

Research Article

A Step Prior to REDD+ Implementation: A Socioeconomic Study

Anne Bernard and Nancy Gélinas

Department of Wood and Forest Sciences, Laval University, 2405 rue de la Terrasse, Pavillon Abitibi-Price, Quebec, QC, Canada G1V 0A6

Correspondence should be addressed to Anne Bernard; anne.bernard.1@ulaval.ca

Received 20 June 2014; Revised 31 July 2014; Accepted 14 August 2014; Published 1 September 2014

Academic Editor: Sunil Nautiyal

Copyright © 2014 A. Bernard and N. Gélinas. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Phase 2 of the United Nations' REDD+ climate change mitigation initiative is underway in the Democratic Republic of Congo. Meanwhile, activities are being implemented to assess the reduction of emissions from deforestation and forest degradation. REDD+ projects need to include a social dimension; thus, the aim of this research was to understand how land-use relationships vary across communities in an area where a REDD+ project is planned. Specifically, we aimed to identify the primary income-generating activities, the variation in access to land, the potential for the development of community projects, and the implementation of alternative income-generating activities. In the summer of 2013, we assessed a REDD+ pilot project in and around the Luki Biosphere Reserve, Bas-Congo Province. We used participatory rural appraisal (PRA) methods in four communities located both inside and outside the reserve. We found that current subsistence income activities led to the destruction of forest habitat due to population pressure and a lack of alternative income-generating activities. Customary land tenures overlay statutory rights, which can often mean that community rights are threatened. To achieve their targets, REDD+ projects should consider the actual land-use patterns of local communities in order to generate sustainable income from the land.

1. Introduction

Deforestation and forest degradation, which occur mainly in low-income tropical countries, account for an estimated 12 to 17 percent of annual anthropogenic greenhouse gas emissions (GHG) [1]. To address this issue, the 15th Conference of the Parties (COP15) of the United Nations Framework Convention on Climate Change (UNFCCC) decided that reducing emissions from deforestation and forest degradation (REDD+) would be the mitigation strategy to slow down land use change, with a focus on conserving and enhancing carbon stocks through sustainable forest management. Until now, approximately fifty high carbon value countries have been supported by the World Bank Forest Carbon Partnership Facility (FCPF) or by the United Nations Collaborative Programme on REDD+ (UN-REDD) in their REDD+ implementation. However, most of the countries targeted by REDD+ initiatives are considered to be fragile states [2], which refers to countries that have “weak capacity to carry out basic governance functions, and lack the ability to develop mutually constructive relations with society” [3].

Although the literature assigns the success of REDD+ projects to good governance, regular updating of policy tools, and adoption of participatory activities [4, 5], these are harder to achieve in unstable countries.

In Sub-Saharan African countries, analysis of state laws compared with international treaties and declarations has shown a large discrepancy between traditional community rights and state control [6]. One of the major problems for local communities—living in forested areas—is the insecurity of their property rights since their customary rights rarely have a statutory counterpart [7]. There are high expectations from REDD+ projects in terms of their potential to impact positively social and economic outcomes. To ensure sustainability of the REDD+ process on a national scale, it is first important to clarify land tenure and carbon property rights. Without a well-established legal status, it is expected that financial rewards will not reach communities in need. Also, to manage the drivers of deforestation and forest degradation, closer attention must be paid to the capital, capacities, and traditional livelihoods of local communities while implementing REDD+ projects. In his report on the key

elements for dealing with climate change, Stern [8] outlined some basic principles for facing that international challenge. The framework he proposed is based on the “3E” criteria (i.e., effectiveness, efficiency, and equity). Angelsen and Wertz-Kanounnikoff [9] have further developed the 3E concept and applied it to the REDD+ framework. We suggest that those criteria can best evaluate the achievability of REDD+ projects in the long term. We argue that, to be effective, the REDD+ framework must consider local needs: securing and defining clear land tenure status and implementing alternative subsistence activities.

This paper presents a case study wherein participatory rural appraisal (PRA) methods were used to assess land-use patterns of local communities within the REDD+ framework. Evaluating land-use issues in this way will help in designing appropriate policies and sustainable development initiatives that can sufficiently benefit all members of poor rural communities as well as helping national committees develop a long-term REDD+ strategy.

In our study, we focused on the Democratic Republic of Congo (DRC) because it was the first African country to participate in the REDD+ process. Since 2009, the government of DRC has formed national and interministerial REDD committees, as well as national REDD coordination, to ensure communication between ministries, civil society, and local organizations. Similar to ownership in other tropical forests, the new forest code in DRC proclaims the government as the only legal owner of forested areas [7]. Although the new forest code does not consider customary rights, it now considers local communities as stakeholders in the forest. The law also addresses the possible development of community forests, even if none is yet in operation. On the institutional and organizational levels, DRC is characterized by the fragmentation of power among elites—elites who historically have prioritized private interests at the expense of the overall population [10]. Thus, DRC is the perfect example of a fragile state [2]. Because of its socioeconomic situation, the Congolese state is constrained to a high rate of deforestation and forest degradation on the forest transition scale [11, 12]. That is also the reason why international and national stakeholders have worked on implementing the REDD+ strategy in that country. However, all upstream efforts will not be enough for the initiative to succeed if local communities are not involved in the process [13]. Therefore, we think that the situation could be controlled if the REDD+ strategy adequately adapts to the livelihoods of local communities. Pilot REDD+ projects in DRC play such a role because they aim to document the strengths and weaknesses of the on-the-ground situation in order to reach a long-term REDD+ strategy.

Our aim was to validate the presence of key elements for implementing a REDD+ pilot project by understanding relationships between communities and their land. The specific objectives were (1) to identify the resources used by local communities, their traditional activities, and land-use patterns, (2) to assess access to land by local stakeholders, (3) to evaluate the social acceptability of community projects, and (4) to evaluate the potential for the implementation of alternative income-generating activities.

