Impact of Forest Carbon Sequestration Initiative on Community Assets: The Case of Assisted Natural Regeneration Project in Humbo, Southwestern Ethiopia

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Abstract: This study was aimed at unveiling the impact of a forest carbon sequestration initiative on community level livelihood assets by examining the case of local communities involved in the management of a restored forest in Humbo district of Southwestern Ethiopia. A triangulation of key informant interviews, focus group discussions, non-participant observations, and in-depth interviews were employed to gather the required data. Findings of the study reveal that at the community level, the project achieved positive outcomes such as the formation of Forest Development and Protection Cooperatives (FDPCs) and strengthening their local leadership capacity, building some physical assets though some of them were not in line with the priority needs of the stakeholder local communities, improved microclimatic conditions, and increased savings of FDPCs. On the other hand, the weakening of certain long existed informal institutions for joint ownership of livestock (*Kottaa*), share breeding of livestock (*UloKottaa*), and the exchange of farm oxen (*BooraaGatuwaa*) were worth mentioning as negative outcomes associated with the project. Therefore, letting the community decide over what to do with the carbon revenue in general and which community level assets to build in particular are likely to meet the priority needs of the concerned communities, enhance the sense of ownership of the forest among the members of the communities, and thereby contribute to the sustainability of forest management and carbon sequestration. Moreover, social impact assessments need to be exhaustively conducted during the replication of similar projects in order to anticipate their possible dysfunctions and thereby to save the long existing informal social institutions of target communities.

Introduction

In Ethiopia, forest resources play a significant role particularly in the livelihoods of rural people as important sources of energy, food, employment, medicine, fodder, and income.[1] Studies undertaken in various parts of the country show that tens of thousands of rural people while depending on forests and woodlands for domestic energy are also engaged in

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the commercial supply of wood, charcoal, and other non-timber forest products to urban areas to earn their livelihood.[2] In the same vein, the connection between forest resources and livelihoods of rural people in developing countries has been enunciated clearly in the literature.[3] For instance, the Center for International Forestry Research (CIFOR) indicated that over two third of the Africa's 600 million people rely on forest products for their livelihood; its contribution to domestic energy alone, wood is the primary energy source for at least 70 percent of households in Africa.[4] From this, it is clear that the importance of forests and woodlands play a prominent role in the developing countries where highest percentage of people are poor and rural based.

The atmospheric concentration of greenhouse gases (GHG) and several detrimental effects associated with them has recently attracted global attention. As a result, various bodies like the United Nations Framework Convention on Climate Change (UNFCCC) and the subsequent Conferences of Parties (COPs) raised the level of concern about stabilizing greenhouse gas concentrations in the atmosphere to avoid climatic calamities. Consequently, the signatory parties to the 1997 Kyoto Protocol accepted legally binding constraints that bound some industrialized countries to reduce their greenhouse gas emission by an average of 5.2 percent relative to the 1990's level.[5] In the face of worrying global climate change and increasing global concern for it, in addition to the role forests play as source of income for rural people, the crucial role forests play as an alternative reservoir for carbon dioxide and thereby controlling and maintaining the stability, functioning, and sustainability of global ecosystems mushroomed as a source of relief for global society.[6]

Under the Kyoto Protocol, developing countries are not obliged to reduce their GHG emissions, whereas industrialized countries have to fulfill such targets through one of three flexibility mechanisms: international emissions trading (IET), the clean development mechanism (CDM), and joint implementation (JI).[7] Of the three mechanisms, it is only the CDM that is related to developing countries. The CDM is intended to help industrialized countries meet a portion of their emission reduction at lower cost by either purchasing carbon offsets that were generated through CDM-registered projects or by initiating CDM projects in the developing countries. In addition, according to the protocol, CDM projects are geographically limited to non-industrialized countries in order to achieve its second objective of helping developing countries achieve sustainable development.[8] By complying with the protocol, some industrialized countries have now started to purchase emission offsets from projects in developing countries and some others finance carbon sequestration projects in developing countries in order to reduce their respective emissions of greenhouse gases.[9] Consequently, having twin objectives of reducing greenhouse gasses and promoting sustainable development in host countries, the CDM projects are being implemented in non-industrialized countries since 2005.[10]

Within the aforementioned framework, World Vision Ethiopia (WVE) in partnership with World Vision Australia (WVA) in 2005 introduced the first carbon forestry project to Humbo communities of Southwestern Ethiopia.[11] The initiative introduced farmer-managed natural regeneration techniques to restore degraded communal forestland and thereby generate income for local communities through the sale of carbon credits. In introducing the carbon forestry project to the area, however, the initiators appear to be more influenced and driven by the hostile socio-economic and environmental conditions that characterized the Humbo area than by the global agenda. Furthermore, the initiators of the project intended "to stimulate ongoing community development and to test new funding streams such as the Clean Development Mechanism (CDM)" through it.[12] Accordingly, the stated goal of the

Humbo project was "to regenerate 2,728 hectares of previously degraded forest land in Ethiopia, with the aim of enhancing the local communities' livelihoods through improved environmental conditions as well as financial inflows to be achieved through linkages with carbon markets."[13] Thus, putting the Clean Development Mechanism into practice, the initiators of this specific project incorporated livelihood objectives into the project design documents (PDDs) as a main part of their contribution to the sustainable development of local communities.

