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Challenges of Community-Forestry Based Carbon Projects: Process, Participation, Performance

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Abstract. This paper addresses the challenges in community-based management of carbon projects in developing countries. It is based on four years of experience in identifying, developing, implementing, and monitoring mangrove restoration and agroforestry projects in upland and coastal areas of India, Indonesia, and Senegal. While many of the challenges are common to any typical grass-roots development project, we focus on aspects that are more directly related to carbon sequestration activities. To address all of these challenges, the paper proposes some measures that we believe help make implementation and monitoring easier for practitioners in this realm. Our thematic focus of “process”, “participation” and “performance” underscores three key areas we believe merit greater attention in these projects. The process elements are important because of specialized knowledge that is often not familiar to communities such as the process of identifying suitable planting sites and arrangements, and suitable implementation arrangements given stakeholder needs requires significant upfront commitment from all involved. The challenges related to process are highlighted through reference to methodology selection, and the implications it has for site selection through to implementation. The second theme – participation – addresses the peculiar stakeholder interests, interactions and arrangements that arise at all stages of the project. A challenge is meeting all stakeholder expectations and constraints through recognizing that people have different motivations and interests; as examples, active engagement is necessary to find acceptable terms for implementation, revenue sharing, and risk sharing. Again, peculiarities of the carbon market – such as carbon property rights – often create uncertainty that must be handled delicately in such circumstances. The final theme – performance – relates to an ongoing need to accommodate a complex array of monitoring, auditing, validation and quality control requirements over a range of multiple objectives. The challenge in this realm is to implement high-scale projects that are economically viable, but which will stretch the capacity of local community-based systems considering compliance requirements with regards to implementation and carbon accounting standards. Hence the interests and requirements of different stakeholders may not be fully aligned. As an example, many carbon projects now have multiple objectives – carbon, biodiversity, and community welfare – but there are few received protocols for addressing these concurrently. An important insight through all of these dimensions is that no single concept of “community” can be universally applied: the connections among stakeholders and others are never as clear as one assumes them to be.

Keywords. carbon methodology, monitoring, high scale implementation, mangrove, agroforestry

1 Introduction

Small local communities worldwide are those most immediately at the front lines of development efforts and climate change impacts. Droughts, fires, floods, cyclonic storms, sea level rise, and changes in the food chain are all hazards associated with climate change impacts. Communities around the world are learning how to adapt; in the absence of such adaptation, they remain exposed to hazards that will threaten their lives and their livelihoods. But these communities – sometimes organized through formal or informal Community Based Organizations (CBOs) – have become

accidental partners in the fight against climate change effects. Their partners include international NGOs, multilateral development banks, and bilateral agencies, various levels of local government, other CBOs, and the private sector in mitigating the effects of climate change. But in so doing, they often find themselves in another world.

While communities have been adapting to local weather effects since the dawn of time, the combination of degraded ecosystems, rapid social changes and climate change, often overstretch the capacity to adapt. In this context, climate change mitigation (regarding International Panel for Climate Change definition) is an opportunity to increase the adaptation capacity through related financing mechanisms and

evolving partnerships especially on high scale implementations. Thus the concept is new for them, as it is for many of us. In less than one generation, communities in some of the poorest countries in the world now find themselves engaged in a quest that the previous generation could not have imagined: the quest to sequester carbon. How do you sequester something you cannot see? Why would you do that? How do you know if you can store it forever? And why would anyone want to pay me for something that I then seem to get to keep? For those of us in the global pursuit for carbon, we tend to treat it little differently than any other commodity. But to the communities at the front lines, the reasons for the pursuit are not always obvious.

This paper describes a brief journey through a handful of projects that have taught us some lessons on the challenges of dealing with community forestry -based implementation and monitoring of carbon projects. We take our examples from mangrove and agroforestry projects across four sites on two continents. Our first challenge is communicating the concepts and methodologies of carbon markets to individuals, communities, and other stakeholders on whom we will rely for the next two decades to engage in a process that will involve defining, designing, implementing and seeing through a project that stretches local capacity to its limits. Why will a tree planted on this side of the river count as carbon captured, but a tree planted on the other side not count? Our second challenge is discovering the incentives, motivations and needs of our community partners through participation that allows us to align and reconcile different objectives. Trees bear fruit, decrease wind damage, and capture carbon by producing biomass, but what if there are trade-offs between forest livelihoods functions and carbon gains? Our third challenge is monitoring the performance of the process and the impacts of implementation efforts alongside community partners. We know that the communities have an interest in the outcomes, but how can methods be aligned to the realities of limited capacity, limited resources, and sometimes arbitrary criteria? Moreover, how can monitoring be completed in what is at times a difficult environment?

Our findings are organized around these three themes: process, participation, and performance. In addressing them we first provide a brief overview of the projects from which we draw our experience.. We then cover the intricacies of different methodologies and frameworks for looking at carbon projects: these include the Clean Development Mechanisms protocols and other voluntary carbon market protocols such as Verified carbon Standards (VCS) or Gold Standard. The methodologies themselves present challenges that influence process, participation, and performance. We then look at some of the key issues within each of our three themes, finally closing with lessons and selected recommendations.