2. Methodology

2.1. Study Area. In Central Africa, DRC is the country with the highest rate of deforestation. Between 2000 and 2005, the neighboring countries of DRC in the Congo Basin forest (Gabon, Cameroon, Congo, and Central African Republic) recorded a mean rate of net deforestation of 0.04%. In DRC, that rate was estimated to be 0.11% for the period between 1990 and 2000, increasing to 0.22% for the 2000–2005 period [14]. The principal direct causes of deforestation and forest degradation are itinerant slash and burn agriculture, high artisanal wood exploitation, wood energy and charcoal production, and mining activities. Among the many underlying causes are population growth, poor governance, infrastructure development and urbanization, economic crises, unemployment, and poverty [15]. Those drivers are not exclusive to Bas-Congo province or even to DRC; the same problems have been observed in other world regions such as Brazil, Bolivia, Cambodia, Ecuador, Mexico, Mozambique, Philippines, Papua New Guinea, Vietnam, and Zambia [16, 17].

The research was carried out in the Luki Biosphere Reserve (LBR) in the Mayombe forest located in the Bas-Congo province of the Democratic Republic of Congo. The site is characterized by a tropical wet climate (type “Aw,” according to the Köppen classification), with a dry season lasting from mid-May to mid-October [18]. Created in 1937 by Belgian colonists, the Reserve has, since 1979, been part of the International Biosphere Reserve Network of the United Nations Educational, Scientific, and Cultural Organization (UNESCO). As defined by UNESCO, a Biosphere Reserve is a site where both conservation and the socioeconomic development of local communities are promoted. For this reason, the Reserve contains three zones (Figure 1(a)). The first zone, located in the center, is the integral conservation zone, where human activity—with the exception of nondestructive research—is not permitted. The second is designated as a buffer zone where both recreational and educational activities are allowed. Finally, there is an outer transition zone, where local communities can engage in traditional activities such as agriculture, sustainable hunting, and gathering. The current manager of the LBR is the local steering committee (LSC), which is composed of multiple stakeholders such as political and traditional authorities, local NGOs, and funding representatives. The total area of the LBR is 33,000 hectares, of which 8,000 hectares comprise the central zone.

When the LBR was first delimited, indigenous communities were already living within its proposed borders. Four enclaves were then defined in order to grant the local population legal access to their traditional territory. The strategic location of the LBR along the national road linking the economic center of Bas-Congo province, Boma, to the capital, Kinshasa, increases public access to the Reserve. As a result, the population in and around the LBR was estimated to be 138,589 in 2012, compared with 28,590 in 1993. While this increase is largely attributable to population growth, there has also been significant migration from cities to rural areas. In Central Africa, human migration is known to be the

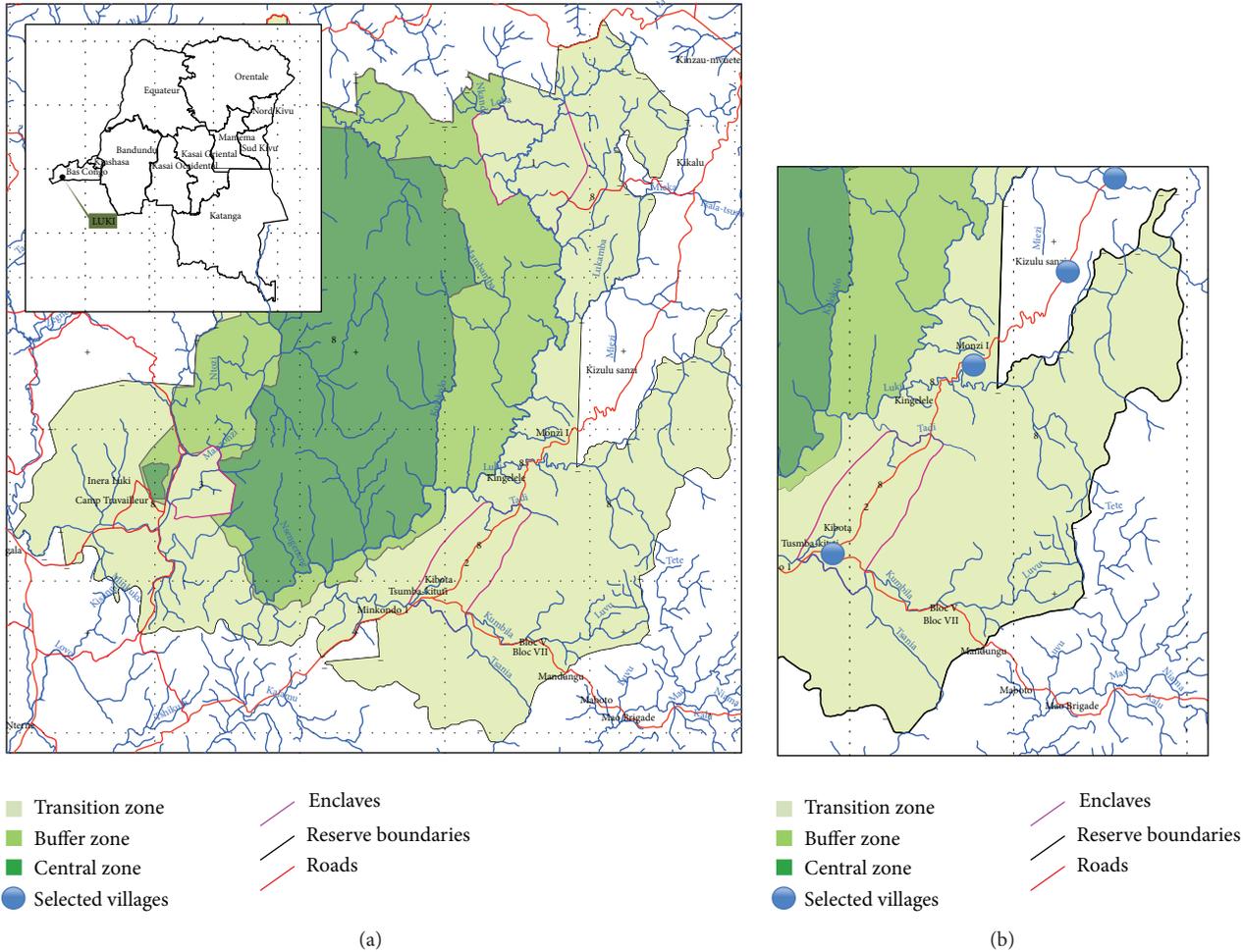


FIGURE 1: (a) Map of the Luki Biosphere Reserve and its designated zones. (b) Map showing the location of the villages selected for the study.

main constraint on forest conservation [19]. After widespread industrial closures across DRC, many people were forced to return to traditional agriculture to survive. Since Bas-Congo and therefore the LBR are easily accessible from Kinshasa, migration to the area has been substantial. This has brought another problem to the LBR: 36 of the 82 villages have been established illegally.