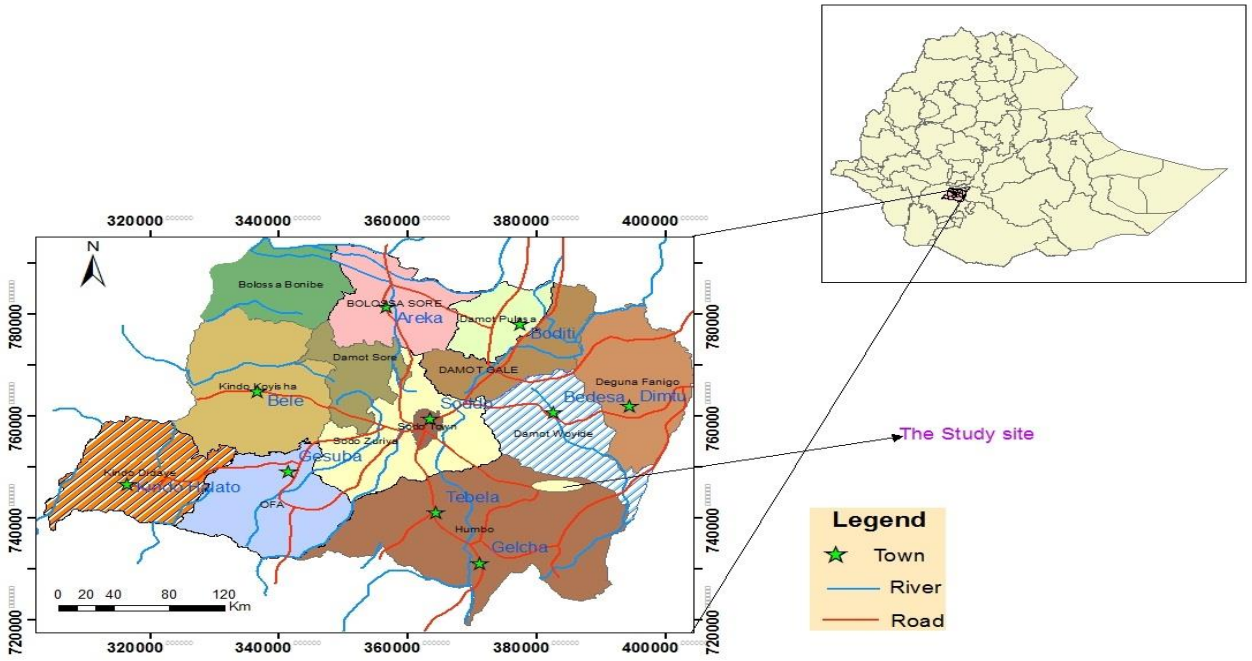
It is well established in the livelihood literature that livelihood assets can be held at household as well as at community levels. However, in the case of the project under consideration, it is clearly stated and specified that the carbon revenues would primarily be utilized for building community level assets. Therefore, it is very important and timely to investigate the state of community level livelihood assets of the stakeholder local communities as they have been receiving carbon revenue since 2009. Accordingly, this article exclusively considers the impacts of the project on the community level assets of the stakeholder local communities. This study was conducted on Humbo Community-based Natural Regeneration Project located in Wolaita zone of Southern Nations, Nationalities and Peoples Regional State with the aim of making explicit the positive and negative impacts of the carbon sequestration project on the community level assets.

Description of the Study Area

This study was conducted in 2014 in the Southern Nations, Nationalities and Peoples Region (SNNPR), which is one of the nine regional states of Ethiopia. Humbo *Wereda* (District), the research site, is one of the twelve *Weredas* in Wolaita zone, which is one of the thirteen zones of SNNPR.[14] The district is located 420 km southwest of the capital city, Addis Ababa, and eighteen kms from Soddo town, which is the administrative seat of Wolaita Zone. The *Werada* is composed of forty-one *Kebele* administrations, of which thirty-nine are rural and two are urban.[15] The total land area of the district is about 859.4 $km^{2.}$ The district had a total population of 144,739 (72,729 males and 72,011 females) in 2013. Only 7,897 were urban dwellers and 136,842 were rural.[16] The overwhelming majority of the inhabitants belong to the Wolaita ethnic group, but there are also Amhara, Sidama, Gamo, and others.[17]

Like the other *Woredas* of Wolaita Zone, agriculture (mainly crop and livestock production) constitutes the most important economic sector in Humbo *Wereda*. The main crops are cereals such as maize, sorghum, *teff*, haricot beans; cash crops like coffee; root crops like sugar potato, *Enset, and* onions; and fruits like banana, mango, avocado and others.[18] However, severe soil erosion, fragmented land size, and erratic rainfall have negatively affected crop production.[19] Farming is mainly rainfall dependent though inhabitants along rivers like the Hamassa and the Bilate and aside Lake Abaya use irrigation. Livestock (e.g. cattle, sheep, goats, poultry, and donkeys) also has an important place next to crop production in the economy of the inhabitants of the *Woreda*. Furthermore, other economic activities like handicraft industries, trade, and others also play important roles.[20]

Map of the Study Area (Wolaita Zone in Ethiopia, and Humbo Wereda in Wolaita Zone)



Description of the Project

This study was concerned with Humbo Assisted Natural Regeneration (ANR) Project. Based on a partnership of World Vision, the World Bank, the Ethiopian Government, and the Humbo communities, the project was introduced to the area starting from 2005.[21] But, here it is important to discuss the socio-economic and environmental conditions that evidently led to the perceived need of said project by its initiator, World Vision Ethiopia, before discussing the nature of the project itself. As mentioned under the description of the study area, Humbo *Wereda's* diversified agro-ecological conditions range from semi-arid to tropical humid and sub-humid climate types that allow the production of different commercial and food crops and sustain diversified flora and fauna. Nonetheless, the district is often characterized by poverty, high population density, variable rainfall, landlessness and increasing demand for agricultural land, environmental degradation, and the like, which in turn accounted for hunger, food insecurity, and recurrent drought proneness in the area.[22] These socio-economic and environmental conditions have driven local communities to encroach on the forest for expansion of farm and grazing lands, charcoal production, fire wood collection, and a search of construction materials among other objectives and consequently resulted in the gradual deforestation of a communal forest that historically covered a significant land area in the district.[23]

