

Participatory management of natural community forests: the case of El Ain natural forest management project, North Kordofan, Sudan

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Abstract

Participatory Forest Management (PFM) has been practiced in El Ain forest through area based projects by involving the local communities. Different stakeholders, government and non-governmental organizations have worked together in El Ain natural forest in the north Kordofan, Sudan. The objective of the study was to assess the El Ain Natural Forest Management Project (ENAFMP) and identify factors that affect the PFM processes.

The study involved 127 respondents in seven villages of El Ain area. The data were collected using structured questionnaire, Focus Group Discussion, Participatory Level Appraisal (PLA), assessment of natural regeneration as well as secondary sources of information.

The findings of the study showed that the factors causing forest degradation at the study area were illegal felling of trees, agricultural expansion, fire and grazing. Density of natural regeneration of the dominant tree species (*Acacia mellifera*) was higher inside the community forests where implementation of the participatory forest management plans were practiced. Results of the study revealed that natural forest resources management practices were very important in improving the livelihood condition of the communities in terms of many benefits obtained from the village forests in the form of construction wood, fuel-wood, fruits, fodder,

shelter and recreation. 51% percent of respondents stated that restocking of tree cover is possible through natural regeneration in good rainy seasons where protection by the communities was practiced. Benefit sharing, however, was found to be unequal between rich and poor people. The study has also indentified that traditional leadership, local representatives and nongovernmental organizations could positively affect the management plans of community forests at village levels. The capacity building activities of the PFM through various trainings has improved the managerial, technical and organizational knowledge of the communities involved. Results of the study showed that women and pastoralists were totally excluded from participation in community forests management. This situation has created conflicts between resident farmers and pastoralists in the process of practicing PFM. However, through repeated consultative meetings, the conditions have been improved towards better understanding and participation in resource management and benefit sharing aspects.

Keywords: participatory management, community forest, benefits, gender, traditional leadership, pastoralists

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1. Introduction

Sudan, Africa's largest country has been splitted in two on July 9th 2011, formalizing the independence of South Sudan. In the year 2011, the Sudan Central Bureau of Statistics estimated the population of Sudan to be about 39 million, growing at the rate of 2.7%. More than 30 million people live in rural areas of Sudan (USAID, 2012). Over 80% of Sudan's employment is generated from the agricultural sub-sector of the economy. The majorities of the population are farmers and pastoralists living on subsistence farming and livestock herding in a nomadic way of life, respectively. Sudan is located between latitudes 8° 22'N and longitudes 22° 38'E, in the northeastern part of Africa. The area of Sudan is 1,882,000 square kilometers (USAID, 2012).

The vast longitudinal extension gives the Sudan unique ecological characters, from dry sandy desert in the northern central parts to high rainfall areas in the south. The country is also covered with desert shrubs and stunted bushes. There are thorny low trees of low rainfall savannah in the central belt to broad leaf high rainfall savannah in the southern part (Sudanet, 2013).

Forests play an important role in the welfare of the Sudanese population. The most important forest types in the Sudan include *Acacia nilotica*, *Acacia seyal*, *Acacia senegal*, *Balanites aegyptiaca*, *Acacia mellifera* and special forest types like Dom (*Hyphaene thebaica*), *Tamarix aphylla*, montane forests (Harrison and Jackson, 1958; Geller, et. al., 2009). The Forests National Corporation (FNC) estimated that after separation of South Sudan, forests cover about 11.60% of the total area, while agricultural land, range and water constitute 13.70%, 26.40%, and 0.17%, respectively. The average annual increment of the growing stock volume was estimated to be 1.340 million cubic meters of which 5% was removed per hectare and year. The majority of the products were used for firewood and charcoal, while 9% was used for high quality timber processing (USAID, 2012).

