Facilitating transition from degraded commons to reforested land and better livelihoods using voluntary carbon schemes: Lessons from Timor-Leste.

Theme: Institutions and actions for the protection of the commons in the 21st Century

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Abstract

This paper explores the potential role of global voluntary carbon markets in facilitating transition from degraded commons to community led reforestation in Timor-Leste. We examine the societal, environmental and institutional conditions that enable and challenge collective action by farmers, community organisations and project developers in meeting carbon certification standards.

In Timor-Leste, natural resources are traditionally governed under local customary laws and institutions (Batterbury et al. 2015). During the Indonesian occupation (1975-1999), villagers were displaced and forest destroyed causing land-degradation (McWilliam et al. 2011). Since independence in 2000, some farmers have reclaimed their land under customary ownership. Conflicts continue over land ownership and livestock invasion but are usually resolved by customary laws (Batterbury et al. 2015). Farmers practice shifting cultivation to grow crops but the intense wet season combined with increased deforestation leads to soil erosion. Reforestation initiatives to address land degradation have shown initial success with planting. However, the effectiveness of these projects often declines from lack of financial support beyond planting campaigns (Lasco and Cardinoza, 2007).

A longer-term option is to link smallholder reforestation with voluntary carbon markets via carbon certification (Neef and Thomas 2009). A project was established in 2011 with Australian non-government support to facilitate tree planting in Timor-Leste for the carbon market. The UK Darwin Initiative Fund is also supporting the project. A key factor facilitating farmers to plant trees for carbon certification has been adoption of an adequate carbon standard methodology suited to the characteristics of the project and credibility of the Project Manager who has ancestral roots, enabling strong community support. Customary laws and traditions are built into agreements between the project developer and farmers, stakeholder consultations and community governance mechanisms.

However, there are challenges for farmers to engage in global voluntary carbon schemes in Timor-Leste. Whilst there is enough land for reforestation, some areas are too isolated to enable good management and tree survival. Scale is therefore limited, making transaction costs high for non-profit organisations. Evolving land tenure arrangements, technical challenges and the evolution of carbon standards reflecting global initiatives require ability of projects and introduction of mechanisms to rapidly adapt.

Timorese farmers are realising environmental and income benefits already from reforested areas. Joining the voluntary carbon market will strengthen their capacity to manage trees for future generations.

Introduction

Timor-Leste is a small developing island state (14874 Km2) located in Southern East Asia, east of Indonesia and north of Australia. It has a population of approximately 1.3 million people, with 67% living in rural areas. Most (60%) of the population is under 24 years of age and life expectancy is 68.7 years. More than 32 native languages are spoken, adult literacy is 64.1 %.
The population is primarily agricultural, with heavy reliance on forest products for construction and energy. The country is rich in oil and gas but lacks technical capacity to develop an oil processing industry (ADB, 2019).

Timor-Leste's forests were first exploited by the Portuguese for sandalwood over several hundred years, followed by extensive burning and destruction by the Indonesian military during the occupation from 1975 to 1999 (Molnar, 2010). High population growth since full independence in 2002 has increased demand for agricultural land and wood, leading to annual deforestation rates of 2.18% (Timor-Leste, MCIE , 2014). Slash and burning activities used to prepare the land for annual crop planting are common practice. This takes place between September and October prior to the intense November-March wet season. Combined with increased deforestation, this activity makes the land vulnerable to landslides, soil fertility losses and erosion. Other environmental impacts include biodiversity losses and water supply reductions. The livelihood impact is low crop yields also exacerbated by droughts, leading to months of insufficient food and continued poverty (Bond and Millar, 2018).

Identifying the need to address deforestation, forest degradation and soil erosion, the Timorese government, foreign aid organisations and local international NGOs introduced reforestation activities in the early 2000s (Lasco and Cardinoza, 2007). Overall, these reforestation activities have been well

received by the community and farmers involved, however the results of past reforestation efforts suggested that tree permanency and project effectiveness tended to decline overtime (Lasco and Cardinoza, 2007). This is partly due to lack of resources for farmers to allocate time to tree management and lack of continued technical assistance. Marginal success resulting from these two factors are compounded by added pressure on natural resources resulting from increased population (JICA, 2016).