Since there are many contributing factors that threaten the Reserve, in 2008 the LSC decided to adopt the REDD+ initiative. At that time, the project manager felt that only one meeting with the local stakeholders' representatives would be required for local communities to approve participation in the REDD+ pilot project. Despite entrusting management to the LSC, it is the World Wide Fund for Nature (WWF) that initiated the process along with the Congo Basin Forest Fund (CBFF). Because of the late release of funds, the project only officially began in August 2013. Thus, all of the participatory rural appraisals presented in our study were done before the project start-up date and therefore they do not take into consideration REDD+ activities. However, we are aware of the specific objectives listed in the REDD+ project proposal that aim (1) to increase forest cover and forest regeneration

in the savannah and to reduce deforestation, (2) to improve the livelihood of local communities and implement a system of local governance, and (3) to contribute to the national REDD+ strategy to help DRC enter the carbon market as well as other platforms, enabling payment for environmental services (PES). From 2013 to 2017, 2.34 million euros will be spent to achieve those objectives [20]. Our study focus is on the second objective by concentrating on the pressures on natural resources by local communities located in and around the Reserve boundaries.

2.2. Participatory Rural Appraisal Methods. For the purpose of this study, four villages were selected: two located outside the Reserve within a 5 km walking distance from the Reserve boundaries and two inside the reserve (Figure 1(b)). One of the villages located inside the Reserve was identified as an illegal settlement (Table 1).

The methods used in this study are based on the socio-economic and gender analysis approach (SEAGA) developed by the FAO [22]. Specifically, a PRA approach was deemed to be the most appropriate for achieving our objectives since our aim was to understand how communities earn their

TABLE 1: Characteristics of the selected villages.

Village	Location	Population	Legal status
Kifudi	Outside	534	Legal
Kizulu Nsanzi	Outside	1136	Legal
Monzi 1	Inside	212	Illegal
Tsumba Kituti	Inside	1480	Legal

livelihoods and what their relationships are with the land [23]. Participatory methods are well suited for the REDD+ assessment, even before starting REDD+ activities, since they are based on the premise that community voices are essential for policy development and implementation [24]. The PRA methods used in our work included participatory resource mapping, group discussions, field observations, and a scoring and ranking exercise. During June and July 2013, we held two workshops in each village where the noted methods were used. To account for gender and age biases, participants were divided into three separate groups of men, women, and young people totaling three groups per village and a total sample of 12 groups. Although the definition of young people was subjective and varied between villages, one participant gave us a more precise definition: “Young is generally under thirty years old.” Also, this group included only males, while young females were automatically included in the women’s group. Since the workshops were held in the local Kikongo language, a translator accompanied us during all field activities.

Before beginning our fieldwork, we met with the local authorities of each village to secure an agreement with them that would allow us to be in the communities to perform our work and to explain our study objectives. Recruitment of workshop participants was done through village chiefs, who communicated with community members on our behalf. Despite our wish to limit participation to between 10 and 12 participants per workshop, additional participants could attend if they desired. Although we had more than the desired number of participants, it was impossible to assess exact numbers because people were constantly arriving and leaving as the workshops progressed.

Participatory Resource Mapping. Participatory resource mapping is a tool designed to gain information about communities and their resource use [22]. In this study, the technique was used to provide information about local and traditional land designations, as perceived by the villagers themselves. To simplify the map-drawing process, one participant was selected by each group to draw the map on a blank piece of cardboard. The aim of participatory mapping was to delineate the village borders, the forest, the agricultural fields, the savannah (if present), rivers and water sources, and all other designations. During this part of the process, even though only one person was drawing the map, all participants were invited to offer their opinions about it. When all the maps were drawn in each village, we met with a group of local authorities and interviewed group representatives to select one of the sketches as the official map.

Group Discussion. The aim of the group discussion was to gain more information about each map developed in the previous

section. Then, three themes were developed with the same participants that were in the mapping sessions. To ensure that all three themes were tackled by each group, we used a written interview guide. Namely, we discussed the resources used, land access, and the possibility of implementing a community project. Note that we did not tackle the local perspective of REDD+ projects because the pilot project had not yet started when we did our workshops. All villagers had the opportunity to express their ideas and there were no barriers to participation. However, the answers to the questions were discussed among the participants and the general consensus was considered in each case. Examples of questions asked were “What resources do you use?”; “What is the process for accessing land?”; “Are there differences between men, women, and young people regarding the division of labor?”; and “Can you envisage the establishment of a community project in your village?” Then, content analysis was performed on the results of the discourse using verbatim transcripts of the translated discussions [25]. Consequently, it was possible to highlight the differences and similarities or any particularities for each group. For this purpose, only the translator’s discourse was transcribed because the group discussions were held in the local dialect.

Field Observations. Field observations were used to validate the land assignments illustrated in the map and discussed with the participants. The researchers went into the field with volunteers from each group to complete documentation about local activities and resource use. In total, we made five field excursions: three of these were with the young people, where we visited their coal furnaces and their fields; two were with the men to visit their fields; one was with a woman where we assisted her during her field activities. Because we did not gain more information from additional visits with men and young people, we limited our field excursions to the above number. Regarding visits with women, the situation was different because it was harder to find volunteers who consented to be accompanied in the field.