The contribution of the agricultural sector to the GDP increased from 30.8% in 2009 to 31.3% in 2010, due to the increase in the area cultivated. Traditional farming accounts for 60-70% of the agricultural output and is basically subsistence production based on shifting cultivation and livestock rearing. The major crops of the traditional agricultural sector are sesame, millet, sorghum and groundnuts, as well as gum arabic from *Acacia senegal* trees. The extreme rainfall variability has made traditional farmers highly vulnerable to drought, while the extensive farming and slash and burn practices have posed serious environmental threats (USAID, 2012; Sudanet, 2013).

The government of the Sudan has passed legislations to devolve the responsibility of management of natural resources to the local communities (Elsiddig et al., 2001, Kobbail, 2011). In spite of the vital role of natural resources play in the livelihood of the communities, there is still some resistance of transferring full management of the forest resources to the communities.

Some policy makers were skeptical to whether these resources can be properly managed by community-based organizations, and it is still believed that privatization and/or state control of natural resources are the only means of preventing the degradation of resources that are customarily held in common.

There are no simple models for the management of common natural resources in highly diverse and of dynamic environment, which is true also for the study area. A participatory resources management process requires some modifications to suit the specific circumstances of each area. There is a growing belief of empirical evidence to suggest that local people are more likely capable of managing natural resources than the state, in a responsible way, because their livelihood depends on such resources, and they have been practicing managing them for many years in spite of the government control (FAO, 2005; Trench, 1999). The common natural resources management systems have worked well and helped to assure

access to natural resources including the landless and other marginalized groups. The communities usually address important social functions such as maintaining the process of conflict resolution and can also assure conservation of natural resources and biodiversity (Hesse and Trench, 2000).

The management of natural forests in El Ain area should be implemented in a way that is environmentally sound, socially inclusive (to different stakeholders and land users), institutionally suitable and economically feasible manner.

The main objective of the study was to analyze the current situation of the community forests in the semi-arid area of El Ain Natural Forest Management Project and to explore means of improving the management of natural forests for the benefit of the community living in and around the forest and the country at large.

2. Materials and methods

2.1 Study site description

The site selected for the study was the El Ain Natural Forest Management Project (ENFMP) area, which is located in North Kordofan State Western Sudan. The aim of the ENFM Project was to assist the natural forest to be more productive and promote sustainable management of the existing natural forest resources (SOS, 1997). The ENFMP is found 32 km south of El Obied town (capital of North Kordofan State) at latitude 13° 11' north and longitude 30° 12' east.

The soil of the study area is classified into three types: sandy, sandy clay and alluvial plain soils (Kobbail, 2005). The stabilized sand soil is poor in mineral and organic matter. Sandy clay soil includes heavy non cracking soils that are impermeable to water. Alluvial flood soils are found in and around seasonal rivers. Air humidity is lowest and temperatures are highest

during March and April months. The average annual rainfall of the study area is between 250-450 mm.

The forest in the study area is comprised of *Acacia nilotica* – *Maerua crassifolia* desert scrub, semi-desert grassland, *Acacia millifera* – *commiphora* desert scrub, low rainfall savanna and other species found in depressions. The dominant grasses are *Aristida*, *Pallida* species, *Eragrostis tremula* and *Cenchrus bifloruas* (Eltahir, & Mahmoud, 2009).

The migration patterns found in the study area were dependent on permanency and security of water availability as well as the time needed for water fetching. This has led to the concentration of settlements in the neighboring water points. Nomads' movement is directed northwards during the rainy season (June- August), and southwards between October-December after the end of the rainy season (Egeimi *et. al*, 2003).

There are three types of land use patterns in the study area namely; 1. crop production mainly groundnuts, millet, sorghum and sesame. 2. animal production mainly dealing with goats, sheep and cattle and 3. forest production with emphasis on production of gum arabic from *Acacia senegal*.