World Vision Ethiopia is one of the non-governmental organizations that have striven to respond to the humanitarian crisis in Humbo *Woreda*, as the area is one of the country's drought prone regions. It started its relief work in Humbo in 1970s. Since then the organization has been involved in the distribution of relief assistance, the distribution of food-based safety nets, and food security related aid.[24] Its engagement in economic development (i.e., mainly agriculture) as one of its priority areas and on land degradation that characterized the areas where the organization works led it to integrate environmental issues at the heart of all its programs.[25] Relying on its long history of community

development work in Ethiopia in general and Humbo district in particular, in 2005, WVE took the initiative to introduce Farmer Managed Natural Forest regeneration (FMNR) as a means to alleviate the situation and improve the community's resilience capacity in the face of climate change and ensure sustainable development. Thus, it pioneered involvement in the Clean Development Mechanism in Ethiopia as part of its effort to respond to local and global issues. Accordingly, in 2006 the field operations of the initiative began "to regenerate 2,728 hectares of previously degraded forest land in Ethiopia, with the aim of enhancing the local communities' livelihoods through improved environmental conditions as well as financial inflows to be achieved thorough linkages with carbon markets."[26] However, the project's aim is not just limited to stimulating ongoing community development and testing new funding streams such as the Clean Development Mechanism but it also subscribes to the other equally important goal of CDM—mitigating climate change through forest restoration and preservation. Thus, involvement in the CDM thereby to simultaneously respond to local and global issues was an opportunity that no one in the country was aware of until WVA came up with the idea and expertise.[27]

As discussed above, WVE in collaboration with WVA took the initiative to formulate and design the project, organized the concerned communities into forest development and protection cooperatives, and continues to solicit as well as mobilize funds for the project. Furthermore, it backs up the project by giving technical and human resource support and by facilitating its management. As mentioned in Biryahwaho et al., WVE's responsibilities include:

- Ensuring that the project obtains all the necessary approvals by government and other players in the carbon business;
- Providing a link with carbon buyers, providing linking and mediation services;
- Entering into an Emissions Reduction Purchase Agreement with the carbon buyer on behalf of the cooperative societies;
- Conducting training for members of the cooperative societies to ensure they are technically competent to implement forest management interventions as well as managing affairs of the cooperative society;
- Facilitating the formation of a Cooperative Union that would eventually take on the project leadership responsibilities beyond September 2012;
- Serving as an external member of the Board of Directors and participating in the general assembly as a non-voting member;
- Rendering technical, professional and advisory assistance to the society since its inception and will continue providing an ongoing advisory role;
- Jointly monitoring the reforestation carbon project with members of the executive committee;
- Acting as a liaison with the relevant governmental, non-governmental and international financing agencies for the effective implementation of the project;
- Assisting in the formulation of internal regulations and forest management plans;
- Providing assistance in case of potential disputes over unauthorized forest usage;

- Recommending a general manager for the project who has the adequate personal capacity for the administration of the project.[28]

In addition to WVE and WVA, some multilateral institutions and governmental organizations at the national, regional, and local levels have been involved in the project as stakeholders in order to help it attain its local and global goals of sustainable development and climate change mitigation respectively. The World Bank, Federal Environmental Protection Authority (EPA), Ministry of Agriculture and Rural Development (MoARD), Bureau of Agriculture and Rural Development (BoARD), Humbo *Woreda* (District) Agricultural, Rural Development and Forestry Development Coordination Office (ARDFCO), Humbo *Woreda* Government Cooperative Office and Community Forest Protection and Development Cooperative Societies are the major stakeholders in the project.[29] Since each of the stakeholders carry out specific responsibilities based on their mandate, it goes far beyond the scope of this article to discuss the specific roles of each actor. However, it is imperative to disclose the primary role of a few of them.

The World Bank has been involved in the project as a buyer of sequestered carbon due to the project using financial resources from some developed countries. The Emission Reductions Purchase Agreement was signed between the Bank and World Vision Australia and World Vision Ethiopia. Then, "WVE receives carbon payments through WVA on behalf of the community and disburses the funds to respective cooperatives proportionately upon the amount of emissions they have reduced."[30] Aynalem indicated that the Bank's involvement in this project purports to be limited to a business deal unlike the role it has played in the Ethiopian economy and environmental programs since the 1950s, and, furthermore, disclosed that it is very much involved in the project shaping it in a number of ways and "paying for the technical support and expertise that is locally inaccessible."[31]

At the national level, the Federal Environmental Protection Authority (EPA) acts as an autonomous government body for environmental management and protection of the country's resources. Among its responsibilities are: negotiations of international environmental agreements; reviewing and approve project development documents (PDD); ensuring an environmental and social impact assessment, if required, has been conducted; issuing a letter of approval to confirm that the proposed carbon project is in line with the country's sustainable development priorities. It also acts as Designated National Authority (DNA) for activities that fall within the ambit of the CDM under the Kyoto Protocol. In addition to EPA, the Ministry of Agriculture and Rural Development (MoARD) and the Bureau of Agriculture and Rural Development (BoARD), Humbo *Woreda* Agricultural, Rural Development and Forestry Development Coordination Office (ARDFCO), and the Humbo *Woreda* Government Cooperative Office have been involved in the project from its very inception in accordance with their mandates.[32]

