

Community forest and agroforestry for climate change adaptation and mitigation in the Monte Alén landscape

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Context

Equatorial Guinea has signed several international treaties on sustainable development, the environment and biodiversity conservation (GoEG 2008; de Wasseige et al. 2009), but no REDD+ strategy has yet been defined by the government. Because of its recent development and improvement in economy, the country could be at the point of reversing the rate of deforestation and forest degradation, becoming a model for Central African countries (GoEG 2008). However, incentives are needed to secure this trend. Community-forest-based REDD+ projects are a possible approach. The government formally recognizes forests traditionally associated with communities, and legislation is in place to provide official rights (GoEG 1997a, 1997b). However, a very small number of community forests actually have land certificates (Nguema and Pavageau 2013). Since rural stakeholders are the second greatest cause of deforestation, involving them in forest management would ensure forest recovery (GoEG 2008). The National System of Protected Areas envisages allocating land for traditional and local uses, and the Equatoguinean legislation currently being developed considers community benefits for vegetal carbon, which could provide opportunities for community-based REDD+ projects.

In Equatorial Guinea, commercial agriculture has been abandoned in favor of other economic activities (GoEG 2008), leaving

subsistence agriculture as the main agricultural activity. Agriculture is vulnerable to climate change, especially in the tropics where there is a high number of smallholders, who have low adaptive capacity (Verchot et al. 2007). In tropical countries, agroforestry is emerging as an adaptation strategy that offers a buffer against floods and droughts, and increases income diversification. Since there are currently no incentives for adaptation, the potential for mitigation can ensure support for the development of community forests and agroforestry in this region.

Site

The project is located in the Monte Alén–Montes de Cristal landscape, in the rural communities of Atom (Evinayong district, Centro Sur Province) and Kukumankok (Akonibe district, Wele Nzas Province), which are home to 450 and 850 inhabitants, respectively.

The main livelihood activities comprise agriculture, hunting, traditional fishing and non-timber forest product collection. Cassava is the main source of revenue, followed by peanuts and plantain bananas. Less important but still present are the bushmeat trade (mainly gazelles and porcupines), livestock farming (pigs and sheep), small businesses (sugar cane wine, corn wine and cucumbers) and artisanal handicrafts.

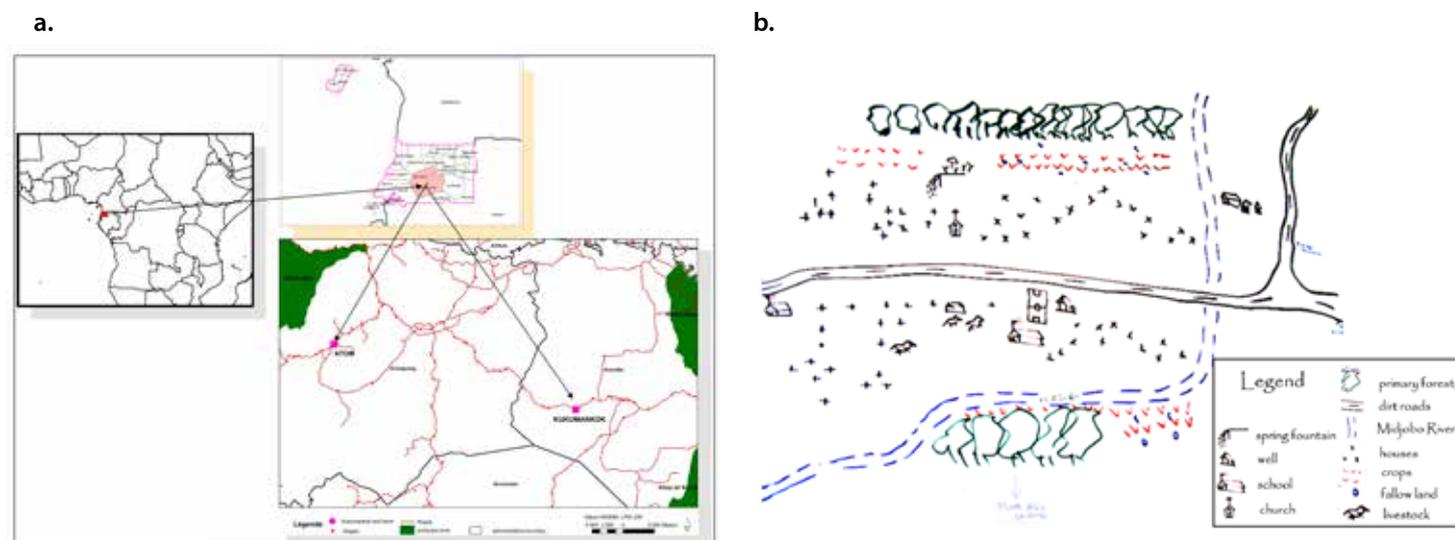


Figure 1. (a) Site location. (b) Natural resource map of Atom drawn by local villagers