A different kind of reforestation initiative was initiated in the central mountains of Timor-Leste in 2010 in Laclubar, Manatuto Municipality) (Figure 1). Although no less challenging, a combination of factors made this project different to classic reforestation initiatives implemented in Timor-Leste. First, the project ("Halo Verde Timor" or in English, "Greening Timor") came about as a request from the community itself. Another differentiating factor was the idea to start with a small area, trialling different species of trees to adjust project development, which in reality reflected the limited resources available for expansion. An on-going community consultation process to understand community requirements was, and continues to be, also a differentiating factor. All of this was done using donations made by a group of Australian citizens called Friends of Laclubar. The modest funding available was used for tree propagation and planting, plus additional payments made to farmers for each tree that survived annually. From the beginning, the project was designed and aimed to position the farmers as providers of carbon offsets in exchange for staged payments for their carbon, once the scale of the project and funding were adequate to become carbon certified.

The project entered a certification process in 2018 thanks to a Darwin Initiative (DI) grant (UK Government) and the continued commitment of farmers to their project. Key actors in the process are GTNT[1] (Australia) which is the project coordinator; represented by the Timorese NGO COTI[2], with technical support from CSU[3] (Australia) and local Timorese partners WV-TL[4] and RAEBIA[5]. To date, the project has planted approximately 75 ha with direct participation of 115 households and their families, involving more than 600 farmers. A mid-term goal is expansion of the project area to at least 120 ha by 2021 and increment of the number of participants. The area of the reforested sites in the project ranges from 0.02 ha to 3.6 ha (average of 0.5 ha), while the size of farms ranges from 0.5 ha to 8 ha.

[1] Group Training Northern Territory
[2] Carbon Offsets Timor
[3] Charles Sturt University
[4]World Vision -Timor-Leste
[5] RAEBIA: Resilient Agriculture and Economy through Biodiversity in Action

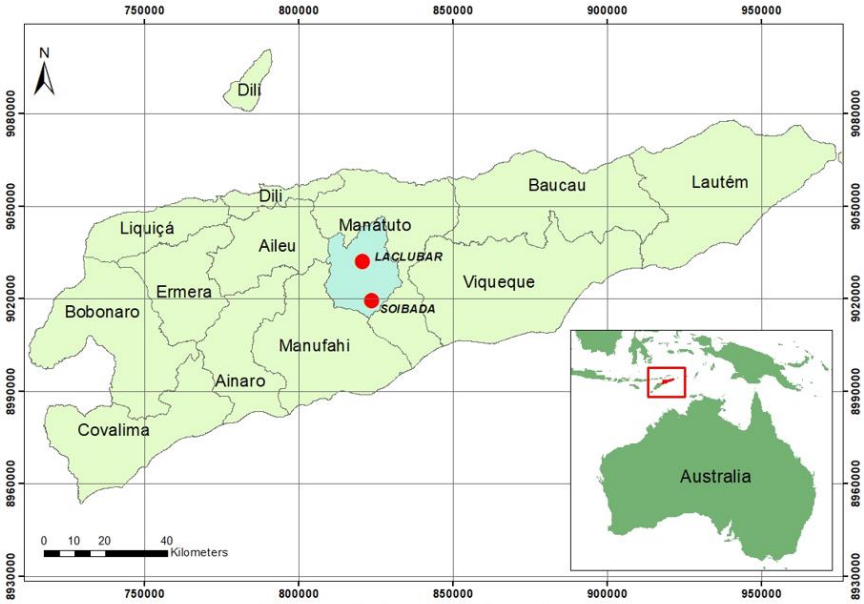

Figure 1. Project Area (Timor-Leste)

Methods and information to develop carbon certification

There are a number of climate mitigation certification standards available to community reforestation projects that link small landholders with voluntary carbon markets. We assessed adequacy of the certification standards against the project features including the overall project size (small-scale) and participating stakeholders (farmers with limited access to land). We also considered eligibility of our activities, and the trade-off between the scientific rigour requirements of the standard (its credibility and reputation) and adequacy to technical and financial limitations of the project as well as the possibility of mixing ex post and ex ante crediting[6]. A key consideration of our project was and remains that reforestation activities should not impact agricultural and wood collection activities or displace these activities elsewhere.