At the basic level there are community institutions namely, Community Forest Protection and Development Cooperative Societies in the seven *kebele* administrations of Humbo district. During the introduction of the project in 2006, World Vision Ethiopia and the Cooperative office of Humbo *Woreda* assisted forest user households in establishing forestry cooperative societies in their respective *kebeles*. Thus, these seven community cooperative societies were formed for the purpose of this particular project, which was "aimed to rehabilitate a communal land area that, it is claimed, has neither formal nor informal institutions that can represent the community or manage the resources in question."[33] The seven cooperative societies have their registration certificates from the

sector office and now have a legal identity and also a user right over the communal land. These cooperatives were established with the following objectives:

- To undertake reforestation and conservation activities of the area designated as forest land within the locality;
- To mitigate the degradation of natural resources and climate change in the designated area and restore the natural balance by planting indigenous tree species;
- To ensure that the development, protection, and conservation of the reforested area is carried out under the full control and active involvement of the community living around the area;
- To improve the livelihood of the members of the society by promoting an investment and saving culture within the community;
- To encourage sustainable forest management and natural resource conservation;
- To ensure that members share the responsibilities and the benefits from the reforestation of the designated area;
- To increase forest cover in the community managed areas and ensure improved forest conditions;
- To use the income derived from the reforestation project to meet the various development needs of the community.[34]

All these were cooperatives were established with these objectives. Accordingly, these community institutions are ultimately responsible for undertaking forest development activities such as tree planting, thinning, pruning, weeding, guarding, etc. of the enclosed reforestation area, protecting and conserving the reforestation area by fencing and/or guarding the area, growing seedlings by establishing nurseries and planting them when necessary, and many other specific activities in line with the bylaws of their forestry cooperative societies.[35]

The Farmers' Forest Union was another institution in place to bring the seven cooperative societies under one umbrella organization. It was established to serve as the main link between forest cooperatives, local government, WVE, and gradually with the carbon buyers. Furthermore, the Farmer's Forest Union is expected to gradually assume all the responsibilities WVE has been playing since the introduction of the project though WVE will continue to play an advisory role throughout the project's sixty-year lifespan.[36] Accordingly, by the time this study was conducted (i.e. early 2014), WVE reportedly transferred its previous responsibilities to the Farmers' Forest Union and was playing an advisory role, providing technical support, and engaged in capacity building activities.

With regard to the participation of local communities in the project under consideration, WVE and WVA claim that the project is under implementation with the consensus and a high level participation of the concerned community members.[37] Furthermore, WVE, WVA, and the World Bank present the Humbo Project as the first successful large-scale forestry CDM project in Africa. In contrast to this, by investigating the power relations between the above international and local actors, Aynalem concluded that the implementation of the project under consideration is characterized by a clear power asymmetry (i.e. local actors are powerless) and pseudo-participation of the local communities:

> The local community was directly or indirectly forced to take part in the management of the communal land. Their interest and concerns are not given due consideration, even if they were recorded in various ways, such as through WVE's socio-economic assessment and consultation meetings. The reason for such disregard for the interest of local participant is because the conservation agenda and practices are already defined globally, so there appear to be no ways of accommodating community demands within the project framework without compromising the main carbon offset targets.[38]

Decisions taken far from the site of local rural resources can have major impacts on the associated rural livelihoods.[39] The costs incurred or the benefits enjoyed by a given community in turn significantly influences the way that community views and manages the natural resource under consideration. If the afforestation/ reforestation (A/R) project is perceived as being a barrier to local livelihoods, it may create an incentive for illegal harvesting and clearing of the forest and thereby threatening the sustainability of the forest and the permanence of carbon sequestration. Thus, investigating and disclosing the changes the project has so far brought about on community level assets would be of a great theoretical and practical significance in the midst of ongoing controversial claims over power relations between the local and global actors, the degree of local communities' participation in the project, and the genuine and primary goal of the project.

Research Methods

The study employed a qualitative research approach. It is a research approach that uses a range of methods to focus on the meanings and interpretation of social phenomena and social processes in the particular contexts in which they occur. It is concerned with exploring the subjective meanings through which people interpret the world, i.e., social events and phenomena are understood from the perspective of the actors themselves, avoiding the imposition of the researcher's own preconceptions and definitions.[40] Therefore, a qualitative approach is the ideal one for this study as the objective of the study is not aimed at generating numeric data for quantification and measurement. As indicated above, during the introduction of the project, one Forest Protection and Development Cooperative (FPDC) was established in each of the seven *kebele* administrations in order to manage a designated area of the forestland under consideration. For this study, out of the seven FDPCs, only three, namely BollaWanche, BossaWanche, and HobichaBadda FDPCs were considered. Out of the range of methods that fall in the category of qualitative research, key informant interviews, focus group discussions, non-participant observations and in-depth interviews were used to generate data in order to identify changes in community level assets due to the A/R project. Key informants and participants of FGDs of the study were recruited from members of executive committees and senior members of the selected FDPCs. The data collected in the aforementioned ways were analyzed by employing a thematic analysis method.

In order to disclose changes observed on community level livelihood assets, the researchers made use of the sustainable livelihood framework that has been forwarded by the British Department for International Development (DFID) as an analytical framework. The framework summarizes the main components of livelihoods and complex relationships among the components such as transforming structures and processes, vulnerability contexts, livelihood assets, livelihood strategies, and livelihood outcomes. This framework

serves not only to present the main factors that affect people's livelihoods, and typical relationships among them but also it can be used in assessing the contribution to livelihood sustainability made by existing activities.[41] Hence, the framework has been selected and used in the present study with the later view in mind, i.e., to assess the impact of Humbo Assisted Natural Regeneration Project on community level livelihood assets. Furthermore, DFID indicates the possibility of focusing on any part of the framework, while keeping the wider picture in mind. Accordingly, in this study's focus was on community level livelihood assets while keeping the rest of the framework's components in mind. Thus, the researchers adopted DFID's sustainable livelihood (SL) approach as an analytical tool for this study, for the approach stresses that poverty-focused development activity should be people-centered, responsive and participatory, multi-level, conducted in partnership, sustainable, and dynamic; and the approach coincides with the approach the initators of the project under study claim to have used.