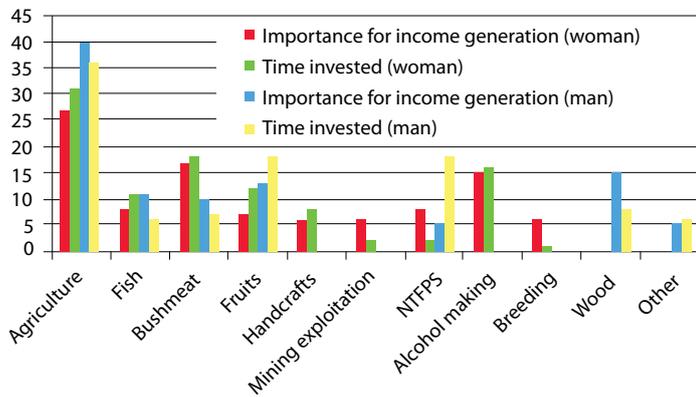


Figure 2. Perceptions on the most important products for income generation and time invested assessed through PRA exercises.

Marginalized groups in the area are shaped by gender issues, due to differences in livelihood activities. Women are mainly involved in agriculture, as opposed to men who are focused on forestry activities, which are less resilient to climate change. The vulnerability of women is exacerbated by their lack of access to credit, technology and markets.

Community vulnerability to climate change, climate change stimuli and impacts in the area

On the socioeconomic side, it has been found that forest communities' vulnerability is based mainly on the lack of access to markets and the existence of migratory outflows resulting in a shortage of agricultural labor (Pavageau et al. 2013). Such outflows are linked to the boom in the petrol industry combined with the lack of viable rural activities (Toto Same 2008). Although villagers can obtain exploitation rights on the forest area *de jure* (GoEG 1997b, 2009), the technical requirements for exploitation of national forests might become a barrier for local communities, therefore reducing their access to forests *de facto*. In addition, only exploitation for subsistence is allowed in community forests. At the national level, oil revenue investment in infrastructure might affect each community differently. The development of macroeconomics might increase consumption per capita putting more pressure on natural resources (Toto Same 2008). Nevertheless, the rural exodus reduces pressure on natural resources, leaving a margin of resilience.

The communities' weak social capital increases vulnerability. Customary institutions are not well developed and have few or unknown management rights over forest. External institutions are not well established either. This results in a lack of community-level decision making being integrated into higher level decision-making processes. Political macro-decisions such as bans on hunting have direct and indirect negative impacts on rural livelihoods. Bushmeat becomes less accessible due to the legislation and promotes increases in the size of animal populations, therefore increasing damage to rural crops by wild animals.

On the ecological side, vulnerability is framed by the status of natural resources and the impact of climate stimuli. Forest degradation limits community adaptive capacity in difficult periods. In addition, toxic fishing techniques result in downstream community vulnerability due to water pollution reducing the availability of fish resources and riverside vegetation.



Figure 3. Selling bushmeat. Photo by Olivier Girard

Table 1. Disturbance-impact matrix (realized by a mixed group of men and women) 0 = no impact; 5 = very high impact; + = positive; - = negative

Exposure unit	Impacts			
	Wind storms	Torroriental rains	Changes in rain seasons	Rising temperatures
Agriculture	-2	-3	-1	-5
Hunting	-1	-4	-1	+2
Fishing	-1	-4	0	0
Population	-2	-3	0	-5
Trees	-2	-1	-1	+1
Livestock farming	-2	-1	-3	0

The most important climate change impacts are increased temperatures, torroriental rains and erratic/changing rainfall patterns, and, to a lesser extent, strong winds. Farmers indicate that droughts are the major climatic threat, while torroriental rains and a shift in the seasons are secondary. Drought can refer to different climatic conditions based on villagers' perceptions: late arrival of the rainy season, decrease of rainfall during the dry months, longer dry spells during the dry season; perception of drought can be also influenced by higher temperatures or decreased water flow in rivers. There is little scientific knowledge on the specific effects of climate changes on ecosystems at a local level, and therefore local knowledge has been used in the analysis. The results are presented in Table 1.

Drivers and agents of deforestation and forest degradation

The area of forest has decreased gradually since the 1970s with the strongest decline in the first decades. The area surrounding the villages (2–5 km toward an area of secondary forest) is threatened by traditional slash-and-burn agriculture for subsistence and commercial purposes and bushmeat hunting, in addition to the intensive deforestation carried out by logging companies. The trend shows that companies were the main factor during the first decades, whereas agricultural activities took the lead more recently. All this is combined with the development of infrastructure such as roads, highways, electricity networks and water distribution systems.



Figure 4. Women’s group. Photo by Marie Claude Simard

Forest–population dynamics are governed by two factors. On one hand, degradation has a high impact on livelihoods since forest is used for small-scale wood exploitation for construction, hunting and land for agriculture. On the other hand, the rural exodus of people attracted by high cash-paying urban jobs acts as a reverse force reducing pressure on forests and forests land.

How does the project respond to these problems?

