to countries with confirmed decreases in deforestation at a global level as measured by satellite monitoring or by outside auditors. Such strict monitoring has never been attached to previous forest programs internally in Vietnam. For example, under the 661 reforestation subsidies, local SFEs were paid on the basis of *how many seedlings were planted in the ground*, not how many actually survived and grew up into forests. So, forest organizations and policy makers who were initially hopeful that REDD would mean new pots of money for existing activities were surprised to find that REDD may require global auditing and monitoring. Global auditing may require work from them that they did not have to do in previous national state programs such as 661.

Assumptions of policy makers about household decision making and vulnerability, and data that local officials want to know but do not have access to, especially on social indicators

To comply with the requirements for REDD readiness, Vietnam's forestry sector has had to build capacity that could generate, analyze, and report on the state of forest resources of the whole country. This included estimating the amount of biomass stored in the forest and its change over time in relation to REDD's technical aspects. Accordingly, local forest officials involved in REDD development in Lam Dong had paid more attention to technical rather than to social issues involving the forest. Officials in most areas were not yet thinking about long-term social monitoring as part of REDD development. It was difficult for them to talk about data and needed indicators as they have not yet contemplated these problems thoroughly.

At the national level, NGOs have already been thinking about this problem. They have, in fact, formed an active REDD network to discuss regularly among themselves the issues about the formulation of REDD. So far, the REDD network is composed of the following:

- *Sub-working group on REDD+ Governance*, which covers issues on REDD+ governance; government structures and capacity building; forest policies, rules, and regulations; and external linkages with other government agencies;
- *Sub-working group on MRV*, which covers issues on forest data, forest inventory, data management, and MRV;
- *Sub-working group on REDD+ financing and benefit distribution*; and
- *Sub-working group on local implementation of REDD+*, which has dealt with FPIC issues.

6.0 CONCLUSIONS AND FUTURE STEPS

6.1 Conclusions from the Study

In the discussions about REDD in Vietnam, not enough attention has been paid to the poverty and social aspects of REDD implementation, and on the potential risks when poor people are induced to make land-use changes in response to carbon markets. Such changes may restrict their food production or introduction of new forms of exchange and marketization in areas that are unfamiliar to them. More attention has been paid to establishing baseline levels of carbon emissions for long-term comparison after REDD was implemented than on long-term social monitoring to determine the household-level effects of REDD payments and land-use changes. While the initial results are that major land-use changes have NOT occurred under existing PES pilots, this does not mean that such changes may not happen under expanded REDD programs. More attention should be paid to household-level beneficiaries in Vietnam and on understanding clearly how their participation is being affected by issues such as poverty status, gender, and land tenure.

The next section discusses some key issues that policy makers need to consider as they develop this new policy.

6.2 Future of REDD Development

REDD governance: It is not clear how any REDD program will relate to existing UNFCCC programs (e.g., Clean Development Mechanism) and other forest carbon programs (e.g., World Bank's Forest Carbon Partnership Facility). It is also not clear as to how it can be ensured that all neighboring countries will participate in order to avoid leakage and displacement of forest with activities like logging. Little cross-national work had been reported by the informants.

Further, questions of good governance are not being addressed well in most Country Readiness Plans for REDD. Early analysis of these developing REDD pilots had indicated that many of the projects are moving too fast without giving enough attention to the structural changes needed in forest management (IIED 2011). This research indicated that many policy makers at the local level in Vietnam saw PES (and possibly REDD in the future) as very similar to previous policies, which did not arrest deforestation in the country in the past.

Measured, reported, and verified carbon (known as MRV issues): These issues include (1) how baselines for historical carbon missions will be set, (2) how future monitoring and verification will be standardized to ensure that carbon-emission reductions are real, and (3) how to ensure the addition and permanence of land-use changes. The entity that would be responsible for monitoring and determining forest-cover changes remains unclear—will it be Vietnam itself or a global authority such as UN agencies? From the interviews with policy makers, none of these issues has been fully resolved for Vietnam. The difficulties in measuring the various environmental services have led local officials to adopt very simple K-coefficients in the PES pilots sites studied. However, such general simplification may confound future REDD projects as well.

Financing and benefit distribution and sharing: It is still unclear whether REDD will be primarily funded by traditional aid-type pledges of participating donor countries (as is the case now in Vietnam) or by an emissions-trading type market. How much money would be raised by each approach? Even the existing PES models in Vietnam, which are supposed to be based on market principles, have required a continued strong role for the central and local governments, both as buyers and as sellers as well as formulators of the most basic parameters for the PES market. This raises the question of the sustainability of such schemes. For example, in the PES pilots in Vietnam, the buyers have received no information about where their money goes and if it is being used effectively.