Scoring and Ranking Activity. This method was used to fulfill the objective of implementing alternative activities in the communities. The purpose was to collect information about the level of interest and the perceptions of villagers concerning potential solutions that could increase incomes and reduce deforestation and forest degradation. Six solutions were presented to participants, namely, reforestation, increase of the number of fruit trees in villages, breeding and domesticating of wild species, introduction of improved domestic stoves, improvement of fallows, and introduction of improved charcoal furnaces. These solutions were derived from the concept of the *image box*, concerning climate change in Central Africa, which was developed by Khasa at Laval University [26]. To facilitate the participants’ understanding, we briefly explained each solution and used printed images to illustrate them. Then, each group was asked to rank the solutions from the most to the least desirable. Based on its ranking, a point score was assigned to each activity (rank 1 = 6 pts; rank 2 = 5 pts; rank 3 = 4 pts; rank 4 = 3 pts; rank 5 = 2 pts; rank 6 = 1 pt). Each group did the ranking activity.

TABLE 2: Primary, secondary, and tertiary activities practiced by groups in the selected villages.

Village	Group	Primary activity	Secondary activity	Tertiary activity
Kifudi	Men	Agriculture	Carbonization	
	Young	Carbonization	Agriculture	Hunting
	Women	Agriculture	Housework	
Kizulu Nsanzi	Men	Agriculture	Carbonization	Breeding
	Young	Carbonization	Agriculture	
	Women	Agriculture		
Monzi	Men	Agriculture	Carbonization	Breeding
	Young	Carbonization	Agriculture	
	Women	Agriculture	Water/wood supply	
Tsumba Kituti	Men	Agriculture	Breeding	Carbonization
	Young	Carbonization	Agriculture	
	Women	Agriculture	Housework	

We then added the scores from each group to determine an overall score for each village. We could also compare results between groups without reference to each village.

3. Results and Discussion

3.1. Resources Used, Traditional Activities, and Land Assignment. Even though the maps were not drawn to scale and were simplified illustrations of the territory, they provided coherent information about land-use patterns in the communities. There were no notable differences between groups from the same village, although the level of precision varied between groups. Also, there were no differences between villages based on the illustrated uses and activities, with the exception of savannahs, which were identified only in the villages located outside the Reserve. Overall, there were no differences in land assignments according to geographical and legal status but there were differences due to physical variations. Participatory maps enabled us to identify communities' land assignments. We observed that, in every village and in each group, agricultural fields always overlapped forests. In all cases, agricultural plots were randomly located in forested areas because of the abundance of agricultural fields. Villagers were able to identify their own plots but it was impossible for the restricted groups to locate all fields used by the whole community. In both villages outside the Reserve, savannahs were well represented and covered a significant area. In the first village (Kifudi), two groups (young people and women) told us that they used the savannahs to make *makala* and to pick fruit and mushrooms. In both outside villages, the men's groups had no interest in using savannahs because the soil is considered too rocky and infertile. One man from Kizulu Nsanzi explained: "We don't use the savannahs. Here, the ancestors did not use them. That is how savannahs were abandoned." For each village and in each group, the principal resource used was the forest, mainly for supplying wood. Many nontimber forest products are collected; the main ones are fumbua (*Gnetum africanum*), Marantaceae leaves, honey, mushrooms, and wildlife. Although there were no noticeable differences in

TABLE 3: Agricultural field areas used by interviewed households by type of crops [21].

Area covered	Food crops	Perennial crops	Industrial crops
Less than 1 ha	51.9%	43.3%	13.3%
1 to 3 ha	42.4%	35.3%	12.9%
4 to 6 ha	3.8%	5.3%	2.4%
More than 6 ha	2.0%	3.3%	1.0%

land-use between villages, we observed differences between groups. All groups named agriculture at least once in their three principal activities (Table 2). Men use the forest to develop their agricultural lands. From one farmer to another, there are differences in the type of crops prioritized, but overall cassava was the most common, followed by banana, taro, peanuts, coffee, and cocoa trees and various fruit trees (e.g., avocado, oranges, grapefruit, safou, lemon, papaya, and mango), while vegetable production was negligible. Agriculture is used mainly to meet food needs but it is also a principal income-generating activity. Nyange [21] did a complete survey of eleven communities in and around the Reserve. Her results show that a majority of the agricultural fields cover less than one hectare (Table 3), which suggests high fragmentation of the territory. Because the villages are located along the principal road, it is easy for them to sell their produce. Local communities do not consume everything they produce; cocoa and coffee are examples of agricultural crops that are not consumed locally but that are sold to generate income.

Young people used wood principally to make *makala*, or charcoal. Men also produce coal, but this was identified as a secondary activity for them. It is estimated that 3,000 bags of charcoal are produced monthly in each village [21]. Women are also involved in charcoal manufacturing but their task is principally to carry the final product from the production site to the main road where buyers from big cities go to replenish their supplies. In addition, women have the task of collecting the supply of wood, which is the main

fuel consumed by households. Charcoal production is also an important income-generating activity since none of it is consumed locally. We noted that some tasks were restricted to certain groups. For example, some household tasks were only performed by women. These include supplying water and wood, home maintenance, supplying food and cooking, laundry, and childcare. In contrast, only men and young people pick oil palm nuts.

Our investigation showed that the principal income-generating activities in the four selected villages can destroy or degrade forest habitats. In the context of extreme poverty, population growth, and a high unemployment rate, the LBR is endangered because of agricultural expansion and charcoal production. A sustainable strategy for the alleviation of poverty must take into consideration the interests of forest-dependent populations and forest users [27]. Given the present situation, communities will not change their current practices without incentives that will improve their livelihoods. With this in mind, we argue that REDD+ cannot be effective if alternative activities to deforestation and forest degradation are not proposed to local communities. For example, agroforestry systems have been proven to be an efficient way to increase carbon sequestration because they provide interesting social, economic, and environmental benefits [28]. Promoting alternative activities that respond to community values could enhance forest integrity and socioeconomic development. However, alternative activities must generate incomes equal to or higher than the *business as usual* practices; otherwise there are no incentives to change the status quo.