2 Project Backgrounds

Our projects draw from a selection of Livelihoods Fund (LV) activities across Africa and Asia. Although they are all forestry projects, they are far from being duplicates of each other. In fact, their selection shows us immediately that the idea of community can even differ from one project to the next.

2.1 Senegal “Oceanium”

Since 2009, the Livelihoods Fund in partnership with the Senegalese NGO Oceanium have planted over 100 million mangrove trees on 10,500 hectares of land in 450 villages in Casamance and Sine Saloum in Senegal to replenish their food ecosystem, the fish and shellfish resources, and to lead the fight against salinization of agricultural land. Primarily this project has been launched because of the vision of one man – Haidar Ali – asking the population to plant mangrove trees to support their own livelihoods: “Plant a tree in your head” was the basis for community mobilization.



Figure 1. Mobilization of local people in plantations - Senegal

The role of private sector engagement – such as Livelihoods Fund – within such a project is imminent but requires an investment perspective to achieve its goals on time, in quantity, and in quality everywhere at a large scale; this implies that communities must adopt relevant practices for replicating efficient pilot models . As an example let us first describe soil fertility quality control, which is a key parameter for replication. Scientists can identify the key indicators: salinity, water flow, sand content, but they cannot generally identify the adequate tools for community people. Villagers are not accustomed to using tools such as refractometers. That means that the suitability of the soil quality has to be measured with the villagers in other ways. We found indicators which are few, visible, tangible situations easy to appreciate by the villagers and correlated with soil quality: remaining presence of trees, color of the soil, highest tide coverage . And then depending on this, each plot is clustered as Green (3 indicators OK means very good conditions for growing), Yellow (1-2 indicators OK means good conditions for growing), or Red (less than 1 indicator OK means Bad conditions for growing). Another example addresses monitoring of tree stem density. How does one measure tree density on 10.000 ha? The solution is in the process of planting itself. Once again scientists have designed an optimum situation by planting initially 5000 propagules /ha . But practically how does one design a

regular process to plant one seed every 2m*1m on 10.000 ha? The solution is a rope where you put a knot every 2 meters and during the planting session each villager is positioned along the rope at each knot and every step they plant one seed.

These indirect “community parameters” have to be calibrated to give confidence in the process. For this reason, each campaign is subjected to an external audit by experts, using a dual set of measurements on sampled plots.

2.2 India “NEWS”

India’s Nature, Environment, and Wildlife Society (NEWS) is at the forefront of implementing a 6000 ha mangrove planting scheme in India’s Sundarbans. While many people know of the Sundarbans forest as one of the largest remaining natural mangrove ecosystems in the world, what they do not realize is that almost 4 million of India’s poorest population try to eke out a living behind a 150 year old system of dykes on about 70 islands. The dykes protect them from flooding, but breaches occur from poor maintenance, or from regular tropical cyclones. The Bay of Bengal is home to the deadliest cyclones recorded in human history, and increasing sea levels coupled with global warming promise higher storm surges. Mangroves provide a life-saving function as a “bioshield” through dissipating wind and wave energy, while also supporting important livelihoods such as fisheries, honey collection, and a large variety of sustainable uses.

The NEWS’s project was initiated in 2010 as an extension of already successful livelihood activities involving health-care services and income generating schemes. Through mobilization of women’s groups, plantations were designed to accept seedlings from nurseries or direct planting. While activities started in one part of the Sundarbans region, the project (registered under CDM) needed to go further afield to find suitable CDM eligible planting conditions and willing villages. Government authorities of India’s forest department, as well as local government officials, have been instrumental in providing permissions relating to land use and carbon rights. To date, some 10 million trees have been planted focusing on 7 species such as *Avicennia alba*, and *Rhizophora mucronata*, *Bruguiera gymnorrhiza*.

Significant logistical challenges are posed by seasonal storms, difficult transportation conditions, and residual competing demands for land use. Concerning competing demands for land use, as an example of participation, during the validation visit in January 2012, the independent validation expert noticed that there were cows on some mudflats that were not part of NEWS’s activities, but that there were no cows on the NEWS/Livelihoods plot. He asked the local village head how that was possible. He explained that there was an old woman that patrolled the area with a stick. “So,” said the validator, “she hits the cows?” “No,” was the reply, “the cow would just come back. She hits the owner of the cow.”



Figure 1. Women looking after their seeds - India

2.3 India “Naandi”

The overall goal of the project developed by Naandi Foundation is to improve the livelihood of small and marginalized tribal communities in the Araku Valley of Visakhapatnam district in the state of Andhra Pradesh in India. Various horticultural tree species will be planted in a phased approach on 6,000 ha in this CDM project activity. Seven different tree species groups are distinguished based mainly on similar growth conditions (similar biomass accumulation rates) and planting densities. All groups will be planted on the 6,000 ha, with different species composition in the mixed stand models. Coffee plantings will be introduced after 3 years on 3,000 ha.



Figure 3. Women working in fruit trees nursery - India -

The plantations are all located on degraded land with very low plant cover (more than 57% of the land is classified as barren land.). The horticultural trees will sequester carbon and will turn this degraded, low carbon lands into a fruit and herb bearing secondary forest. The transformation of a low carbon landscape into a high carbon sequestering, multiple use landscape will improve food security, nutrition and provide additional income for the community. The project area will cover 302 villages and approximately 10 planting sites per village, i.e. on in total 3000 discrete areas of non-forested land, each area has a geographical identification.