Furthermore, working out local mechanisms for payment to local beneficiaries engaged in forest protection is complicated. This was noted in the comparison of the two PES pilots in Son La and Lam Dong. It is still unclear how REDD payments may be made, and if this will follow the PES pilots' models of using K-coefficients or if another model will be used. The experience from the PES projects showed that local authorities are more likely to use the simplest calculation possible for forest payments, which may not reflect actual opportunity costs or efforts of participating households. Furthermore, how to ensure conditionality (i.e., that payees only get the money if they deliver forest protection) remains problematic for both PES and REDD. Most PES payments have not been adequately made based on actual land-use changes; thus, the conditionality in PES had been weak, and this will be a major issue for REDD.

Setting prices to cover opportunity costs: Early estimates of the "cheapness" of abating forest emissions are now being questioned (Greenpeace International 2011). Promises that REDD could reduce carbon emissions for less than USD 10 per ton have been criticized for excluding "transaction and implementation costs, as well as the challenges of governance, and for undervaluing activities not integrated into formal markets, such as subsistence farming" (Dyer and Counsel 2010, p. 1).

Further, even in theory, a REDD payment may be larger than any other land-use choices; REDD proponents have rather simplistically assumed that, all other things being equal, a land use that provides the most money will be the one chosen by the farmer. These studies rely on quite basic models of forest area and carbon prices (Bellassen and Gitz 2008; Nelson et al. 2008). Yet this is not how smallholders often act; there are multiple factors that influence land-use decision making, of which economics is just one.

One area that needs further work is the development of a more realistic view of how households respond to price incentives, and whether or not REDD payments alone will be sufficient to induce

households and other forest-using groups to change their land-use practices. Evidence from PES examples in Vietnam shows fairly minor land-use changes, even in response to large PES payments.

A final problem is the probable high transaction costs that occur when thousands of smallholders are included in REDD projects. The Son La PES scheme, which had more than 50,000 smallholding households, had proven to be very unwieldy to administer.

Local implementation: Issues in this category include how REDD projects will use safeguards and FPIC to ensure that the participants' rights are protected, that there are no adverse impacts on participating communities and households, and that participating developing countries' capacity can be built up to ensure that the goals of REDD are met at local levels (Agrawal, Nepstad, and Chhatre 2011).

Existing FPIC consultations on REDD in Vietnam have been inadequate, thus these need more attention. The UNFCCC at Cancun agreed to the principle of safeguards, although details have not yet been developed. Many found the final decision to be too weak as it only requires participating nations to have "a system for providing information" on how these governments are addressing the problem of the safeguards in REDD. The Subsidiary Body on Scientific and Technical Advice is working through possible approaches for reporting on safeguards in the future.

Consequently, different REDD projects have developed their own approaches to safeguards, including the UN-REDD's Principles & Criteria; the World Bank's FCPF Strategic Environmental and Social Assessment; and the Community, Conservation, and Biodiversity Alliance REDD+ Social & Environmental Standards. Although these safeguard standards all refer to the idea that local communities must be involved in REDD development, the focus has primarily been on developing the safeguards to prevent abuses (a "do no harm" approach) rather than bottom-up suggestions on how to enhance local forest-based livelihoods as part of a multifaceted sustainable forest management strategy (a "do more good" approach).

Securing land tenure: Most REDD pilots still do not have built-in mechanisms to increase tenure security. In fact, many have the potential to weaken tenurial regimes, particularly in shifting resource access away from local autonomy to outsiders, from auditors or state officials to carbon buyers (Phelps, Webb, and Agrawal 2010; Sikor et al. 2010). As a result, some indigenous communities in Peru, for example, have declared that they would not participate in any REDD-type project as they considered it a threat to their traditional forest rights. As a recent report noted "In order to be positively engaged in REDD, rural populations require secure tenure, economic incentives for conservation, and the opportunity to participate in program design and implementation. Yet, this is where REDD programs and rural communities face significant barriers. First, property rights are often insecure, with customary resource rights not being codified in law and with majority of forest area in most developing countries legally owned by the state" (Laylor, Weinthal, and Olander 2010, p. 3).