3.2. Land Accessibility. Access to agricultural fields follows ancestral rights. Except for Monzi 1, a former planter camp established by INERA (*Institut National d'Enseignement et de Recherche Agronomique*), all other communities were forcibly moved to their current locations after Belgian colonization. At the time, the colonists wanted to concentrate all indigenous communities around the main road. Today, descendants of the people who were displaced are now considered the first settlers; they have the right to use land without the permission of the chief or village elders. In Monzi 1, the situation is almost the same except that the rights holders are the descendants of the first planters. Even though Monzi 1 is considered an illegal village, there are rules governing land access for newcomers. In all four villages and in every group, newcomers must ask permission for access to the land from the rights holders. Only one group (men from Kifudi) mentioned that, due to the increase in the number of rights holders, newcomers might not be accepted into their community in the future.

Rent payments for access to land are not well defined and depend mostly on the relationship between newcomers and rights holders. If the newcomer is known by the rights holder and makes a good impression, it is easier for them to rent land in a settler's concession. Also, there was variability in rent levels between villages. Only in Kizulu Nsanzi was monetary rent mentioned: "It is 50,000 Congolese francs per cultivation period for one hectare. This is the rent to a rights holder when you are a newcomer." In Kifudi, on the other hand, monetary rent was not mentioned in any of the interviews, while, in

Monzi 1 and in Tsumba Kituti, the rent was considered largely symbolic. "If someone comes to you to make a cassava field, you have to talk with a first settler who has sufficient fallow. Then you pay something symbolic, a glass of sugar," a man from Monzi 1 told us.

Regarding charcoal production (*makala*), agreements with the rights holders were different since coal can be produced at any time during the year and in any type of forested area. As mentioned during the interviews, there are two ways to produce coal: "After the clearing period, in the dry season, we use the wood that we have cut down to make our maize, cassava, or rice fields, to make *makala*. But, during the wet season, we use any tree we find in the forest [to make *makala*]." Thus, for the first way of producing coal, young people have to have an agreement with the rights holder to make charcoal, after the owner or the tenant has cleared the field to plant his crops. In that case, the charcoal producer must give the settler part of his production. However, there is no standard format for this kind of agreement. The second type of charcoal production is harder to follow since it is done randomly. A group of young people told us: "Normally, decisions are made by the rights holder, but given the difficulty of life, young people don't necessarily pay attention. They enter [the forest] and they cut. If we surprised them, then they will pay." The men's group of the illegal village (Monzi 1) also confirmed the lack of rules surrounding charcoal production: "We work chaotically. Nobody is watching us. When somebody comes in the Reserve, he finds a place, he cuts and he do *makala*. [...] Rights holders don't hinder people who want to make *makala* only, because they already have their field." According to villagers who live in the Reserve, everybody can exploit the Reserve without any agreement. The agreement is essential when it comes to land belonging to rights holders.

Except in Kifudi, it was clearly expressed by the men's group that expansion of agricultural plots by newcomers might be limited in the future; in the other villages, an increase in agricultural fields is possible. When land is assigned for agricultural use for charcoal production, agreements between newcomers and rights holders are neither registered nor monitored. If land tenure rules are not defined, carbon property at least should be. If one or the other is determinate, it increases the probability of success for a given project. Nonetheless, that is not yet the case in the four villages we studied.

Our analysis of access to land for the local communities in this study has demonstrated the importance of customary rights. Our findings also provide real evidence of land tenure instability in and around the LBR. As expressed frequently in the literature, the issue of securing land tenure predominates in ensuring an efficient, effective, and equitable REDD+ project. They alone determine whether newcomers or young people have the right of access to their land in order to meet their subsistence needs. This illustrates that, even inside vulnerable communities, there are groups that are further marginalized. Such groups are defined in the REDD+ social and environmental standards (REDD+ SES) [29] as people who have little or no influence over decision-making processes because of their gender, ethnicity, socioeconomic

status, or religious affiliation. In our case study, we could also include age as a discriminatory factor. However, in the context of DRC, we can expect an increase in migration from urban to rural areas. The number of newcomers and young people is thus expected to rise as unemployment increases along with the net birth rate. These will be major factors to consider in the large-scale implementation of the REDD+ framework in DRC. Thus, REDD+ projects that plan for reforestation or for avoiding deforestation will necessarily require the agreement of rights holders. In such cases, it will be important to consider the implications for marginalized groups and whether the implementation of REDD+ projects carries a risk of increasing inequality inside poor rural communities.

Considering the absence of customary land rights for newcomers and young people and the increase in their number, it would be unacceptable not to take them into consideration while implementing a REDD+ project. It is known that the principal causes of deforestation in the area are due to the increase in agricultural fields, charcoal production, and small-scale logging. Thus, agreements between rights holders and REDD+ project managers will not be sufficient to avoid deforestation and forest degradation, and, consequently, objectives will be harder to achieve. On a larger scale, it would be interesting to explore further the issue of illegal settlements in the Reserve. Even though the Congolese state does not recognize such settlements, they have been increasing constantly during the last decade, with no indication of a potential slowdown. This is alarming for project managers because the people living in illegal settlements have no traditional relationship with the LBR surroundings. In future research, it would be interesting to study attachment level to a territory and the influence that it has on deforestation and forest degradation, for which newcomers and illegal settlements are considered to be more responsible.

3.3. Social Acceptability of Community Projects. We tested the acceptability of community projects because the new forest code includes an article on community forest development, even though none are currently established in the country. The pilot project in and around the LBR proposes that 20,000 hectares of forest will be protected. Securing the central transition zone is considered a step toward avoiding deforestation in the REDD+ framework. However, that territory is already subject to intensive exploitation by local communities. A precise analysis of current activities occurring in the protected area should take place to evaluate the possible leakage that securing the protected area could create. Since funding for the pilot project ends in 2017, there is the risk that efforts made to secure the central and transition zones during the term of the project might not persist beyond the end of project funding.