Results and Discussion

A pentagon of livelihood assets that can be utilized for achieving the outcomes of livelihood strategies is central to the DFID's Sustainable Livelihood Framework. They refer to the resources upon which people draw in order to carry out their livelihood activities. The framework identifies five types of capital (human, social, financial, physical, and natural capital) upon which livelihoods are built.[42] Accordingly, this sub section of the paper analyzes and discusses the impact of forest based carbon sequestration initiative on each type of the livelihood assets of the stakeholder local communities.

Impacts on Community Level Human Capital

Human capital represents skills, knowledge, the ability and potential to labor, and good health that in combination with other assets enable people to engage in different livelihood activities and achieve their livelihood objectives. It is enhanced with good health services and investments in education and training.[43]

In the present study, the provision of a series of new training by the initiative was its well-recognized contribution to the human capital of the stakeholder local communities. Key informants from the selected local communities indicated that the project created a number of training opportunities to local communities on issues related to environmental protection, forest management, land and water conservation, financial management, carbon monitoring, credit and saving management, agroforestry, and wide range of income generating activities. And the informants attributed the enhanced awareness of local communities about the importance of forest resources to the training given by the project. In this regard, a key informant from BossaWanche indicated that:

> Training changed initial unfavorable attitude of some of our community members towards the conservation of the forest. In fact, not only the knowledge gained from training, but also the per diem allowances we received during training sessions were meaningful to convince us. Most importantly, the training equipped our community members with basic skills on how to restore the forest and manage it. Now they are the members of this community who run our FDPC.

A key informant from HobichaBadda also described the importance of training provided by the project as "access to training reduced initial resistances to protection of the forest land by

raising community members' awareness about benefits to be enjoyed and made us have a common vision to manage our common property and benefits from it."

Capacity building was, therefore, one of the important outcomes of various training as stated by key informants. In this regard the key informants at each site indicated that the training provided, particularly on forest management, financial management, carbon monitoring, and credit and saving management, has built the capacity of community members to manage the forest and associated benefits of their respective cooperative with some technical assistance and human power assistance from World Vision Ethiopia and the cooperative office of the *Wereda.* From this, it is evident that the project has built the institutional capacity of the local community, which in turn positively contributes to the sustainability of forest management. This finding agrees with Corbera where it was indicated that a small carbon forestry project in the state of Chiapas, Mexico contributed to strengthened local capacities and leadership and to reinforcing community based natural resource management across the region.[44]

Transfer of various skills was mentioned as another important contribution of the project to human capital of the local communities. Key informants indicated that skills transferred through training in various income generating activities like tailoring, bee keeping, poultry, cattle fattening, and other activities have created a conducive environment for learning and transfer of skills among community members. Participants of focus group discussions also recognized the delivery of training in various income-generating activities. However, only bee keeping has been identified by participants of focus group discussions as an income-generating activity that has been better adopted by some farmers. In HobichaBadda, participants of focus group discussions explicitly disclosed the difficulty of practicing cattle fattening due to a severe shortage of fodder. Similarly, in all of the study sites participants mentioned the difficulty of raising poultry due to rampant attacks from wild animals that have been returned the area due to forest restoration. From this it can be argued that some skill training has not thoroughly anticipated the feasibility of and potential hurdles for application in the communities, which in turn limited diffusion among members of the cooperatives.

Impact on Community Level Social Capital

Social capital represents the social resources upon which people draw in pursuit of their livelihood objectives. In this regard, vertical as well as horizontal social networks and interconnections, memberships in formal and informal groups, relationships of trust, reciprocity and exchange, and access to wider institutions of society are of paramount importance. They play significant roles in enabling people to work together, extending people's access to and influence over other institutions, reducing transaction costs, and reinforcing adherence to mutually agreed upon or commonly accepted rules, norms, and sanctions.[45]

The emergence of institutions for governing access to the forest and securing of property rights over the forest were worth mentioning impacts of the project on the social capital of the local communities as described by key informants. A key informant from BossaWanche stated:

> In the time of Emperor Hailesilasie [1930-1974], the area (i.e. the area currently used by carbon forestry project) was covered by dense forest and belonged to individual landlords. At the time, the inhabitants of the area access forest products based on the periodic permissions of the owner of the

> forest. Starting from the beginning of Dergue regime [1974-1991] until the introduction of the afforestation and reforestation project in 2006, the area remained open to public which gradually resulted in unmerciful destruction of the forest and killing and chasing of wild animals that used to live in it.

The enclosure of the forest accompanied the institutionalization of rules and regulations for utilizing the forest products and benefits associated with its protection. This can be further cognized from the account of a key informant from BollaWanche who said:

> Unlike the open access condition that long existed before the establishment of our cooperative, nowadays there are specific rules that govern access to the forest by members of our cooperative. On top of that, since we have legal certificate over our forest, non-members of our cooperative cannot exploit it as before.

Initially, the impact of the project was divisive in the case of HobichaBadda. In-depth interviews and focus group discussion revealed the severe extent to which the community was divided during the conception and implementation of forest area enclosure. The participants attributed the then resistance of some community members to the perceived greater opportunity cost of the forest area enclosure to a majority of the community members. In this regard, participants disclosed the hitherto unresolved issue of restriction of grazing in the area. However, the participants indicated that the apparent environmental benefits of forest protection and the expected financial benefit of the project have enabled them to work together to protect the forest. Furthermore, as one informant from HobichaBadda stated:

> Though the protection of the forest prevented us from taking our livestock for grazing to the area, it made the forest our property, which had previously been exploited by people from other *kebeles* of Humbo *Wereda* and even SodoZuriya *Wereda*. Though nobody is allowed to cut trees from this forest, every member of our cooperative is sure that the carbon revenue from our forest belongs to us.