The existing pilot PES projects in Vietnam have not adequately addressed land-tenure issues, and REDD+ will have to confront the same problems as well. This is likely to be a major issue that may prevent the poor in many areas from benefiting. It is clear from several studies that poor households in Vietnam are less likely to have secure land tenure; they will have much smaller plots when they do have land-tenure certificates, hence making them less able to participate in payment for protection plans (Sikor and Nguyen Quang Tan 2007; Nguyen Quang Tan 2006, 2008).

According to the 2006 Rural Census, 1.4 million households have some form of secure forest use rights (i.e., with red books). But these households only have rights to about 25% of the total forest estate as noted earlier (the rest being managed by SFEs and other state organs). Further, the vast majority of household forest owners have small plots of forestland allocated to them: 800,000 of the 1.4 million forest-owning households have less than 1 ha and only 120,467 households countrywide have more than 5 ha of forest with secure land-tenure rights (GSO 2011). The uneven spatial distribution of forest cover and the unequal land-tenure situation have implications to PES/REDD projects.

Many PES and REDD proponents have tried to emphasize that proper projects will hopefully strengthen tenure rights to forests and result in better livelihood outcomes. However, existing PES projects (and presumably future REDD projects) have shown that that tenure issues have not been changed. People who already have land tenure get paid; and people who do not have land tenure get contracts, but their land-tenure status has not changed at all. There were no examples showing additional land allocation as

part of the new policy. This indicated that in Lam Dong, at least, the PES payments were primarily paying people who had no legal forest rights to protect forests. Essentially, PES contracts have become yearly labor contracts.

As PES/REDD scales up, the main concern would be without innovative ways to incentivize land decentralization, PES schemes may end up only working with SFEs and other state institutions as this would lower transaction costs. The PES schemes may miss the smallholders who would most benefit from it. Without additional pushes for land allocation, the poorest may be prevented from benefiting from the PES scheme.

Existing PES pilots do not show clear paths for addressing the question of land tenure to avoid pitfalls experienced in past approaches. Further, it is unclear if households will be able to secure red books from the PES project in the future as an incentive for participation. So far, current PES pilots in Vietnam have not yet been able to drive more even and secure land tenure for the poor and ethnic minorities. This will be a primary hurdle to tackle before PES in Vietnam can be described as pro-poor (Pham Thu Thuy, Hoang Minh Ha, and Campbell 2008).

Livelihood impacts: REDD policies might shift the availability of forest products and can potentially restrict access to forests with negative results. Studies such as McElwee (2008, 2009, 2010a, b) have noted that forest dependence in Vietnam is very important across income groups and ethnicities, and this research confirms this. Forests are not only important in supplementing overall income to households, they can also be important in the timing or when that income will be supplied.

Forest products are often collected when other work opportunities are unavailable, such as during the agricultural slack season. During these times, these forest products can provide seasonal supplemental food and income when households have few other choices. Use of forests for overall income diversification (such as to supplement income during seasons of low agricultural labor demand) and for coping in case of loss of crops or other emergencies were observed in all the study sites. Hence, this forest use remains important. Quantifying such importance will be necessary to understand how benefits and losses from land-use changes under REDD may occur. The fact that the study has not yet noticed any significant livelihood impacts under existing PES projects should not keep policy makers from continuing to monitor this problem closely.

For example, access to and control of forest products by local peoples may shift under REDD if such activities are deemed by outside actors to have a deleterious effect on carbon storage in local forests receiving REDD payments. Some REDD restrictions may be directed at less damaging activities (like swidden agriculture) and away from the true drivers of deforestation (like export agriculture or logging) due to powerful interests (Hansen, Lund, and Treue 2009).

Need to link REDD to climate adaptation: A final concern discovered during the study was that few policy makers have considered how to incorporate climate adaptation into either PES or REDD policies. There was very little attention at the policy level to understand the linkages between climate vulnerability and the development of forest policy. In no site were forestry officials able to state how they had built climate change forecasts into how they had allocated or protected forestland or developed PES contracts.

When interviewed about the need to think about how PES/REDD may be able to help households adapt to climate changes in the future, most local officials said that these two concerns had not yet been linked, primarily because PES/REDD development is being led by MARD, while climate forecasting and adaptation issues are usually being handled by MONRE. As a result, climate change adaptation policies are being developed separately from PES/REDD policies. But it is clear that the two areas need to be conjoined; climate change will affect the biophysical properties of forests over time in Vietnam, and responses to climate change adaptation may include the need to rethink some existing forest policies.

These challenges clearly indicate that much more research needs to be done at the country and sub-national levels to ensure that social indicators and attention to livelihoods are primary components of REDD development.

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