Taking into consideration the proposals for the LBR within the pilot project and concerns outlined in the literature, we wanted to know the social acceptability of community projects in the selected villages. When first presented to participants, community projects were conceivable to them only if they went through entitled settlers. However, since

community work is not common in the four villages, it seems that such projects could face barriers. In effect, projects would be efficient only in land belonging to rights holders. The men's group in Kizulu Nsanzi summarized the situation by expressing the following: "They [community projects] could be done in each rights holder's concession and their family could work for it; that would work. However, if all villagers have to work on the same field, it will be problematic." For both villages outside the Reserve, community projects would occur primarily in the savannahs because they do not have any particular usefulness. However, harvesting nontimber forest products was mentioned as being important by a group of women. In all villages and in all groups, it was felt that the efficiency of community projects would automatically be linked with the status of rights holders; other villagers have no power in the implementation of these kinds of projects.

Inside the Reserve, the situation varied from place to place. Because Monzi 1 is a former planter camp established by the government, the population was more responsive to communal projects. In Tumba Kituti, in reference to the question of community projects, the women told us that this would be possible in the Reserve. One of them said: "Unused lands in the Reserve could be favorable for community projects. When we will face a lack of agricultural fields, men will still start to exploit the Reserve." That statement could serve as a warning to Reserve managers during this period of population growth.

In the literature, there are many examples showing that community forests are well designed to meet REDD+ objectives. Community-based forest management (CBFM) in Tanzania has enhanced community property rights, improved forest management, and defined uses of benefits [30]. However, Robinson et al. [31] have noted in their paper that CBFM has resulted in carbon leakage into non-REDD+ forests. They proposed that REDD+ projects should be implemented in forests where conservation values and biodiversity protection are prioritized and where governments are the land tenants. In addition, even if use rights are necessary in order to have a successful community forest, they are not automatically synonymous with the enhanced wellbeing of forest-dependent people [32]. A meta-analysis proved that the deforestation rate is higher in protected areas than in community forests where local communities must develop the management framework themselves [33]. Considering these contrary findings, what are the best practices to adopt in the LBR?

3.4. Potential of Alternative Activities Implementation. As previously stated, to attain the objectives of a REDD+ project in and around the LBR, traditional agriculture and charcoal production must be reconsidered or modified in terms of sustainable alternatives. When communities were asked to propose which solutions they thought would reduce their impact on forests as well as on the integrity of the LBR, all groups answered that job creation was the keystone solution for improving their livelihoods. Taking their answers into account, we suggested six solutions that are more achievable in the short term. In each village, the three solutions with the highest approval were, in order of importance, reforestation,

TABLE 4: Scoring and ranking of the alternative activities proposed to the villages studied.

	Overall		Kifudi		Kizulu Nsanzi		Monzi 1		Tumba Kituti	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
B	20	2	18	1	13	2	13	2	13	3
R	22	1	14	2	14	1	17	1	15	2
TV	8	5	8	5	5	6	6	5	9	4
IF	18	3	11	3	12	3	10	3	17	1
IDS	12	4	9	4	11	4	10	3	6	5
ICF	7	6	3	5	8	5	7	4	3	6

B: breeding and domestication; R: reforestation; TV: trees in villages; IF: improved fallows; IDS: improved domestic stove; ICF: improved carbonization furnace.

TABLE 5: Scoring and ranking of proposed alternative activities by the groups studied.

	Overall		Men		Women		Young	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank
B	15	2	19	2	17	3	21	1
R	16	1	22	1	18	2	20	2
TV	5	5	8	6	10	5	8	5
IF	14	3	16	3	19	1	15	3
IDS	9	4	10	4	16	4	12	4
ICF	5	5	9	5	4	6	8	5

B: breeding and domestication; R: reforestation; TV: trees in villages; IF: improved fallows; IDS: improved domestic stove; ICF: improved carbonization furnace.

breeding and domestication of wild animals, and improved fallows (Tables 4 and 5). Results were the same when we compared one village to another or similar groups in each village.

Reforestation was considered the most important solution because INERA tested and developed an agroforestry system where coffee and cocoa trees were planted under a dominant forest layer of exploited species, the limba tree (*Terminalia superba*). Reforestation also has some historical significance in the LBR area because the Belgian colonists planted limba when they arrived. In addition, acacia plantations that supply wood have been developed by local NGOs in neighboring villages. Even if communities perceived the practice to be positive, illegal cutting of limba was considered a problem. Moreover, the groups we questioned were interested in planting, but only if they have sufficient funds to buy limba seedlings. Therefore, two limitations of reforestation are the lack of financial support and poor monitoring. Regarding REDD+ project plans, 1,000 hectares will be planted through community initiatives that will be led by local development committees (LDCs). However, as shown previously, community projects would not be well received by the four selected villages because it is not in their interest to share land. Rather, they prefer individual work.

The second most popular solution, particularly among young people, was the breeding and domestication of wild animals (Table 5). In all four villages, participants indicated that, instead of charcoal production as the principal income-generating activity, they would prefer to breed animals; men and young people already breed pigs, sheep, and chicken on a small scale. This activity provides an auxiliary income because not enough livestock is bred to enable them to cease surplus agricultural production. They also face many

obstacles concerning their animals. Because they allow them to scavenge along the main road, the animals are often killed by cars. However, villagers prefer scavenging because the animals feed themselves, which reduces costs. Diseases and theft are also problems that were mentioned during discussions. In addition, they were in favour of breeding wildlife because there is, in their opinion, a drastic decline in some wild animal populations, which limits traditional hunting. The wild animals mentioned repeatedly were the cane rat (*Thryonomys swinderianus*), the Gambian pouched rat (*Cricetomys gambianus*), and the African brush-tailed porcupine (*Atherurus africanus*). They also discussed the interest in gaining animal husbandry skills. However, if this activity is to increase, it will be important to ensure that there are sufficient markets for these new products.