2.2 Methodology

A multi-stage sampling procedure was applied in different stages for selection of villages and respondents. Seven villages were selected from the ENFMP area. The selected villages represented different geographical locations within the project area. Cluster sampling was used to select villages based on the criteria of community forest ownership and village's location. The selected villages were Jagrur, Elgifil, Elqoz, Warshal Hafir, Warshal Mudakha, Badoga and Abunana. The villagers were categorized into different strata based on their wealth status in the community. Wealth ranking was carried out by the local village leaders. Three categories of wealth groups were identified namely: rich, intermediate and poor (Table 1). From the

categories provided, the proportions taken were 1:2:3 from rich, intermediate and poor respectively. Systematic sampling was applied to select respondents from the list prepared by the respective village leader. The total number of households selected for the study ranged from a minimum 49 households in Badoga to a maximum 80 households in Elgifil with an overall average of 60 households. A total number of 127 respondents were selected. 84 persons for the questionnaire administration, 40 persons for the Participatory Learning and Action (PLA) and 3 persons including the project senior staff for the Focus Group Discussion.

Fifty percent (20 persons) of the respondents selected for the PLA, focus group discussion and one third (28 persons) of the total number (84) selected for questionnaire execution were women.

The respondents were subdivided according to position and status in the community in groups:

i. villagers from ENFMP sites, ii. local leaders, iii committee members of the village community forest and iv. ENFMP staff.

Table 1. Number of wealth categories identified by the chiefs (sheikhs) of the respective villages

Villages	Number of Rich households.	Number of Intermediate households	Number of Poor households	Total Number /Village
Elgifil	9	30	41	80
Jagrur	8	18	31	57
Elgoz	5	20	35	60
Abunana	7	22	30	59
War.h.	2	19	40	61
Badoga	3	17	29	49
War. M.	4	22	29	55
Total/sample	38	148	235	421

Both primary and secondary data were collected using closed structured questionnaire, focus group discussion, thematic PLA/PRA. The focus group discussions were held in Elgifil and Jagrur villages which were selected randomly. Information on critical sensitive issues like income and wealth were collected from key informants (village leaders). The random selection of line transect method (10 m wide and 50 m length line) was used for assessment of natural regeneration in three villages, which represented the eastern, western and southern parts of the project area. The villages selected to investigate the natural regeneration were Badoga, Abunana and Elgifil. The survey was conducted with the involvement of four villagers, helped to count the natural regeneration of *Acacia mellifera* and *Grewia tenax* species.

Secondary data were collected from reports and records of El Ain Natural Forest Management Project as well as from other institutions. Data obtained from the Focus Group Discussions were summarized and tabulated. Data for assessing natural regeneration were analyzed by presenting the number of tree regeneration per hectare.

3. Results and discussion

3.1 Factors causing natural resources depletion

Respondents in all selected villages reported that rainfall deficiency and expansion of agriculture were the major factors affecting forest resources conservation. Grazing does not have much impact on natural regeneration if the seedlings were greater than one meter high. This view was confirmed by field observations that a considerable amount of livestock droppings (fresh and old) were observed inside the village forests and even more than outside the forests.

The semi-arid areas are known as non-equilibrium environments where annual rainfall and other external events (drought, diseases) are the most important factors that determine the production potential of resources such as vegetation, annual grasses and livestock (Behnke et al, 1993; Trench, 1999). The livestock number has been kept relatively low by impact of drought and diseases as well as by the continuous movement of herders between pastures as they rarely stay long enough in one particular area to cause a significant negative impact. In addition, the environmental conditions of the study area are more resilient and bare pastures were quickly regenerated when the rainfall returns (Clawson, 1975; Salih, 1994; Trench, 1999). With regard to villager's experience and knowledge about the establishment and management of the community forests as well as their registration process, 90% of the respondents mentioned that protection against tree cutting and provision of basic goods and services were the main targets at El Ain project. Nevertheless, the sale of forest products for income generation was not a first priority rank for the local people in the area.