Taking into consideration this general criterion, we identified the Plan Vivo standard as the best possible fit to our project and adopted their requirements and methodology for baseline and carbon modelling, governance and benefit sharing. Data collected in the field to establish baselines[7] for the DI project was also used to inform monitoring requirements of the carbon certification process including:

[6] In an ex-post crediting arrangement, a buyer purchases carbon that is already stored in trees while in an ex ante crediting model a buyer may agree to pay in advance for the future delivery of carbon credits.
[7] Baseline defined in the project as "business as usual" prior the carbon certification process

Social conditions and measurements

A baseline household survey conducted in 2017 by Millar and Bond (CSU) where the majority of households involved in the project (40 at the time) were interviewed using a semi-structured approach to determine:

1. Family size, land and livestock ownership
2. Land tenure and land use
3. How much labour (time) family members spend on managing tree plantations
4. Any problems experienced with tree plantations
5. Plans to use the trees after 30 years
6.Income and expenditure

The survey showed significant variability in annual income ranging from U$10 to U$4,500, derived mostly from remittances, sales of palm wine, followed by non-farm jobs, forest products and coffee production. This information will used to monitor income changes during the crediting period of the project. Currently the average income is U$2.6/day. From a technical perspective, the survey provided information on labour time allocation and its impact on tree survival, tree maintenance and areas where project management could be modified or refined. Preliminary solutions to issues such as weed control (the project and overall farmers in the region do not use chemicals) and grazing exclusion were identified.

To further strengthen control measures, it was suggested by farmers to introduce a Timorese customary law called *Tara Bandu*. This law involves a public ceremony where culturally significant items are hung from a wooden shaft to denote the banning[8]. of certain social practices and unauthorised use of natural resources (The Asia Foundation 2013), for example unlawful harvesting of trees in private or communal land or uncontrolled animal grazing in young tree plantations. Through the *Tara Bandu* system, sustainable management of resources can be regulated at the local level while also honouring tradition (Soares 2012).

The survey also provided information that was used to identify potential future risks to project expansion and land conflict and potential mitigation actions. One of the risks identified was a Land Law Tenure framework that came into force in April 2017 and that the government intends to

[8] In Tetun (one of Timor's main languages), *Tara* means hanging and *Bandu* ban.

gradually implement to formalize land titles. Land tenure in the project area, as in most parts of rural Timor-Leste , is based on customary land rights. In the context of Timor-Leste, the core principles of customary land are origin (first possessors of areas of land) and alliances resulting from kinship (blood relations and marriage) (Fitzpatrick *et al*. 2008). The survey shows that among farmers participating in the project, and the community at large, there is a common understanding relating to land ownership (who owns what) and the boundaries of properties. The consensus among farmers and local government stakeholders consulted is that land tenure conflicts in the region are uncommon. To reduce and mitigate the risk of land disputes however, project participants have agreed to provide land ownership declarations. These are signed by each farmer and formally recognised / witnessed by the local community leader and neighbours.

The survey also provided us with a good understanding of perceptions of farmers' on biodiversity, and their views on the importance of planting trees, as shown in the following quotes:

"Before when there were no trees, there was nothing inside but now with the increased number of trees it increases wild birds and more bees as well as snakes and frogs "

"Yes, there is change because these species (lorikeet, spitting bird, butterflies) today you can see really a lot of them compared to times in the past when trees were not yet planted"

"*These plants can [absorb] or suck back dirty air or carbons that damage the environment and also can damage everything that is living. Perhaps when these plants grow big, they will already have the capacity to [absorb] carbons that exist from the big industries."*

These comments and others recorded during recent consultations give us a degree of confidence that the project is likely to continue even in absence of financial incentives. It would be unrealistic however, to rely solely on farmers' good will towards the project. Thus, the project has signed written agreements with farmers based on a land use plan designed by each project participant and strengthened by future *Tara Bandu* agreements.