The planting process is developed as a “one shot process” and is a key performance innovation for the initial sequestration of carbon. It has been developed by villagers together with Naandi field officers.

First, the pits are filled with topsoil. A biodynamic site fertilizer strategy is applied during the time of planting. Cow Pat Pit (CPP) manure consists of fermented cow dung combined with eggshell powder, basalt dust, and herbal preparations, which is retained in a brick pit for a period of 3 to 4 months and mixed with water (1 kg of CPP manure in 40 liters of water per acre before application) .

The participating farmers themselves add 5–6 kg of compost for each planting pit Approximately 250 g of vermiculture compost is mixed with the topsoil while filling the pit for planting

Healthy, straight-growing grafts from reliable sources are planted at the center of pits with the ball of the earth intact during rainy season. The planting is done for balls in such a way that the roots are not expanded. Plants are watered immediately after planting. In the initial one or two years, a stake is provided to make them grow straight.

2.4 Indonesia “Yagasu”

Indonesia’s Yagasu Foundation has an elephant as its symbol: the brand is well recognized in Northern Sumatra and Aceh because of the efforts of Yagasu. Its few domesticated elephants, rescued lives and protected property in the aftermath of the December 2004 tsunami that struck the northern coast of what is now part of this project area. In a project that nominally includes 5000 ha of mangrove plantation, about one-quarter is in or adjacent to some of the most heavily devastated shorelines in the world. Where once stood houses and buildings and rice fields, now stand a few trees, a tidal marsh, and occasional offerings in memory of the 170,000 people that perished during the tsunami. But these areas, as many others along the North Sumatra coast, were converted decades ago to fish and shrimp ponds in a national scheme intended to improve the lives of coastal people: mangroves were cleared, fishponds appeared. Coastal erosion and salination, however, undermined these schemes and most ponds were eventually abandoned. The abandoned areas are now a target of this Livelihoods carbon project.

Working through some [90] communities, Yagasu is re-establishing a “Coastal Carbon Corridor” intended to improve fishery yields and trap sediment. The Livelihoods sponsored project commenced in 2011, building on a number of pilot activities that Yagasu had already successfully completed in

the area. The project has strong support from Provincial ministries responsible for environment and forestry, and registration of the project nationally under CDM would represent one of the first of its kind for this forest-rich country . By early 2012, some 1.6 million plants (including *Rhizophora mucronata*, *R. apiculata* and *R. stylosa*) were planted along 572 hectares of the coast.



Figure 4. Planting life - the story continues

Based on initial results Yagasu appears to be on the right track from the initial visits and meetings. After showing us their site, we were served cookies and drinks made from mangrove products. The products had already gone through various early stages of nutritional testing and were being sold in Indonesian airports to departing tourists with all proceeds going back to the local communities.

3 Carbon Methodologies

The concept of carbon sequestration in a forest ecosystem is relatively straightforward. A plot of land has growing trees that sequester CO₂ from the air and it eventually is stored in the trunk branches, above and below ground in the form of carbon in its biomass. The dry weight of the wood contains about 50% carbon. Credits are typically issued for the carbon sequestered expressed in terms of tons of CO₂ equivalent (tCO₂e). The role of a methodology and the guiding carbon standard is to determine when a certain activity qualifies for carbon sequestration and, if it does, how and when the carbon should be counted or credited. A key idea in most methodologies is that only additional or incremental carbon should be counted, and it should be permanently sequestered. Another key concept is that the carbon credit becomes a unique tradable commodity with market value, meaning it has an identifiable source and becomes in effect a private good rather than a public one.

Depending on the carbon standard applied it follows different compliance procedures and is also named differently as stipulated below. We strongly believe that by extracting from

different methodologies key requirements, carbon from most restored and dynamically developing ecosystems can be accurately accounted. Numerous formal and informal methodologies exist to address the eligibility and valuation issue, but we will characterize those treated here as drivers for soil management efficiency, sustainability (social and economic) for communities in Section IV UNFCCC CDM related carbon credits from forestry generate temporary certified emission reductions (tCER), but despite the spirit of the convention that these should be traded the EU member states did not allow their use in the European Trading System (ETS). Therefore, the fungibility is limited but companies use them but have to replace them after 20 years or latest after 60 years when registered twice. A number of methodologies have been specifically developed for forestry activities considering not only tree biomass but also carbon stock changes in soils and below ground biomass. In the Livelihood projects this internationally accepted standard will be used to validate the project. The following drivers for communities have been met in each of the Livelihoods projects described above.