Hence, it is evident from the foregoing discussion that the formation of cooperatives with specific rules for access to the forest, for participation in its protection, and for benefit sharing secured property rights over a portion of the forest, the current environmental benefits of the forest and expectation of future financial benefit have boosted the cooperation among cooperative members. Furthermore, the enforceability of the bylaws of cooperative, and the legal recognition of their property rights were found to have contributed to their mutual trust and confidence in their effort to develop and protect the forest. However, the existence of disincentives for forest protection, such as exclusion of grazing and restriction on collection of forest products is worth noting.

The organization of forest users into cooperatives has been reported to has facilitated community access to other formal institutions. In this regard the key informants from BollaWanche and BossaWanche specifically indicated that their respective cooperative is working in collaboration with the Water Supply Desk of the Zone to increase the number of water points initially planned by the latter. A key informant from BossaWanche commented:

> In addition to giving us a user right over the portion of the forest and financial return associated with its protection, the formation of forest development and protection cooperative has enabled us to easily

> communicate with water supply desk of the zone. For instance, our forest protection cooperative has arrived at consensus with water supply desk of the zone to support the establishment of four water points.

This statement shows that the organization of forest users into cooperatives has boosted the power of local communities to access and influence other formal institutions for the betterment of their respective community.

Although the project managed to assist the development of new institutions for forest management in the community and enabled members to work together more than they used to, it is not exempt from notable negative latent impacts on other long existing local institutions. One of the institutions the community members almost stopped practicing was *Kottaa* (joint ownership) and *UloKottaa* (share breeding) of livestock. Participants of focus group discussions in all of the study sites explicitly indicated that *Kottaa* and *UloKottaa* had been the main mechanism of owning livestock among poor community members. However, the participants indicated that the enclosure of the forestland marked the collapse of these arrangements, for the poor do not have any marginal land for grazing and fodder extraction. Consequently, the relatively wealthy people would not give livestock to poor people on the basis of the aforementioned arrangements, since the latter could not access sufficient fodder for the livestock. This shows that the protection of the forestland has detrimentally affected the long existed institutions for the flow of wealth among social classes of the community, i.e. the flow of wealth from relatively wealthy to poorer people through joint ownership and share breeding of livestock.

Another local institution identified as having been adversely affected due to the protection of the forest was that the arrangements for *BooraaGatuwa* (farm oxen exchange). There was a strong consensus among the participants of focus group discussion in HobichaBadda that farm oxen exchange among farmers has been weakened due to massive cattle selling induced by fodder scarcity and restriction of grazing immediately after enclosure of forest area for the purpose of the carbon forestry project. The participants indicated that the few people who have maintained their draught oxen are practicing farm oxen exchange. This shows that the detrimental impact that the project caused on one livelihood activity, i.e. livestock rearing, has ruined several institutions, which in turn detrimentally affected another livelihood activity, i.e. crop production. Therefore, it is plausible to conclude from the above evidence that the project has inadvertently weakened informal social support arrangements.

Impact on Community Level Physical Capital

The impact of the carbon forestry project on physical capital was more or less identical across the concerned communities. In all of the study sites, the carbon revenue received by each cooperative was primarily used for the installation of cereal milling machines in each FDPC. A key informant from BollaWanche stated: "priority was given to planting the cereal milling machine in order to ease the burden of women and children travelling longer distance carrying grains in search of a mill. Accordingly, a cereal milling machine was planted in a place central to member households of the cooperative."

Although glad for having a cereal milling machine as property of their respective cooperative, there was a strong consensus among focus group discussions participants of BollaWanche that their priority need was not a cereal milling machine which they occasionally use but rather potable water which consumes two to four hours labor of women and children of the area per day. They also questioned the priority given to community level

physical capital in general and the installation of cereal milling machines in particular. They indicated that it would have been better if the carbon revenue had been distributed among members in order to support change in their livelihoods. As the private flourmills at HobichaBadda town are easily accessible to members of the cooperative, the participants agreed that the installation of an additional flourmill was not a priority need of their community. Instead, the road connecting HobichaBadda to *Wereda* and Zonal town was identified by the participants as a pressing issue preventing them from using modern transport services.

Therefore, the above results of focus group discussions from both HobichaBadda and BollaWanche show that the endeavor made by the project to contribute to the physical capital of the communities was not in line with the priority needs of the communities. In turn, the observed incongruence between the priority needs of communities and the physical capital built in their communities show that the effort was not participatory. Furthermore, the similarity of physical capital given priority across cooperatives indicates that the socio-economic differences among communities have been underestimated.

Road constructed across the forest by members' participation was mentioned as another physical capital that emerged in association with forest protection project. As the key informants indicated, the road was constructed with the objective of controlling accidental fires, accelerating pruning processes, and easing fodder and firewood collection for the inhabitants. However, focus group discussion participants at all sites indicated that the roads were constructed primarily for the purpose of forest protection rather than meeting the immediate livelihood needs of their community. There was consensus among participants particularly at HobichaBadda that they use the roads only occasionally where fodder and firewood collection is allowed. In this case, though the road makes little direct contribution to the immediate needs of the concerned communities, it has a big potential role in preventing or mitigating forest fires, which can nullify the sacrifices they hitherto made for the sake of forest protection and it's hoped for benefits.