Environmental conditions and measurements

The land where the project is taking place corresponds to sites identified as deforested. These are mostly areas that are marginally cultivated, or areas not cultivated at all due to their relatively low productive capacity. This is the biomass baseline scenario of the project. There was no recent information from other projects or studies in the area of interest that could inform the project's baseline, thus the project established its own baseline, via biomass sampling (Figure 2), and by installing temporary plots using a random stratified approach on our land classification analysis.

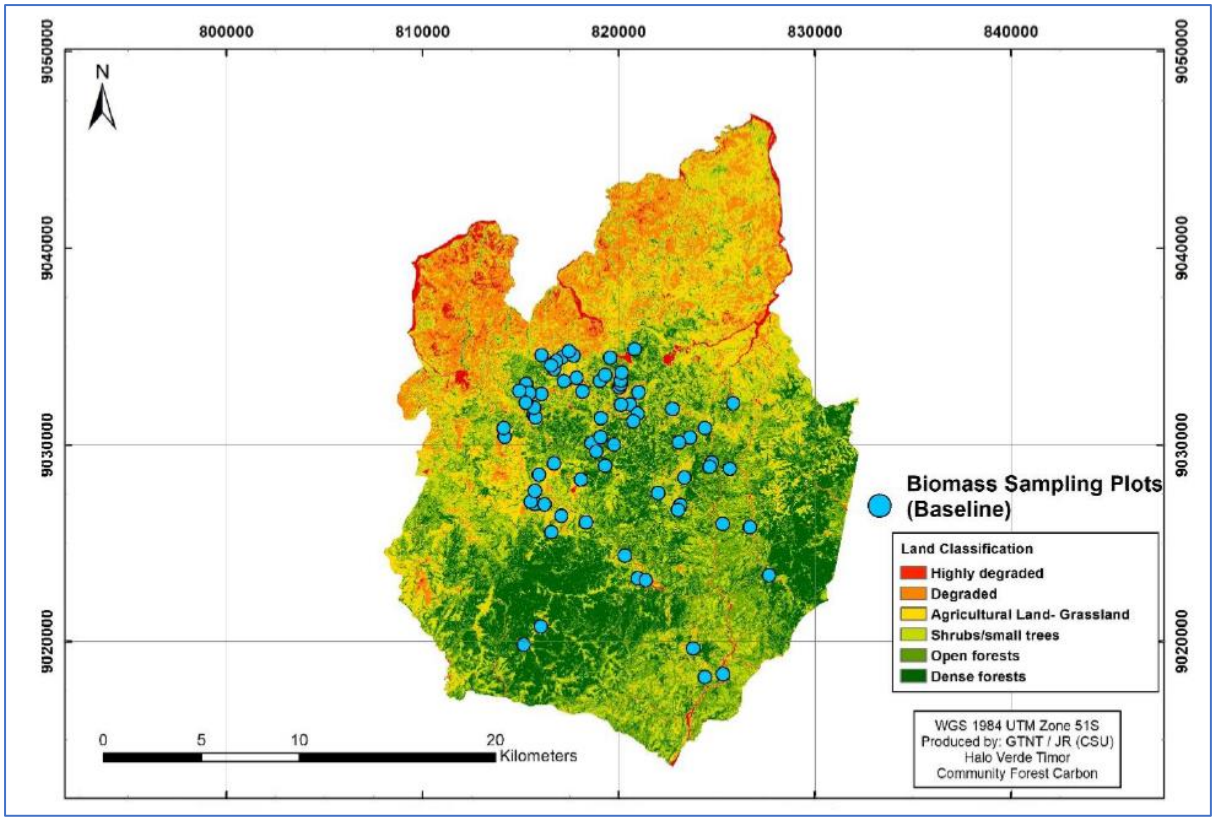

Figure 2. Land Use Classification and Baseline Sampling

Not surprisingly the biomass baseline (above and below ground) estimated was relatively low at 3 tCO2e/ha. A typical area in the baseline is shown below (Figure 3).

Figure 3. Examples of eligible areas for future reforestation (Laclubar 2018)

The soil baseline was estimated using the model small-holder agriculture mitigation and baseline assessment (SHAMBA: https://shambatool.wordpress.com/outputs/) approved by the Plan Vivo foundation.