Although the principal income-generating activity among young people is charcoal production, they ranked the introduction of improved furnaces as the least important of the three solutions (Table 5). This result is a good indicator of their perception of this activity. Although currently it is a quick and easy way to make money, young people's groups would welcome sustainable alternatives that could generate equal or higher incomes.

3.5. Other Challenges for the Implementation of the REDD+ Activities. One short-term objective of the integrated pilot project in and around the LBR is the replanting of 1,000 hectares of forest in the traditional territories of surrounding villages. This objective is a response to the need for an increase in carbon stocks under the REDD+ framework. However, there is no mention of monitoring and assessing carbon stocks over time. Moreover, there is nothing indicating that pilot project managers have initiated steps to establish

agreements with rights holders. Currently, there is little to ensure that communities will work to preserve those new plantations because no alternative activities are yet planned for their conservation. Also, the villagers' perception is that plantations provide short-term income. Reforestation is a quick way to make money because communities will be paid for their work through their LDCs. After planting 1,000 hectares, it is thought that villagers are likely to return to their current practices. This raises the following questions: How will REDD+ project managers protect the plantations and carbon stocks, and what will the incentives be for local communities to assist them? To establish a plantation, agreements with rights holders are essential, and furthermore it will be necessary to work with marginalized communities to prevent the future reduction of carbon stocks. In addition, carbon ownership rules are not yet properly defined, which adds to the uncertainty surrounding the potential effectiveness of REDD+ projects in the LBR.

Some studies recommend the decentralization of forest governance as a prerequisite for improved success of REDD+ projects [6, 7, 34]. In the LBR, management is currently undertaken by the local steering committee, which is composed of customary rights representatives, regional and national administration representatives, and local development committee members. In fact, the LSC brings together all stakeholders that have an impact on the resources within the LBR. Although this study does not focus on governance issues in the LBR, we think it is important to consider the management structure in order to better understand its effects on the success of the pilot project. Under the current structure, it is possible that the main REDD+ objectives are not achievable and hence it will be important to identify any modifications that might be necessary to facilitate the success of the project. The pilot phase of REDD+ allows national policies to be implemented and tested at the local level. Meanwhile, local projects such as the LBR pilot project can help in developing a strong national REDD+ strategy that preserves and enhances the livelihoods of local populations as well as achieving international targets. Even if decentralization is considered essential in empowering local stakeholders [34], we think that assigning a partner to the LSC to act as a mentor at the start of a REDD+ project might also increase the chances of having the project succeed. To attain a real reduction in deforestation and forest degradation in the LBR, with no leakage, it is important that there is social cohesion along with good governance. Even if the LSC is the perfect example of a decentralized organization, our study suggests that it may not be strong enough at both institutional and organizational levels to successfully implement such a project.

4. Conclusion

In the process of implementing a national REDD+ strategy, pilot projects are essential in order to identify the strengths and weaknesses of the approach. Because DRC is currently evaluating the effectiveness of and the issues concerning REDD+ projects through its integrated network of pilot projects across the country, we assessed the LBR pilot project. To date, there is not enough evidence showing that REDD+

initiatives will be effective in the long term, but we can assess the way they are currently implemented. Through participatory methods, we were able to understand the realities facing local communities concerning land tenure, land security, and the implementation of alternative activities, all of which are key components for the success of REDD+ projects. Conducting discussions with different interest groups in local communities gave us a real perspective on the deficiencies of the current approach in achieving REDD+ objectives. Whether for access to fields, starting a community project, or eventually initiating forest-based community management, rights holders will be the principal decision-makers—without exception, they hold power over granting access. However, our case study of these four communities in and around the LBR sheds light on the insecurity of land tenure, the absence of alternative activities, and the lack of governance features, all of which are components that could threaten the security of forest assets and the eventual sustainability of a long-term REDD+ initiative. In addition, we gained information on the feasibility of community projects as well as the implementation of alternative income-generating activities. We found that communitarian initiatives, as discussed in this inquiry, are not well designed for the local communities. Involvement of communities—before the implementation of a project that affects their livelihoods—is not a distant wish: it is a necessity. This case study could provide project managers with information that helps them achieve their specific objectives: improving the livelihoods of local communities and implementing a system of local governance. On a national scale, our work is intended to provide insights to policy makers, for the implementation of future REDD+ projects, by taking into consideration local perspectives and realities.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

Acknowledgments

This work was funded by the World Wide Fund for Nature-DRC (WWF-DRC) and *Fonds de Recherche du Québec-Nature et Technologies* (FRQNT). The authors thank Marie Nyange for her data. They also thank Symbal Phanzu Tsimba for his translation and assistance during the workshops. Finally, They would like to thank David Auty for his linguistic review and helpful comments.

References

- [1] G. R. Van Der Werf, D. C. Morton, R. S. Defries et al., "CO₂ emissions from forest loss," *Nature Geoscience*, vol. 2, no. 11, pp. 737–738, 2009.
- [2] A. Karsenty and S. Ongolo, "Can 'fragile states' decide to reduce their deforestation? The inappropriate use of the theory of incentives with respect to the REDD mechanism," *Forest Policy and Economics*, vol. 18, pp. 38–45, 2012.
- [3] The Organisation for Economic Co-operation and Development (OECD), "Fragile States 2013: Resource flows and trends in a shifting world," 2012.