- Areas have to be non-forested since 1990, which presents the communities a chance to restore degraded and unproductive areas.
- The project duration (at least 20 years) refers to long term commitment of communities to preserve restored areas, bind communities, project developers, and local authorities. This concept is defined as permanency by UNFCCC.
- The UNFCCC procedures require the formal approval by national authorities, which can be considered as a constraint compared to voluntary carbon standards where this is not required. Nevertheless, it's a way to create a durable relationship and strengthens the legal recognition of the project among the host government, project developers, communities and national authorities. 1) Reducing Emissions from Deforestation and forest Degradation (REDD+) is an UN sanctioned system (UN-REDD a respective support program) but currently respective carbon credits cannot be generated and traded under the UN system (only in the voluntary carbon market). Respective schemes cover in general large areas and communities are involved to the extent that they must be engaged to stop deforestation and forest degradation. They also can benefit from a share of revenue generated by the REDD initiative. The plus of REDD+ indicates that also carbon stock enhancing measures such as biodiversity conservation and timber management are eligible. Eligibility has to be demonstrated using a structured documentation of the baseline situation including information on the land use in the past and what would be the situation without the project against which the additional carbon enhancing activities can be claimed. Communities need to understand the respective logic and its implications, i.e. can credits be claimed at all and which amount of credits that can be generated. Carbon finance provided to communities for carbon credits is

considered as a way to pay for environmental services. However, there is a distinct difference between services such as provision of clean water (which can be traded continuously) and carbon where each ton sequestered can be transacted only once, hence when trees are mature no more carbon credits can be generated. Reflecting the need to align incentives for the community and the climate an up-front investment that generates livelihood benefits such as fruit trees or fish habitats and provides climate benefits permanently even after the carbon crediting period expires is preferred. 2) Originally the Voluntary Carbon Standard but now the Verified Carbon Standard VCS, was developed for voluntary carbon transactions and was developed from the experiences gained from the CDM mechanism (CITE). The VCS seeks to establish high quality carbon credits with the same fungibility as non-forestry related CDM credits, but with potential to consider REDD+ projects and also agricultural soil carbon projects. The VCS is recognizing the permanency of the carbon credits from all forest and other land use projects. Carbon credits are issued and adjusted according to the risk of non-permanency of the projects through recognition of buffer amounts. These buffered carbon credits are constituted by a part of issued carbon credits of each project in a mutual way by VCS to mitigate the risk of failure of some projects. Eligibility requires a structured risk analysis to evaluate the "buffer" level involving since the starting point of the project communities on risk allowance. 3) A standard addressing the community oriented non-carbon project benefits is namely the community, biodiversity and climate adaptation (CCBA) benefits. This wider scope is of great interest for investors, which require that projects sequester carbon and generate positive direct and indirect biodiversity and community co-benefits. Gold status is awarded when the project conserves globally rare species and has exceptionally strong community and climate change adaptation benefits. Monitoring processes have to integrate related community, biodiversity and adaptation benefits, which in fact are a challenge since the benefits are diverse and difficult to quantify (e.g. biodiversity benefits). However, we think it is very important to quantify respective benefits in a robust, but focused manner to make the monitoring of the impacts by the communities themselves as a sustainable way to make them involve in the conservation of the ecosystem. 4) Simplified informal credits or offsets. These represent a broad class, which do not necessarily involve formal tracking. They include a wide range of initiatives: simple tree-planting campaigns funded by individual patrons not necessarily interested in the carbon; un-audited offsets by corporations or individuals; or, audited offsets through strict methods that are never intended to be traded. We do not spend much time on this category, but we note that it is the type that has the easiest intuitive connection to small communities in developing countries. In the minds of many, a tree

planted or protected anywhere should receive a credit. The standards above generally require robust and therefore complex methodologies and independent third party verification to generate carbon assets.

The most noticeable differences among these methods include issues of eligibility, scale, and scope.

Eligibility refers to the general compliance of a project area to a specific standard. In the CDM the definition of “forest” differs from one country to the next, within an internationally defined range, i.e. minimum canopy cover 10-30%, potential tree height 3-5m, and area 0.1ha-1ha

The scale of a project is a concern in many methodologies. Under CDM, both large and small scale projects exist, defined by a threshold of the amount of carbon sequestered; a forestry project removing fewer than 16,000 tCO₂e a year can qualify for simplified procedures that reduce administrative and monitoring requirements. But the thresholds are quite low; all four projects in this paper are of a size that requires large-scale methods to be applied. Some methodologies allow extensions to be made, such as the CDM rules governing “Programs of Activities (POA)” which in effect permit indefinite number projects to be replicated elsewhere in a country once the initial project has been scrutinized and validated. Scale can also come into play inside a project: the CDM methodologies for reforestation require that 67% of the total project area is identified and delineated before credits can be earned: this is at times difficult for community projects requiring multi-year planting programs.

Finally, new standards are evolving e.g. to better capture co-benefits (e.g. biodiversity and socio-economic) within project boundaries. Meeting related eligibility requirements may underline the “charismatic carbon” associated with the project and may warrant a price premium and will improve the project design or its documentation.

4 Challenges of Process – Explaining the Concepts

The process elements are important because of specialized knowledge that is often not familiar to communities; the process of identifying suitable sites, suitable planting arrangements, and suitable implementation arrangements given stakeholder needs requires significant upfront commitment from all involved. The challenges related to process are highlighted here through referencing the standard and methodology specific requirements, and the implications it has for site selection through to implementation.

For all of the project sites discussed above, the basic approach has been to use CDM eligibility and validation procedures are applied but Livelihoods Fund may in due course shift to voluntary market criteria, to extend in scope to community and biodiversity benefits of the type contemplated in the CCBA. The only exclusion initially was the use avoided deforestation methods, mainly because these generally apply to larger areas, impose significant restrictions on community activities, and are normally too passive.