The project will initially last for 2 years focusing on capacity building, development of vulnerability scenarios and implementation of pilot activities to reinforce the synergy between adaptation and mitigation, mainly through agroforestry interventions and community-forest-based REDD+ projects (INDEFOR-AP 2012). The main components of the project are presented in Table 2.

Table 2. Pilot project interventions and their benefits.

Project component	Benefits			
	Mitigation	Adaptation	Biodiversity	Community development
Local stakeholders’ capacity building regarding climate change concepts and REDD+: Creating a stakeholder platform and providing training, once participants and training needs are identified.	REDD+ knowledge (based on training needs), synchronization of mitigation activities.	Knowledge of climate change concepts (based on training needs).	Knowledge of links between biodiversity, adaptation and mitigation (based on training needs).	Improved knowledge and increased cooperation.
Sustainable forest management within REDD+: Setting simple management plans (SMPs) for community forests. The community forests will go through a legal procedure to ensure land deeds for the community. The SMP will integrate REDD+ and adaptation, including the development of a management manual, and will be based on analyses of community vulnerability. A participatory approach will be used to identify suitable parcels, analyze vulnerability, and develop SMPs and the manual.	Improvement of carbon stocks through community forest REDD+ project.	Selection of best practices and species for adaptation. Protection of water sources. Stronger financial capital.	Emphasis on local species. Improvement of green corridors for fauna. Regulated bushmeat collection.	New income sources. Food and health security. Secured forest tenure rights.
Agroforestry and tree domestication: Establishing a tree nursery and distributing saplings among farmers, with the main species being those of edible and medicinal value.	Increased carbon stocks due to tree domestication.	Protection against floods, strong winds and soil erosion. Stronger financial capital.	Emphasis on local species.	New income sources, more secure crops; livelihood diversification, food and health security, diversification of forage sources for livestock.
Pilot project monitoring and evaluation: Setting up monitoring and evaluation mechanisms with the identified stakeholders.	Verification of increase in carbon stocks and functioning of the Payment for Environmental Services scheme. Lesson learning.	Continuous evaluation of adaptation activities and reduction of community’s vulnerability. Lesson learning.	<i>Ex ante</i> and <i>ex post</i> impact analysis of biodiversity resources. Lesson learning.	Capacity building on monitoring and evaluation skills.

Conclusion

The project intends to reduce the *deforestation* and forest degradation rate by 30%. In terms of forest cover, the project aims at conserving 50% of community forest and afforesting/reforesting 15% of agricultural land. In terms of nurseries, the project will produce at least 1000 saplings of priority species. This will have an impact both on *mitigation* based on the increase of carbon stocks, and *ecosystem conservation*. Afforestation and reforestation will conserve and protect the watershed, and the agroforestry scheme will contribute to soil conservation. Plant *biodiversity* will be improved through the selection of key species for the nurseries, whilst animal biodiversity will hopefully be positively impacted based on the resettlement of green corridors. Both will be evaluated before and after the project.

Community development will also be evaluated during the project, including level of knowledge, income, food and health security, social structure and availability of natural resources. The project aims at increasing technical knowledge, within the population on climate change concepts and among technicians with regard to project design and implementation. Income will be improved due to the payment schemes conceived in REDD+ (rural residents have expressed their support for conservation objectives; however, they want viable economic alternatives to compensate them for any restrictions on their use of the forest). Food and health security will be reinforced directly with the introduction of agroforestry tree species, and indirectly with the improvement of ecosystem status. Social structure will also be positively impacted due to the involvement of local committees in project development, decision making and monitoring–evaluation, since the project adopts a participatory approach. Land ownership and rights will be clarified

with the legal registration of forest deeds. Gender issues will also be supported.

All the above aspects of community development will help to reduce *community vulnerability*; which will add to the specific *adaptation* activities that will be described as part of the SMPs.

Implementing organizations

The project INDEFOR-COBAM in Equatorial Guinea is part of a series of five pilot projects started by CIFOR partners with the support of the project “Climate change and forests in the Congo Basin: Synergies between adaptation and mitigation” (COBAM).

COBAM is a project started by CIFOR, framed within the African Development Bank (AfDB) grant to the Economic Community of Central African States (ECCAS) for financing the Congo Basin Ecosystems Conservation Support Program (PACEBCo).

INDEFOR-AP stands for “Instituto Nacional de Desarrollo Forestal y de Manejo del Sistema de Áreas Protegidas” (National Institute for Forest Development and Protected Areas System Management), which is the implementing partner of the project. INDEFOR-AP is a para-governmental institution founded in 2002 by the government, linked to the Ministry of Agriculture and Forestry. It is the entity currently responsible for forest management in Equatorial Guinea, with a strong expertise in technical and legal aspects, as well as social sensitization. Its main activities, in collaboration with partners, consist of protected areas planning, elaboration of an interactive forest atlas, and research on the alternatives to animal hunting surrounding the protected areas. Within community forest management, the organization supports communities in setting forest limits and the formulation of forest requests.

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