3.2 Natural regeneration and rehabilitation efforts

Natural regeneration is a key indicator for sustainable forest exploitation in the semi-arid woodlands with a good stock of well growing mature trees.

It was found that the density of *Acacia mellifera* regeneration per hectare inside the community forests of all villages was on average of 114 trees, with minimum number of 100 trees in Abunana village and maximum number of 128 in Badoga village. For *Grewia tenax*, the overall average was found to be 24 trees per hectare. The minimum and maximum number of trees per hectare in Elgiful village was found to be 19 and 29, respectively. In the woodland outside the community forests, the average was found as 58 tree/ha for *Acacia mellifera* and 15 tree/ha for *Grewia tenax*. According to villagers, frequent fires outside community forests have resulted in lower regeneration rates.

Fifty one percent of respondents indicated that natural regeneration is the most suitable method for restocking of trees in rainy seasons, while 49% supported the idea of tree planting and restocking of tree cover using water micro-catchments in clay soils.

Clay soils have an extremely low rate of infiltration and high water run-off even if the rain is in the form of light showers. The project has introduced the water micro-catchments technique to enable maximum harvest of water available.

Ballal (2002) pointed out that the micro-catchments are designed to harvest and store run-off water, so giving time for infiltration of water down into the soil where it is made available to plant trees. This method of water management is efficient in the improvement of tree survival and vegetation cover. The construction of the micro-catchments was triangular (one side being 3 m at the base and 1.5 m each of the other two sides) and needs hard work and longer time. One person usually prepares only one unit per day.

3.3 Prioritization of Economic Sectors

Next to agriculture and livestock production, forest resources are important to local people in livelihood improvements. Consequently, it is very imperative to consider local communities as a key group in the management of forests in order to achieve resource sustainability. Natural resource products are primarily collected and produced by the poor families and part of the products are bought by the rich families in the village. Apparently, rich families rather pay others to produce for them (Kerkhof & Siddiq, 1998). The poor depended directly on the natural forest products.

Management of natural resources on sustainable basis could serve the poor and marginalized groups. In order to represent the interests of all stakeholders, it is therefore necessary to

involve such poor categories when formulating community forest policy and resources management plans.

3.4 Costs and benefit categories of the community forests management

Results of the Focus Group Discussion with the project senior staff on costs and benefits categories of the management plan of the community forests are summarized in Table 2.

Table 2. Costs and benefits of the community forests management plan

Costs	Benefits
1- Direct cost of local inventory, panoramic photography, protection guarding, registration fees, recording filing, monitoring and evaluation (all in terms of money).	1- Better management of natural forest promotes environmental conservation.
2- Costs of the activities in terms of efforts, time, and training.	2- Sustainable management promotes productivity of the natural forests.
3- Long time interval between tree planting and harvest.	3- Meet the demand of the community in natural resources.
	4- Capacity building of the community, in terms of technical skills.
	5- Raising awareness and organizational capacity building.
	6- Recreation value

Interviewed respondents mentioned that the benefit from the community forests were in form of construction wood, fuel wood, fruits, fodder, protection (shelterbelt), recreation and environmental conservation. Some of these gains such as recreation, soil conservation, and watershed values are not sold in the market place-outdoor, as they are not quantified in money terms. People normally agree with outputs that have values in terms of money. Kerkhof and Siddiq (1998) pointed out that there is often a long time interval between establishing new forest stands and harvesting.

3.5 Benefit sharing

The distribution of construction materials was considered as one of benefit sharing mechanisms. Fodder for animal feed was particularly distributed according to need and upon request. Rich people obtained hay and construction wood in large amounts while poor people got just what they needed (Table 3). That means that there was no question about equity in division of benefits.