In Senegal, the most complicated aspect of the methodology selection and implementation related to the proliferation of small sites. For a total area of 10500 ha, some

5000 separate plots have been registered within the project documents and each of these requires ongoing monitoring. A key challenge faced during the process was quality control of plantation. It was resolved primarily through training local people (“GPS boys”) to register parameters on areal extent, soil quality and density. A second challenge included driving community participation in plantation quality control. This was resolved through community training and information sharing, and providing financial incentives for the communities (not the individuals) related to quality performance; in this context it is important to underline that financial incentives should be designed to strengthen the community. Individual cash payments are often counterproductive based on our experience. Important for the community are social events such as festivals where the joint achievements are celebrated and results are presented to the wider public.

A key lesson from the Senegalese project was to design and to make the quality goals simple, understandable and verifiable by the people and make them proud to reach “their” goal.

In the India project with NEWS, the CDM methodology selection was complicated by a number of factors. First, selection of eligible parcels was non-trivial. The estuaries of the Sundarbans stretch 100 km landward with some being stable and accreting, while others are intensively eroding. Moreover, sandbars and shoals have been rising from the estuaries over the past 50 years, sometimes in the middle of the estuaries but more frequently in stable meanders of the rivers. Land-use mapping both for the baseline reference period (1989) and the current period was required to estimate the aerial extent of the eligible parcels. A target of 6000 ha was selected, but that required land use & land cover (LULC) mapping for 1989 and for 2010, coupled with constraints of land availability (e.g., protected forests were excluded) and of villages willing to participate and sign agreements. Experience from Senegal also prompted us to consider small plots of less than 10 ha, and ensure that no single community was responsible for more than about 150 ha. If this sounds like a formidable challenge, it is! Originally, all of the LULC interpretation and Global Positioning System work was done by an independent wetlands research institute; but to empower the CBO and the villagers and to build the capacity needed to monitor the project, the CBO was supported to take over all of the activities (mapping, eligibility interpretation, and GPS work). Training programs were devised and implemented, and the local communities immediately showed ownership for the introduced technologies and were proud about their accomplishments and in what they have learned. A second challenge was that the methodology selected itself changed midway through project design and implementation; originally the CDM only had small-scale methodologies available but a large-scale methodology became available requiring greater commitments but also providing more scope for finding eligible land and claiming credits (such as for soil carbon). This shift was taken in stride in consultation with the CBO and the resultant project is now in compliance with the large-scale methodology. The lesson from this exercise was that the grassroots CBOs are willing and able to learn the new technologies and tools available for implementing complex carbon project protocols.

The Sundarbans project also faced important challenges in translating concepts between the CBO (NEWS) and the individual communities. Carbon sequestration and carbon rights became elusive ideas, but orientation days were conducted for each village to explain some of these concepts. Where possible, local metaphors were used (e.g., “trees giving fresh air”) and many of the local opinion leaders managed to grasp the concepts, even though it was acknowledged that not everybody understood that carbon rights were being transferred to foreign interests. Upon further questioning, many people did not care to learn of the intricacies but trusted their leadership and the CBO to give them proper advice. In the India project with Naandi, a key challenge faced during the process was to deal with the mix of trees between carbon efficiency and communities demand for added revenues from the biomass; concurrently an associated challenge was to avoid a multitude of tree species in the mixture. It was resolved primarily through selecting 7 different species groups which are distinguished by their similar growth conditions and similar biomass, accumulation rates, planting densities. Each farmer was able to choose from the different tree species groups planted on his or her own land. Coffee will be introduced after 3 years on 3,000 ha. And one plan which is the only one for the 6,000 ha, displays the spatial distribution of the different tree species groups within the planting sites.

In Indonesia, a methodological issue is that the CBO originally saw their project as a REDD project, as there were still significant parts of the coastal corridor that were under threat from expanding palm oil plantation. Yagasu’s desire was to protect important natural spaces. But Yagasu also had considerable experience with small scale mangrove restoration. Their in-house mapping capacity was already very advanced. By going through the large-scale mangrove methodology requirements, Yagasu was able to identify some 10,000 ha of potential reforestation along shorelines and interior abandoned fish ponds. An associated challenge in Indonesia was that national authorities have themselves been working on a new Nusantara methodology just for Indonesia that captures large REDD initiatives and reforestation activities within a decentralized framework. At a central level the familiarity of the issues was thus also very advanced, and it was agreed during the process that coastal mangroves would not play a significant role in the broader national work. The fact that some of the work was in the Aceh tsunami affected area placed a high profile of importance on the initiative that facilitated national and provincial cooperation in terms of access to old maps, which helped establish the eligibility of the land.

5 Challenges of Participation

The second theme – participation – addresses treatment of the specific stakeholder interests, interactions and arrangements that arise at all stages of the project. Challenges are associated with meeting all of the stakeholder expectations and constraints; people have different motivations and interests. Active direct engagement is frequently necessary to find acceptable terms for implementation, revenue sharing, and risk sharing. Again, peculiarities of the carbon market – such as

carbon property rights – often create uncertainty that must be handled delicately in such circumstances.