Key informants from BollaWanche and BossaWanche reported that the construction of grain stores was another contribution of the project to the physical capital of the communities. Their main purpose was keeping cereals purchased during harvest time to sell back to members and non-members with some discount in food deficit seasons. There was consensus among participants of focus group discussions that some cooperative members are able to get grain at nearby with 30-70 cents (Ethiopian unit of currency) discount per kilogram of a given grain. From this it is possible to argue that the construction of grain stores has contributed to the availability of food at community level though access to the available food by households depends on their wealth conditions. Furthermore, construction of grain stores next to cereal milling machines reduces the burden and saves the time of women and children.

Impacts on Community Level Financial Capital

The carbon revenue resulting from protection of the forest has strengthened the financial capital of each forest development and protection cooperative. As key informants from each FDPC mentioned, the amount of carbon revenue is increasing from year to year. For instance, HobichaBadda FDPC has received 82,844.80 ETB (Ethiopian Birr) in 2009, 128,495.70 ETB in 2010, 172,159.60 ETB in 2011 and 415,974 ETB in 2012.[46] Similarly, BossaWanche and BollaWanche cooperatives have received carbon revenue four times proportionately upon the amount of emissions their respective portions of the forest have

reduced. Though in some cases the revenue utilization was not in line with the priority needs of the concerned communities as indicated in the foregoing section, some of it was utilized to build some physical capital, e.g. flour mills, grain stores, as key informants indicated.

The forest development and protection cooperatives have started receiving carbon revenue since 2009, yet none of them as of 2014 had started loan services. Though cash generated through carbon stock sales is deposited in the bank in the name of each cooperative, participants of FGD at each study site explicitly stated that individual members do not have access to loan services from their respective cooperatives. There was a consensus among participants of focus group discussions at each study site that the most common mechanisms for getting loans in the communities are based on social networks, e.g. friends and relatives, and informal social arrangements for loan such as local *Dichchaa* (money lenders).

Interviews with key informants also revealed that providing loan services is only a long-term plan of their respective cooperatives. In this regard, the lack of an institutional framework for providing loan services was mentioned as one of the obstacles for providing the loan service. Hence, the cooperatives' failure to provide loan services to their members prevents the endeavor from having similar favorable impacts on financial capital at the household level. Since financial capital is the main asset that poor people lack most, the member households could have used it for investing in the other household capital if they had access to it.[47]

Impact on Community Level Natural (Environmental) Capital

Key informants and participants of FGD identified the environmental impact of the project as the most noteworthy result. Those from BossaWanche mentioned restoration of degraded forest areas and the resultant improvement in local environmental resources, mainly improvement in rainfall conditions, improvement in soil moisture retention capacity, reduction temperature, reduction of soil erosion, and restoration of wild animals as key environmental benefits resulting from the project. While similar environmental benefits were identified by a key informant from BollaWanche, additional environmental benefits such as restoration of more than three water springs and reduction in wind erosion were identified by a key informant from HobichaBadda. A key informant from BossaWanche observed improvements in rainfall conditions:

> The volume and time of rainfall in our vicinity is gradually restoring back to the condition that existed before 1984 [the time when the area was covered by dense forest]. In 2012 we received first autumn (*Belg*) rain in mid of April. In 2013 we received it around March 11 and in this year (2014) even earlier. Furthermore, we get sporadic rainfall even in January and February, which was uncommon in the last thirty years. This is due to the park.

Thus, the evidence shows the existence of perceived improvement in rainfall conditions due to the restoration of vegetation in the area. However, these perceived changes in the microclimatic conditions of the areas require further comprehensive studies in order to establish a causal relationship.

Participants of focus group discussions in each of the study sites strongly acknowledged the contribution of the project to environmental assets of their respective communities. There was strong consensus among participants in each study site that the observed significant positive changes in the environmental assets of their respective community, e.g.

increased vegetation cover, reduction in temperature, timely and adequate rainfall, increased moisture retention particularly in land adjacent to the forest, reduction of wind and water erosion, and so on were due to the rehabilitation of the forest. The improvements in microclimatic conditions of the area have in turn contributed to agricultural practices in the area though they alone are not sufficient conditions. For instance, in each site of the study, there was good deal of consensus among participants that the improvements in local climate has allowed them to cultivate a variety of crops at least twice a year though the small agricultural land that characterizes the area, but damage to crops caused by wild animals is a significant limitation on exploiting the opportunity.

There were opposing views concerning the restoration of wild animals to the protected forest. Key informants at each study site considered wild animals as potential sources of financial benefit to their respective cooperatives. They indicated the possibility of ecotourism in the area in the near future. Their positive view towards the restored wildlife was partly due to their repeated trips to various parks. They had a number of opportunities to do so as they were members of forest management committees as all of them indicated. Different views were expressed by participants of FGDs and individuals with whom in-depth interview have been conducted. There was a strong consensus among participants of focus group discussion at each study site that the restoration of wild animals is a major threat to livestock and crops of farmers neighboring on the forests. Though households near the forest area are able to produce a variety of crops like enset (false banana, a staple and drought resistant crop for both human consumption and animal feed), sweet potato, yam, potato, cassava, and so on, the participants indicated that it is a vain effort for their crops are severely damaged by wild animals, mainly pigs, monkeys, hedgehogs, and wildebeest. Furthermore, there is a difficulty in raising livestock around the forest due to frequent attacks from wildlife like hyenas, monkeys, leopards, and some bird species. Consequently, participants of focus group discussion, particularly at BossaWanche, indicated that unless an appropriate measure is taken to resolve the human-wildlife conflict, it is hardly possible for neighboring households to sustain their life there.

The issues raised in the foregoing discussion indicate the differential impact of the rehabilitation of the forest. Households at near distance from the protected forest became the main victims than beneficiaries of the endeavor. This is evident from the detrimental impacts of initial area enclosure and the later increasing attack from wild animals on agricultural produce and livestock of households closer to the forest. Here, a resource considered by some as a source of potential financial benefit has become an actual threat to the life of households in close proximity of the forest.