A pilot biodiversity survey was completed in 2018 for some of the planting sites. This work will be expanded in late 2019 across the landscape in stratified random sample areas of 1) project tree plantations 2) degraded areas / non-planted areas; and 3) dense forested areas. This will give us an indication of how the biodiversity of project tree plantations compares with unplanted areas and more dense forests. Sampling sites for forested areas and degraded areas will be selected from satellite imagery, while planting sites will be selected from the spatial data the project has captured.

Climate mitigation estimate

The estimated reforestation potential for the whole of Timor-Leste could be 800,000 ha (Godinho *et al*. 2003). We found from our land use analysis conducted in 2018 using satellite imagery, that in our area of interest (degraded land not suitable for productive agriculture but yet accessible to farmers) there is roughly 2,000 ha of land that could be reforested without displacement of agricultural activities. The potential carbon sequestration rate of this area could be 10,400 tCO2e/ year from above and below ground biomass. Biomass calculations relied on growth rates from a field inventory of our existing project sites used to estimate tree diameter growth rates. The biomass was calculated for all species planted by the project (Mahogany, Casuarina, Gmelina and Albizia) using the SHAMBA model with implementation of the pan-tropical allometric equation for moist forests from Chave *et al.* (2005). This equation applies across the appropriate rainfall gradient for the project area (1500–3500 mm/year).

Project activities and institutional conditions

Key project activities for carbon certification of the project are ecosystem rehabilitation (Reforestation, including agroforestry) which is an activity initiated in 2011 (Figure 4) and gradually expanded every year based on availability of resources.

Figure 4 Project Areas Reforested (Laclubar)

Besides the livelihood benefits generated by agroforestry, sustainable wood harvesting at end of the rotation (the project cycle is 30 years) and intended carbon sales from carbon mitigation through biomass enhancement, the project is introducing activities that address issues such as tree mortality while also generating additional tangible financial benefits. These are complemented with land use planning and project governance adjustments.

This came about by adopting a *multi-level adaptive learning and management strategy* similar to that proposed by Williams *et al.* (2014). This strategy is based on two aspects of learning: 'technical' and 'institutional'. Technical learning, defined as an iterative ongoing process whereby, through the process of day-to-day experimentation, problem solving and monitoring, project actors begin to learn what works, and adjust their activities appropriately. This can occur at all three levels of the project. For example, at the project, Village level in our carbon agroforestry project, the in-country project coordinator or a farmers' group representative, may uncover a more efficient way to administer payments, or a better source of seedlings, and would then adjust their activities appropriately. At the farm-level, a farmer may see that some species are performing better than others and agree with project staff to change their planting arrangements.

Institutional learning on the other hand, occurs at larger scales (i.e. at village, farmers' group and project-level) and involves periodically taking a step back from day-to-day operations and inviting feedback on the project objectives, land use designs and other elements of the project design. A project may then choose to make changes to their broader strategy or organisational processes/structures. For instance, project staff may see an opportunity to link with other conservation initiatives in the area; technicians may develop a more efficient or robust approach for monitoring; or farmers may indicate a desire to start a new type of agroforestry system.

An example of the application of institutional adaptation are modifications to the project's governance through introduction of Farmers' Groups (FGs) and a Project Steering Committee. Refining the governance structure of the project is an emerging priority as the project transitions to the certification phase, and new management, monitoring and verification arrangements needed to be introduced or modified. New governance arrangements are also seen by the project as a tool to create opportunities for farmers' income diversification, alongside or complementary to the carbon component. The FGs together with the project coordinator and technical team are the project's engine. The FGs serve as a forum to discuss project directions and design of activities. They are also responsible for management of contributions made by farmers from their carbon payments into a

common fund. As an example, the common funds could be used to create opportunities for micro-loans, communal social investments or any other use farmers elect to allocate their funds to.

The project has also promoted the creation of a project steering committee (PSC) which includes local authorities and local religious and spiritual leaders, national government agencies, international donors based in Timor-Leste and NGOs. The PSC was formed to build strategic bridges between the participants and other stakeholders that might have interest in investing in carbon offsets. The PSC plays a role in keeping the project abreast of challenges and opportunities resulting from evolving national policies, regulations and international initiatives on climate change mitigation. Although the project has in place a grievance mechanism; the PSC's role is also to serve as a mediator if required.