Table 3. Benefit sharing of forest products among the wealth groups in the different villages

Village	Wood for rich (pole)	Wood for poor (pole)	Hay for rich (head load)	Hay for poor (head load)
Elgifil	39	11	200	65
Jagrur	23	8	136	47
Abunana	12	8	125	51
Badoga	15	5	116	43
Warshal H	27	7	128	32
Warshal M	29	6	119	38
El Goz	32	13	159	58
Total	178	58	973	334

Nevertheless, this traditional situation reflected a high spirit of the group work in communal land and mutual understanding between different members of the society. It could be reasonable, if the harvest would have been equally distributed and rich people who need more of the harvest could buy from poor people. This would enable to develop an economically feasible management plan. On the other hand, pastoralists who are also among the key users of the natural resources in the study area were totally excluded of any rights, although they

were recognized to have been using the resources long time ago even before the establishment of the community forests. Therefore, equity in division of benefits should have a bearing in the management of natural resources, if these pastoralists were included in the process.

3.6 Institutional aspects of community forests

3.6.1 Traditional leadership and village-based institutions

Traditional leaders of the settled ethnic groups in villages are commonly named sheiks, whose origin dates back to the time of settlement of the villagers in the area. Upon his death, the sheikh is usually succeeded by one of his sons, most likely the oldest, but for some reasons a younger son may take the position. Villagers were found to have influence on the decision of the succession. There are some village representatives who have as important role as that of the sheiks. Such people are usually consulted by the sheikhs or by the project staff when discussions of important issues took place. In this situation, the sheikhs might not have the final word, for example, an influential teacher may act as a village speaker in spite of the presence of the sheikh.

Land is considered as state property and the tribal leaders take the control over the land at the village level. The rush for land resources has consequently led to conflicts and disputes, which often became violent (Salih, 1994). Tribal leaders set rules to organize land tenure under their domains. Later on such organizational framework has been recognized as local customs and rules on the land acquisition. As reported by Kerkhof (1999e), the unregistered Land Act of 1970 reaffirmed the government's ownership to all unregistered land. However, local tenure arrangements operate still either alongside or interrelated with the official system. The head of the village is trusted to be responsible for allocation of land to adult people of his village and to new comers who wish to settle in the village. Successful management of social forests in ENFMP depends on establishment of land rights that enable local communities to

use forest resources. Therefore, issues on land tenure need to be addressed as important elements in any forest management. Security of land tenure and legitimized customary rights to land will definitely encourage villagers to invest and enable them to manage their resources in a proper way.

The conflicts and problems encountered in the villages are usually solved within the village members themselves. In some cases, sheikhs from neighboring villages are invited to help.

There are many organized working groups or bodies seen as a complement to traditional leadership in the project area. For instance, the popular committee is a government institution responsible for development issues, security and taxes. The forest committee instituted by the NFMP is responsible for implementation of community forest management plans, the development committee founded by the Area Development Scheme (ADS) Project, the reservoir committee organized by Care Sudan and the Pump Committee established by UNICEF.

3.6.2 External institutions

Results of the focus group discussion with senior staff of the NFMP showed that Forests National Corporation (FNC) was the main external governmental institution dealing with the forestry sector in the area. The NFMP was administratively and institutionally located under the umbrella of the FNC. The FNC offices were few and very far away from villages to run the activities seamlessly. The rural council was the lowest authority of local government at the village level and has very limited financial and human resources (Kerskhof *et al.*, 1998a).

3.7 Capacity Building

Importance of capacity building comes from the fact that development activities have to be implemented with a more adaptive approach, which often requires making decisions and

handling issues of change at the field level. Capacity building of the staff involved in the development activities as emphasized by Cernea (1985), and ESRU (1998) is an important and critical factor in the organizational effectiveness.

The middle level staff of the ENFMP has been trained regularly in different subjects related to the participatory natural resource management. Such training included short courses on technical, planning, managerial, and social aspects. As results of the focus group discussion indicated, some staff members that have been working in the project for relatively long periods exceeding more than ten years were experienced and skilled and able to deal with their work efficiently on continuous basis.