Restoration of grasses to the forest floor and hillsides was another important issue identified by the key informants as the contribution of the forest protection to the improvement of environmental capital of their respective community. Key informants from HobichaBadda stated: “every member of the cooperative is allowed to harvest grasses from the forest at a low price. Periodically, based on the availability of grass in the forest, we issue coupons for members thereby they can harvest grass for allotted weeks/months. They pay 4-6 Ethiopian Birr to get the coupon.” In the same vein, focus group discussion participants from all of the study sites acknowledged the restoration of grass to the forest floor and hillsides. They recognized that initially the availability of grass has increased around and in the forest with the increase in forest cover and exclusion of livestock. However, they indicated, as trees grew in height, the availability of grass in forest floor has gradually

declined. Consequently, participants indicated that the fodder they get from the protected forest lasts for only a few months.

To sum up, the establishment of FDPCs, building institutional capacity of FDPCs, helping the FDPCs secure property rights over the forest land, enabling FDPCs to secure carbon revenue, and contributing to the improvement of microclimatic conditions of the area are recognized community level positive impacts of the project. However, the outlawing of animal grazing in the project area and the resultant fodder scarcity and lack of grazing land has contributed to the weakening of the long established social arrangements for joint ownership and share breeding of livestock and draught oxen exchange.

Conclusion

The forest carbon project under consideration had both positive and negative implications for community level assets of the stakeholder communities. A series of training sessions provided on several issues including income generating activities contributed to the human capital of the concerned communities. However, training, especially on some income-generating activities, has not fully anticipated the feasibility of and potential hurdles for their application in the communities. With regard to social capital of the concerned communities, the project managed to enhance the capacity of the communities to work together in order to sustainably manage their respective portion of forest. However, it is plausible to conclude from the evidences that the project has inadvertently weakened some informal social support arrangements. In this regard, important social institutions such as arrangements for joint ownership and share breeding of livestock, arrangements for exchange of draught oxen, and other informal social support systems were unwittingly weakened due to the project activities. The environmental capital of the concerned communities was enhanced in a number of ways. But, it was accompanied by the opportunity cost of losing fuel wood, fodder and grazing land, and more disturbingly the security of crops and livestock, which in turn may act as disincentives for the affected communities in the course of the sustainable management of the restored forest. Though the physical and financial capital of the stakeholder communities were enhanced due to the project, the way they were enhanced was not in line with the priority needs of the concerned communities. In this regard, it is appropriate to conclude that the project initiators imposed plans for enhancement of physical assets in particular and for the utilization of financial capital. This was also evident from the similarities of physical assets built across communities and plans for the utilization of financial capital. Therefore, letting the community decide over what to do with the carbon revenue in general and which community level assets to build in particular are likely to meet the priority needs of the concerned communities and thereby enhance the sense of ownership of the forest among the members of the communities. Moreover, social impact assessments need to be exhaustively conducted during the replication of similar projects in order to anticipate the latent negative impacts and thereby to save the long existed informal social institutions.

Notes

1 See Alemayehu 2010; Yemiru et al. 2010; and Aynalem 2012.
2 See Kasahun 2008; Alemayehu 2010; and Yemiru et al. 2010.
3 For example, Byron and Arnold 1997; Gibson et al. 2000; Asquith et al. 2002; Homewood 2005; Winkler et al. 2005; Timko et al. 2010; Winkler et al. 2011; World Bank's Carbon Finance Unit 2011; Yasuoka et al. 2012; FAO 2013.
4 CIFOR 2005. This is the Center for International Forestry Research.
5 Smith and Scherr 2002; Maraseni et al. 2005.
6 Streck et al. 2008; World Bank 2008.
7 Maraseni et al. 2005; Streck et al. 2008; UNFCCC 2010.
8 UN 1998.
9 World Bank 2008.
10 Maraseni et al. 2005; Streck et al. 2008; UNFCCC 2010.
11 World Vision Ethiopia 2006; Brown et al. 2010.
12 World Vision Australia 2011, p. 3.
13 Ibid.,p. 4.
14 *Wereda* is an administrative division which is equivalent to a district.
15 *Kebele* are lower level administrative units (division) or farmers or peasant associations in rural Ethiopia.
16 Wolaita Zone Finance and Economic Development Department 2013.
17 Bisrat 2011.
18 Wolaita Zone Finance and Economic Development Department 2013.
19 World Vision Ethiopia 2006; Elias 2006.
20 Bisrat 2011; Wolaita Zone Finance and Economic Development Department 2013.
21 Aynalem 2012; World Vision Australia 2011.
22 Elias 2006.
23 World Vision Australia 2011.
24 Desalegn 2007; Aynalem 2012.
25 Aynalem 2012.
26 World Vision Australia 2011, p. 4.
27 Aynalem 2012.
28 Biryahwaho et al 2012, p. 3.
29 Ibid.
30 Ibid., p. 3.
31 Aynalem 2012, p. 56.
32 Ibid.; Biryahwaho et al 2012.
33 Aynalem 2012, p. 59.
34 Ibid., pp. 62-63.
35 Biryahwaho et al. 2012.
36 Ibid.
37 World Vision Australia 2011.
38 Aynalem 2012, pp. 98-99.
39 Dev et al. 2003; Homewood 2005.
40 Jupp 2006.
41 DFID 1999.
42 DFID 1999; Neefjes 2000.
43 DFID 1999; Ellis 2000.

44 Corbera 2005.
45 DFID 1999.
46 One Birr was equal to 0.0455 USD as of October 2016.
47 Ellis 2000.

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