Technical learning and adaptation

Although soil management activities have been promoted by the project in recent years through demonstration days, most project farmers partially implement or do not implement the activity in their sites at all. In most cases, this is mainly due to lack of time, and incentives to continue increasing organic matter returns to the soil to improve ground cover. The literature consulted suggests that there is a direct co-relation between soil carbon volumes and soil organic matter; (Crawford. 2009). It is fair then to assume that improvements in soil management, such as increased ground cover or fire exclusions, will result in lesser soil degradation and therefore reduced carbon losses (i.e. a climate benefit).

The new approach proposed consists of obtaining certification for carbon stored in the soil resulting from improved management. Farmers then will be compensated for their time and work (as with the other carbon) subject to monitoring results of the activity performance. A similar approach is the introduction of tree planting on perimeters of farmers sites. The expectation is that live fencing systems will add to the project's overall climate benefit, generating a financial benefit through its carbon, while preventing grazing of animals in planted sites.

We considered the potential for displacement of agricultural activities and wood collection activities from project sites to forested areas; creating additional degradation and deforestation in communal land or elsewhere. This is what is known as project leakage. The introduction of land use management plans designed by each participating farmer is mitigating this risk. Farmers need to demonstrate in their land plans, that they have enough land to continue with their day to day activities and that they aim to increase agricultural and fuelwood production through improved soil management and

sustainable future harvesting regimes. The land use plans are part of a payment for ecosystem services agreement (PES) signed between the project coordinator and each one of the participants. This is also one of the requirements for certification.

Livelihood Diversification

A driving force for diversification of livelihoods in the project is the difficulties predicting the price of forest carbon (like with most commodities) over the long term, while trading prices for carbon credits in the voluntary markets tend to vary significantly, unlike offsets sold in compliance markets (Hamrick and Gallant. 2017). Carbon prices in voluntary markets are based on factors that include buyer preferences, co-benefits associated with the project, the type of seller, or the size of the transaction (Hamrick and Gallant. 2017). These aspects also mean that there might be a variety of buyers, some of whom might prefer to buy offsets from projects that not only address climate mitigation but that also have tangible positive impacts on community livelihoods and biodiversity, or projects that have a compelling story to tell. Based on these factors, the project identified that opportunities for increasing incomes could fall into two categories: 1) measures to maximise the value of our carbon credits by promoting the project with organisations needing to address their corporate social responsibility and 2) additional activities to claim credits for other ecosystem services such as biodiversity benefits or soil/watershed protection. The key requirement to enable this opportunity and the other adaptation actions described; is to ensure community input in the design of the activities. It is also crucial to manage community expectations and clearly communicate to the community that carbon and other ecosystem services that might be "commercialised" by the project need to be considered as one of several livelihood sources.

Discussion and Conclusions

Based on our experience to date, we identified the key factors that enable and challenge collective action by farmers, community organisations and project developers in meeting carbon certification standards in Timor-Leste:

a) Societal

Enablers:

- A very good understating by the community of the benefits generated by tree planting and sound natural resources management, reinforced with awareness activities that included field days, participatory mapping and children's environmental education.

- Management of community expectations by reinforcing messages regarding potential variability of sales and prices of carbon in voluntary markets
- Strong community participation and their involvement in all phases of the project achieved through a combination of on-going consultation and employment of a local project coordinator with good knowledge of the area and good community acceptance.

Challenges:

- Limited time that farmers can allocate for implementation of carbon related project activities
- Inclusion in the project of as many community members as possible
- Displacement of day to day activities by project activities to other areas

b) Institutional

Enablers:

- The project respect and support for community traditions and customs including customary land tenure and traditional laws for management of natural resources
- The ability of the project developer to ensure on-going endorsement from Government institutions, village's leaders and religious authorities.
- Introduction of measures to strengthen community governance institutions

Challenges:

- Evolving laws and prospect of introduction by the government of formal land titles
- Lack of or incomplete NRM regulatory framework in Timor-Leste
- Evolving international markets and standards for carbon and costs associated with carbon business development

c) Technical / Environmental

Enablers:

- The project allocated time to start small, trial species against sites to calibrate activities and expand according to the limited resources available
- Identification and introduction of management options resulting from baseline information (households and biomass surveys) and adoption of strategies for on-going adaptation including soil management and live fencing
- Adoption of a standard and methodologies that suited the project characteristics

Challenges:

- Tree survival affected by grazing and lack of labour for weed control and soil nutrients improvement
- Overall the area that can be reforested is significant, but the land that each farmer can allocate to carbon activities is limited by the relatively small size of farms
- Procurement of resources required for on-going monitoring commitments

The enablers and challenges listed above in most cases influence each other or overlap, therefore they are integrated in the discussion that follows. Perhaps one of the main project enablers to date has been on-going community participation and community input to management issues and alternatives to mitigate risks. Examples are the introduction of land ownership declarations, the formation of the farmers' groups (FGs) and the opportunity to improve tree survival through customary laws. It was essential for our project to gain a good understanding of the current situation regarding land tenure and to identify the potential for land disputes, especially when considering new participants joining the project.

Based on community consultations, and during the household survey, we established that land tenure security was of little concern to farmers interviewed and that land disputes were uncommon. We concluded that this was likely a result of the well-established customary land ownership that characterises the project area. This confirms other studies suggesting that traditional land arrangements have worked well in Timor-Leste in spite of the country's tumultuous past and that the existing land tenure arrangements should be preserved, or at least recognised or incorporated into government policies and legislation formalising land tenure (Batterbury *et. al*. 2015).

The literature consulted also indicates that a disruption of customary land tenure in Timor-Leste will likely lead to livelihoods being negatively impacted, as land tenure and livelihoods are mutually

reinforcing (Batterbury *et. al*. 2015). It is unclear when the Government's land title formalization will occur in our project area or what impact it might have on farmer's land. However, the history of lack of land tenure issues in the project area, together with the emerging FGs and land ownership declarations, give re-assurances that the status quo (i.e. lack of land tenure conflicts) in our project will be preserved. This is a key enabler for project development.

Another enabling factor mentioned in this paper is the interest expressed by farmers in introducing a *Tara Bandu* law as a conservation tool in our project. This will be a community agreement where at a minimum, banning of grazing activities and harvesting of trees in planting sites and application of penalties (cash or payment with animals) is established and enforced by the community itself. Depending on the prohibition agreed, this law fills the void created by lack of or incomplete Government legislation regulating private and communal forests and land use. A number of international aid organisations promoting sustainable use of natural resources management (NRM) have adopted this law as a core element of their activities with promising results. That has been the case of the *Community Based Natural Resources* project initiated by CARE International in 2002 (Cardinoza 2005). However, their experience, as well as others experiences also suggest that *Tara Bandu* is not a silver bullet to address community NRM issues, nor is its implementation straight forward, with careful design of the agreement required. Examples of design considerations are the need to ensure that banning activities in protected communal forests will not disadvantage the livelihoods of other community members. As an example, a result of a ban might force some farmers to spend more time looking for wood or forest food outside protected areas. There is also potential for increments in prices of essential forest products (Bhatttachary in Mongabay, 2018).

Another consideration mentioned by Cardinoza (2005) is the need to ensure that the time frame of project activities is appropriate for the time required to prepare for the *Tara Bandu* ceremony (formalisation of the agreement), as consultations and an agreement involving the whole village is needed to ensure effectiveness of the *ban*. It is also necessary to consider the potential for conflicts between villages if consultation is not extended to neighbouring communities. This becomes more relevant if these neighbours are not part of the *Tara Bandu*. Awareness should reduce the potential for conflict by preventing community members from neighbouring areas entering banned sites.

There is still a number of social and technical elements that the project will be adjusting during implementation of the certification phase and beyond. That includes refinements to the functioning of the FGs and their common funds, the introduction of *Tara Bandu* as mentioned above, and new monitoring and verification elements of certification and technical aspects. Other more pressing

challenges such as tree survival improvements from grazing exclusion and land use planning are being addressed.