In Senegal, all stakeholders were enthusiastic participants throughout all of the preparation and implementation. In total, the carbon project included some 450.000 individuals at the community level, with coordinating efforts provided by the CBO Oceanium. Nevertheless, there were significant challenges. A key challenge faced during preparation was the interaction between the project developer, villagers on one side and forest department and national authorities on the other side. It was resolved primarily through a formal contract committing project developers, communities, forest department, and the Ministry of environment to a 10 year period for shared monitoring activities.

The NEWS carbon project in India was characterized by a wide range of interests among stakeholders. Community members generally acknowledge that mangrove systems are an important barrier to protect dykes. State government officials have an interest in planting forests on new state lands; mud shoals that emerge from the estuaries or along embankments are in the first instance state lands. Local village governments have a say over land use on any lands under their responsibility; such responsibility can be transferred to them for new lands such as shoals. Areas flooded and subsequently abandoned because of embankment breaches belong to the private landowners at time of flooding, even though these may be unproductive. Finally, open mudflats are typically treated by fishers and pastoral grazers as common property open access areas. In brief, use rights and legal rights over property can overlap or be unclear, and securing proper documentation over carbon ownership has been among the greatest challenges faced by a CBO in a vast territory. The situation is further complicated under CDM because the Designated National Authority (in Delhi – thousands of kilometers removed) must approve the project and is itself interested in assuring that stakeholder interests have been properly addressed. To address this, the resolution of all of the potentially conflicting positions was achieved through methodical treatment of all interests via participatory meetings, sensitization, and documentation of agreements. Each local community signed agreements on long term protection. Some communities were not interested and mudflats adjacent to them were thus excluded from the project. Social networks and contacts of the CBO came into play very strongly to ensure access to decision-makers and resolve conflicts. A key lesson was that such contacts are an important asset that only established CBOs have. A second challenge was managing expectations inside a community: not every member or household in a village is obliged to participate in the project activity. Payments were distributed only to those working on the project, and small local “self-help” groups were generally formed that required strong commitments from village members. These groups (typically of women in the majority) were an effective means to address conflicts and to organize nurseries and planting. They have also been effective at enforcing encroachment.

In the India project with Naandi, a key challenge faced during preparation was training the people and giving them the capacity to develop a local nursery and switch from

an external supply of plants to a local supply at a level of 1 million trees/year; the project would thus become less vulnerable to the commercial supply of young plants. It was resolved primarily through the launching of a central managed nursery by Naandi that became a significant supplier of young plants for the communities. It also permitted introduction of improved new practices in the nursery. Finally, it became a training center where the farmers could improve their practices and replicate these to create their own efficient nursery “business”: providing plants for the local community. A second challenge specific to implementation included introducing fertilization and pest controls as a cost effective management method, while also promoting a qualitative principles to avoid unsustainable use of chemicals and to encourage organic practices. This was resolved through the elaboration of bio-dynamic process affordable by the communities which are trained by Naandi people and local composting center are developed close to the planting areas. A key lesson from this was that a “bipolar” approach can achieve a high level of qualitative autonomy for the communities on agricultural know-how. The bipolar approach is characterized by a large-scale production center where you can experiment, develop practices and train people on these practices; this in turn is coupled to a smaller satellite center owned by villagers to replicate these practices.

Yagasu’ carbon project in Indonesia stands out among the others as a strong example of captured co-benefits from local products. The coastal systems had developed a small tourism industry based on attracting recreational fishing from nearby Medan; local communities catered to middle-income families escaping the city for a day of fishing or crabbing. Also, commercialization of mangrove products was at a scale we had not yet previously encountered: local communities were making food products, rice substitutes (from *Avicennia* flour), syrups, cigarette paper, and various building products in a sustainable manner from the mangroves. A management challenge in this context, however, was that the species suitable for such livelihood benefits were not necessarily the same as those yielding the highest levels of carbon annually. The local *Avicennia* and *Nypa* species had more local uses but their carbon potential was far inferior to that of *Rhizophora* spp; moreover, the desire to use the local mangroves for fishery-based livelihoods required that areas remain accessible. In the end, through consultations and planning, tradeoffs were made that designed the system in a way that species important to livelihoods could be interplanted with the high carbon species; all of this was moreover done on a mosaic that maintained up to 30% of plantation areas as channels and open water to permit some form of aquaculture (such a system is not uncommon in natural conditions in any event). The lesson was that if one does not insist on the highest levels of carbon sequestration, then there may be greater community livelihood co-benefits and willingness to co-manage the plot.

Another observation made at Yagasu’s sites was that, during project design and verification, we noticed that the communities had a propensity to replace any single tree that died. We normally expect 10% or higher mortality on plantations due to natural causes, and thus plant more densely than the final desired plantation density. This is also a way of letting

the fittest survive under natural selection in ecosystems. Replacing a single tree that dies is a labor of love, and the economics make no sense. But the locals feel it is absurd simply to let trees die and plant more than one initially needs. Hence the implementation program was developed to accommodate replacement planting. For us this underlined the importance of being flexible in a matter that takes into account local preferences.