- [4] D. Pettenella and L. Brotto, "Governance features for successful REDD+ projects organization," *Forest Policy and Economics*, vol. 18, pp. 46–52, 2012.
- [5] O. Springate-Baginski and E. Wollenberg, *REDD, Forest Governance and Rural Livelihoods: The Emerging Agenda*, CIFOR, Bogor, Indonesia, 2010.
- [6] A. Awono, O. A. Somorin, R. Eba'a Atyi, and P. Levang, "Tenure and participation in local REDD+ projects: insights from Southern Cameroon," *Environmental Science & Policy*, vol. 35, pp. 76–86, 2014.
- [7] A. Agrawal, A. Chhatre, and R. Hardin, "Changing governance of the world's forests," *Science*, vol. 320, no. 5882, pp. 1460–1462, 2008.
- [8] N. Stern, *Key elements of a Global deal on Climate Change*, London School of Economics and Political Science, London, UK, 2008.
- [9] A. Angelsen and S. Wertz-Kanounnikoff, "What are the key design issues for REDD and the criteria for assessing options?" in *Moving Ahead with REDD: Issues, Options and Implications*, A. Angelsen, Ed., pp. 11–21, 2008.
- [10] A. Aquino and B. Guay, "Implementing REDD + in the Democratic Republic of Congo: an analysis of the emerging national REDD + governance structure," *Forest Policy and Economics*, 2013.
- [11] T. K. Rudel, L. Schneider, and M. Uriarte, "Forest transitions: an introduction," *Land Use Policy*, vol. 27, no. 2, pp. 95–97, 2010.
- [12] E. B. Barbier, J. C. Burgess, and A. Grainger, "The forest transition: towards a more comprehensive theoretical framework," *Land Use Policy*, vol. 27, no. 2, pp. 98–107, 2010.
- [13] B. Blom, T. Sunderland, and D. Murdiyarto, "Getting REDD to work locally: lessons learned from integrated conservation and development projects," *Environmental Science and Policy*, vol. 13, no. 2, pp. 164–172, 2010.
- [14] Observatoire des forêts d'Afrique centrale (OFAC), "États des Forêts 2010: Les forêts du Bassin du Congo," 2010.
- [15] "Ministère de l'Environnement, Conservation de la Nature et Tourisme RDC (MECNT)," Synthèse des études sur les causes de la déforestation et de la dégradation des forêts en République Démocratique du Congo, Democratic Republic of Congo, 2012.
- [16] E. A. Ellis and L. Porter-Bolland, "Is community-based forest management more effective than protected areas? A comparison of land use/land cover change in two neighboring study areas of the Central Yucatan Peninsula, Mexico," *Forest Ecology and Management*, vol. 256, no. 11, pp. 1971–1983, 2008.
- [17] E. Estrada, E. Trines, and I. Emmer, *Comparative Study on REDD+: Recommendations for Action*, vol. 78, Sylvestrum, Leeuwarden, The Netherlands, 2012.
- [18] A. Lubini, *La Réserve de biosphère de Luki*, MAB, DECNT, Kinshasa, Congo, 1984.
- [19] Z. Mogba and M. Freudenberger, "Migration humaine dans les zones protégées d'Afrique centrale: Le cas de la Réserve special Dzanga -Sangha," *Yale F&ES Bulletin*, vol. 102, pp. 113–139, 1998.
- [20] Congo Basin Forest Fund (CBFF), *Projet pilote REDD intégré autour de la Réserve de biosphère de Luki dans la forêt du Mayombe*, BAD, 2010.
- [21] M. Nyange, *Participation des communautés locales et gestion durable des forêts: Cas de la Réserve de biosphère de Luki en République Démocratique du Congo [Ph.D. thesis]*, Laval University and Kinshasa University, 2014.
- [22] FAO, *Guide d'application niveau terrain: programme d'analyse socioéconomique selon le genre*, Food and Agriculture Organization of the United Nations, Rome, Italy, 2002.
- [23] R. Chambers, "Participatory rural appraisal (PRA): challenges, potentials and paradigm," *World Development*, vol. 22, no. 10, pp. 1437–1454, 1994.
- [24] A. Özerdem and R. Bowd, *Participatory Research Methodologies: Development and Post-Disaster Conflict Reconstruction*, Ashgate Publishing, 2010.
- [25] K. Krippendorff, "Content analysis," in *International Encyclopedia of Communications*, E. Barnouw, G. Gerbner, W. Schramm, T. L. Worth and, and L. Gross, Eds., pp. 403–407, The Annenberg School of Communications, University of Pennsylvania, Oxford University Press, New York, NY, USA, 1989.
- [26] D. Khasa, *La Boîte à Images: Les Changements Climatiques en Afrique Centrale*, Université Laval, Québec, Canada, 2002.
- [27] W. D. Sunderlin, B. Belcher, L. Santoso et al., "Livelihoods, forests, and conservation in developing countries: an overview," *World Development*, vol. 33, no. 9, pp. 1383–1402, 2005.
- [28] A. Albrecht and S. T. Kandji, "Carbon sequestration in tropical agroforestry systems," *Agriculture, Ecosystems and Environment*, vol. 99, no. 1-3, pp. 15–27, 2003.
- [29] REDD+ Social and Environmental Standards, "and Environmental Standards," Version 2, 27, <http://www.redd-standards.org/>.
- [30] V. M. Viana, A. R. Aquino, T. M. Pinto et al., *REDD+ and Community Forestry: Lessons Learned from an Exchange of Brazilian experiences with Africa*, The World Bank and Amazonas Sustainable Foundation, 2012.
- [31] E. J. Z. Robinson, H. J. Albers, C. Meshack, and R. B. Lokina, "Implementing REDD through community-based forest management: lessons from Tanzania," *Natural Resources Forum*, vol. 37, no. 3, pp. 141–152, 2013.
- [32] H. Purnomo, G. S. Arum, R. Achdiawanm, and R. H. Irawati, "Rights and wellbeing: an analytical approach to global case comparison of community forestry," *Journal of Sustainable Development*, vol. 5, no. 6, pp. 35–48, 2012.
- [33] L. Porter-Bolland, E. A. Ellis, M. R. Guariguata, I. Ruiz-Mallén, S. Negrete-Yankelevich, and V. Reyes-García, "Community managed forests and forest protected areas: an assessment of their conservation effectiveness across the tropics," *Forest Ecology and Management*, vol. 268, pp. 6–17, 2012.
- [34] E. A. Coleman and F. D. Fleischman, "Comparing forest decentralization and local institutional change in Bolivia, Kenya, Mexico, and Uganda," *World Development*, vol. 40, no. 4, pp. 836–849, 2012.



Hindawi

Submit your manuscripts at
<http://www.hindawi.com>