An example is the introduction of soil management activities and live fencing, aiming to increase tree survival and reduce farmers' labour in the long run, while increasing carbon that potentially can be sold. The project has also adopted individual land use planning in which each farmer participating in the project designs the future land use of their farms and project sites. Land use planning by farmers is an additional safeguard against displacement of farmers activities to other areas reducing thus the risk of project leakage. The land use plans are also part of the carbon agreements signed with farmers.

From a governance perspective, the project is encouraging the creation of FGs representing the different villages that comprise the project. This is key to ensuring that management of the project and ownership remains with farmers; a re-affirmation of one of the 2011 main goals of the project when activities first took place. Effective consultation processes are also an important instrument to manage community expectations. A message that the project regularly emphasises with farmers during meetings and more formal means such as the carbon agreement, is that carbon payments need to be considered as one of several livelihood sources but not as the main source of income.

The variability of carbon prices in the voluntary markets is a challenge for most projects developed by smallholders in a similar context to that of our project. We believe that the cost of carbon certification should be seen as an investment with two objectives: one to create direct revenue for farmers from sales of carbon and the second as an opportunity to attract funds for alternative livelihoods' creation. An alternative to alleviate this cost and to create revenue opportunities is for a project to guide development of proposals designed by the community with a mechanism that allow farmers to add, adjust or discard proposals as they see fit. Once again, the farmers groups could be an instrument to enable such a process.

As mentioned, the project did not face the time limitations for completion that other projects usually experience. The trade-off here is that although there are no time pressures exerted by project donors or investors, the ability of projects to expand rapidly or make progress are also limited by insufficient resources. This time flexibility however, has been crucial to give the project scope to modify activities, adjust where required, learn from mistakes, reduce risks and pave the way for certification.

Conclusions

Based on our project, we concluded that a culture of adaptation (as well as high doses of patience and stamina for all involved) is a necessity for initiatives of this nature to prosper in a country like Timor-Leste. This is exemplified in the project by the introduction of new management activities

with potential to improve tree survivals, modifications to project governance and adoption of a suitable carbon standard. Introduction of a structured or methodological process for adaptation such as the *multi-level adaptive learning and management strategy* adopted is likely to facilitate project modifications.

Projects need to make sure that consultation with all stakeholders is as frequent as needed and recognise that community members might have most of the answers to guide project activities. Enabling a strong project governance facilitates community participation, communication and input. The scientific rigour and input required for projects developed in a country like Timor-Leste must be proportional and appropriate to the resources and technical know-how available to poor community groups contributing to climate change mitigation efforts. This is particularly relevant to monitoring and verification needs of projects such as this.

Traditional laws and institutions, at least in rural areas, seem to be as relevant as ever. They are well regarded and respected by communities. Support for preserving or integrating these institutions into new legislations should be a major government consideration. *Tara Bandu* is an important tool for management of natural resources in Timor-Leste. Although, careful design of the final agreement to avoid disadvantaging some sectors of the community is a necessity.

A number of challenges remain for project development including: prospects of changes to current land tenure arrangements, variability of prices of carbon in voluntary markets, onerous monitoring commitments and the need to reduce labour input and/or the ability of projects to compensate that cost through added value of the carbon sold. From a carbon project development perspective there is basic information that is still needed to improve technical aspects of future initiatives in Timor-Leste including: growth models for native species and carbon yields, identification of native species that might suit carbon projects in agroforestry systems, updated crop production data and spatial data. Timor-Leste is a researchers' paradise as many knowledge gaps remain.

It is crucial to manage community expectations and clearly communicate to project participants that sales from carbon and other ecosystem services that might be "commercialised" by the project are additional but not central to core livelihood activities of families and communities. The potential for Timor-Leste to become a provider of climate change mitigation solutions through reforestation and other land use change activities that benefit poor farmers is significant. However, the reality is that farmers -even for communities like Laclubar, where there is a high degree of awareness of the benefits of tree planting- will not be able to develop these activities without initial financial assistance and on-

going compensation even if modest. There might be opportunities for the Timorese Government to address this limitation by attracting external funding to establish partnerships with farmers in the development of forest carbon and other ecosystem service initiatives. The ultimate goal would be for these projects to become self-sustainable in the long run creating opportunities for replication in other parts of the country.

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