6 Challenges of Performance Monitoring

Performance monitoring is a key theme as it relates to an ongoing need to accommodate a complex array of monitoring, auditing, validation and quality control requirements over a range of multiple objectives. The challenge in this realm is that capacity of local community-based systems is often stretched to the maximum in performance monitoring, and interests of different stakeholders may not be fully aligned. As an example, many carbon projects now have multiple objectives – carbon, biodiversity, and community welfare – but there are few received protocols for addressing these concurrently. The main strategies for addressing community based monitoring challenges rely on: (i) training; (ii) local innovation; and (iii) development of simplifying procedures.

In Senegal, plantations are operated by direct planting of seedlings without any nurseries; monitoring activities are conducted at the community level and focus on aspects such as plantation of the large-scale project and taking care of the young planted seeds. A key monitoring challenge has been to make communities understand the key factors of good plantation performance and then to target incentives to these very factors. It was resolved finally through the same factors which are described between Livelihoods and the project developer: “GREEN” coded areas (corresponding to good growing conditions) with the right tree density indicated good performance. A second challenge specific to monitoring included stratification and how to monitor the evolution of the tree density and then measure the growth of the trees. This was resolved through combining a mix of external expertise informed by local observations, similarly to how soil quality was monitored. A key lesson from this was to choose from the outset the right “community-based” performance incentives, and be certain that these factors are included in the common contract you have with the project developer.

Monitoring challenges are significant in the Indian Sundarbans. Destructive sampling is illegal under national laws because mangroves are protected species. Three months of the year the area is prone to storms that routinely take lives and damage property. Loss of life to tigers and snakebite is not uncommon in the region: during the first planting season a villager gathering propagules for the project was attacked and killed by a tiger. Satellite imagery and remote sensing are confounded by high tide levels which submerge plantations; only multiple views might give some idea of plantation extent or condition and these are too costly to purchase given the budgets of most of these projects. Traditional forest mensuration methods work at early stages of plantation growth but once a plantation is 5-10 years old it is impossible to move through and measure safely. Errors are potentially

large, and the diversity of species escalates from natural regeneration once the initial plantation has taken hold. At present, all of the plantations are readily measured but the situation is expected to become more difficult. Work has commenced with the Sundarbans Forestry Department to establish protocols that can more readily assess above ground biomass; estimating below ground biomass and soil carbon remains elusive and the project will rely on default methodologies and calculations for working estimates. In the future, destructive sampling may also be permitted to obtain better estimates, but carbon measurement remains difficult under these conditions.

Although carbon monitoring can follow certain standard protocols, monitoring community benefits and biodiversity in the Indian Sundarbans is not straightforward. Criteria call for monitoring of indirect and direct impacts, but there are no standards for what might be regarded as positive or negative effects, beyond simply following locally developed preferences. These seem to us somewhat arbitrary, and in any event are more useful as a feedback device for ongoing management, rather than a definitive metric for defining success. Much of the problem deals with measurement of the baseline and specification of counterfactual conditions; livelihood activities can be wiped out in one fell swoop by a bad storm, or by a pest, through little fault of the communities. A diversity of plantation activities might make them more resilient to future losses, but there is no way of knowing how well they would have done in the absence of the activities. Moreover, most monitoring tends to be input oriented (e.g., people involved, hours spent) rather than results oriented (e.g., income levels achieved, health and nutritional status improved). Given that results are often long-term, monitoring timeframes and impacts are more difficult to tie to specific project activities. Biodiversity impacts fall in a similar realm: the timescale of the impacts is not in concordance with that of most short term monitoring protocols. At this stage, there has been no particular need for detailed impact monitoring in the Indian Sundarbans, but this may change in the future.

In the India project with Naandi, a key monitoring challenge has been to collect vast amounts of data (area, species mix) for a single plot, to treat these, and to store the information knowing that carbon project eligibility procedures require saving and being able to trace single items from year 0 to year 20. It was resolved primarily through a tool developed by Naandi called “Livelihoods 360” relying on the mobile phone network. From a standard mobile phone farmers or field officers, can collect data which are sent to central servers where the data are treated; the majority of farmers – even the poorest – in these communities now have a mobile phone. This also allows the project developer to send back treated information to the field officers and farmers. A second challenge specific to monitoring included limited skills of farmers, who more accustomed to managing cattle than to managing fruit trees. This was resolved through capacity building in centers such as the central nursery, and it will be developed further.

Many of the general issues faced by others – as noted above – are also faced by Yagasu in Indonesia. But some of Yagasu’s approaches show how innovation can potentially lead to

better performance monitoring. The issue of below ground biomass measurement is problematic worldwide; few empirical studies have been done and results are frequently not easily transferred to other locations because of differences in biophysical conditions. From the outset, Yagasu has maintained a very high level of research interest and capacity on issues associated with carbon measurement and tree growth. At the proposal stage, for example, staff had been working on fractal models of tree and root growth, which would assist in estimation of below ground biomass using non-destructive methods. Since then, ongoing research programs on BGB will assist in estimates of carbon sequestered by the project. The work can assist projects in the country by providing a benchmark national value for use in those estimates.

7 Summary of Recommendations

Against all odds, the communities with which we are working are demonstrating a remarkable capacity to adapt to the processes, participatory models, and demands for clear performance monitoring. There are definite lapses, but many of these lapses are not of their own making and – to their credit – are usually temporary. We regard this as an incredible achievement given that carbon projects seem to demand considerably more effort than other types of community-based initiatives. From this, we identify a number of elements that seem to ensure a greater level of success in such projects.