Most of the community members in ENFMP were found to have been trained by the project staff in different aspects related to forestry, for instance, pot filling in a nursery, construction of water micro-catchments, seedling transplanting, community forest management, conflict management, and raising environmental and gender awareness. As emphasized by Fowler (1990), it is important to have an organizational capacity building of the local communities in order to achieve management and conservation of natural resources on sustainable basis. As a result of the capacity building programs adopted in the ENFMP area, the local communities (sedentary farmers) have gained skills that enabled them to develop their personalities and establish village associations other than project committees such as the youth cultural clubs in Warshal Mudakha, Elgifil and Elgoz villages, Women Treasures Fund in Elgifil, Elgoz, Badoga and Abunana, and development committees in Elgifil, and Badoga. The training was considered as a positive impact of the project with regard to involvement of the local communities in development activities.

According to Richardson (2013), adoption of extension messages using appropriate information and communication technologies improves the livelihoods of poor rural families

and will likely have significant direct and indirect impacts on enhancing agricultural production, marketing and post-harvest activities.

3.8 The role of women in natural resource management

Women in the project area were found to have different activities, interests, needs, knowledge and priorities regarding natural resource products. The role of women in the management plan of the community forests in the study area was to some extent ineffective. However, they participated partially in some of the activities even if the project insisted to give them equal chance to work in the various committees.

Findings of focus group discussions with local people and the project staff revealed constraints that hold back women participation from community forest management. As indicated by men, meetings were usually not relevant to women because they did not generate ideas and share experiences when discussions took place. In addition, women have little time and are overloaded with several household activities. Due to cultural barriers, women are traditionally not supposed to express their views and they have little access to land and education. Even women themselves gave some examples that illustrate the subtle discrimination.

In general, planning for “people centered” development requires more precise information about who the “people” are. Elsewhere and within every socio-economic group, lives of women and men are structured in a fundamentally different ways. A gender-based division of labor is universal, but it differs by occupation, age, ethnic group and class. However, gender analysis in a forestry framework is important to achieve successful forestry program in terms of sustainability, equity and effectiveness (IIED, 1997; Hussein, 1998).

3.9 Traditional rules for tree utilization

Results of focus group discussion showed that there are some traditional rules existing besides the formal rules of the 1989 Forest Act. The formal rules included statements such as; do not cut green trees and fruit trees, do not cut inside the community forest, do not cut construction wood, do not cut trees found in farms of other people, do not remove the whole tree, no cutting for firewood inside the community forest, no cutting of *Acacia senegal*, *Acacia nilotica*, do not collect green fruit, do not collect fruit from other people farms. Setting fire in someone's *Acacia senegal* land was treated in court.

There is an old traditional belief saying that "cutting any trees will kill livestock". Official rules required permits for various forms of resource exploitation which bear cost greater than the revenues anticipated.

Conclusions

Factors affecting natural forest management in the ENFMP were recognized to include essentially physical, socioeconomic, cultural, institutional and capacity building of both villagers and the staff. Grazing in the forest did not have much harmful impact on natural regeneration. However, rainfall deficiency and agriculture expansion were the most significant factors affecting the natural regeneration. The density of vegetation cover inside the community forests was significantly higher than that outside the community forests in the buffer zones, which might verify an environmentally sustained management of the conserved village forests in the project area. Tree planting and restocking using water micro-catchments in clay soils was found to be effective in forest development practices. The sale of the forest products for income generation was not a priority for local people in the area.

Local community in ENFMP area used forests in terms of direct products such as construction wood, fuel wood, fruit and fodder, together with other indirect benefits in form of shelter-belt, recreation and environmental conservation, soil conservation, watershed values and others.

Construction materials and fodder were distributed between the rich and poor people according to need and upon request, respectively. Conflicts involved in the villages are usually solved by the village members themselves; otherwise neighboring village leaders would be invited to help solving the problem. Nomadic pastoralists were not involved by the ENFMP project as a key user group in the different stages of the management process of the community forests.

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