- Lesson 1. Remember that **everyone can learn and be trained**. GPS logging and analyses of criteria of carbon additionality are now in-house skills that were previously contracted out. Many CBOs have created their own awareness building material on “carbon” to educate local villagers, politicians, or local bureaucrats using local languages and metaphors to convey complex concepts. Branding (“Livelihoods”) is a powerful complementary aspect of the ongoing learning, as people can build trust in the brand and the positive impacts it can have on them.
- Lesson 2. Find the **hidden strength in local networks** and connections available to the partner CBO. All of the CBOs with which we have worked have a store of local social capital on which they draw. This is seldom obvious, and is not easily described. But it only manifests itself when seemingly intractable problems are encountered: ranging from corrupt officials, to deaths of local experts, to higher than budgeted expenses for sourcing seedling pots/bags. Entrepreneurs step in to make bags locally. At times these connections seem to be propelled even further by the momentum of our projects. Recognize this strength when it arises, and do not stand in its way.
- Lesson 3. Go for **clarity in targets** and standards. Most CBOs we work with have been around for a while, are registered nationally, and are capable accountants. They understand accountability very well, and specification of hard targets and standards is both possible and desirable, as it provides a transparent

means for everybody to see what happens. Choosing clear achievable targets with the CBOs is more effective than imposing difficult to achieve or loosely defined targets. Also, it is important to specify maximum levels if these are applicable; while for mangrove plants a planting density of 5000 stems a hectare may be best, communities frequently enthusiastically overplant by a factor of two or three or more. To them this seems prudent, but ecologically the high density becomes a constraint on plantation growth and may require thinning and additional costs in the future. Communication of the reasons for the target is thus equally important.

- Lesson 4. Be **flexible and patient**. This manifests itself in many ways but it usually relates to the speed at which we expect things to be done versus the speed that is actually achievable. Scaling up small projects is no simple matter. It is generally easier to attach a “carbon activity” to existing livelihood activities than the other way around. CBOs expanding to new sites need time first to establish a reputation and build trust through conventional livelihood activities: health related interventions coupled with simple income generating schemes are a usual first step. Once these are in place, the more difficult concepts and protocols have a better chance of taking hold.

In association with the above, we have found that some of the “rules” and “expectations” can work against these lessons. Methodologies which lack clear targets, guidelines with no flexibility, or legal agreements with no scope for delegation all stand afoul of some of the above lessons.

We will not list all of the problems that our CBOs encounter, but highlight the three which we believe to be the highest priority.

- Priority 1. Greater methodological flexibility is needed in scaling projects. Most of the standards have not been created regarding high scale community projects such as mangrove projects. In these cases, flexibility can also provide from the standard itself towards the communities requirements. LV, in collaboration with IUCN and RAMSAR Secretariat proposed a large scale community-based methodology for Mangrove restoration that has been approved by the CDM Board in 2011.
- The methodologies do not lend themselves well to adaptive scaling over a multi-year period. A 6000 ha project cannot be done in one year: it is generally feasible within 3 years and lessons learned in early years can be applied in subsequent build out and introduction to other communities. Moreover, attributes of communities will differ in a region and what might work in one community will not work in another; most methodologies assume and require homogeneity in practices to permit flexible scaling.
- Priority 2. Project scope regarding co-benefits needs to be more precisely defined in candidate

methodologies, with greater attention also paid to what is meant as the local “community”. There is frequently a presumption that everybody in the “community” has the same interests, but this is not so. One person’s gained fishery ground is another person’s lost grazing area. Capturing the full extent of impacts may be cumbersome if there are no clear boundaries drawn. We generally use a workaround method that tries to identify all beneficiaries of a given area or plot, but such identification is difficult in the absence of historical baseline studies and under conditions of free and open access to physical data. Simplified protocols to address the scope of co-benefits are required.

- Priority 3. Monitoring protocols for co-benefits need to be field-tested in practical settings. Most current criteria for monitoring social impacts and biodiversity impacts are either too costly to implement reliably or, leave so much to interpretation that an improvement in social or ecosystem conditions may not be detectable over the monitoring period. There may also be a disincentive to report correctly if incentive pricing for carbon requires impacts to fall within a specific range. In some instances, a *prima facie* successful project (e.g., one that removes species from threatened status or substantially reduces poverty) could have the unintended effect that the project no longer qualifies for certain preferential (e.g., Gold) status. These criteria are eliminated or expressed in a way that is more meaningful to monitoring by CBOs.

Livelihoods Venture is addressing a number of these. For example, initiatives with IUCN and RAMSAR Secretariat are underway to test potential guidelines for the definition (Priority #2) and monitoring (Priority #3) of co-benefits. Provisionally this will be done with Yagasu at some of their sites in Indonesia, once these are formally registered as carbon projects.

In closing, we thank our partners in the CBOs discussed in this paper. Another important lesson we have learned is that a sense of humor also helps considerably when we face the challenges inherent in these carbon projects. Their unfailing sense of good humor has been appreciated more than we can express.

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