

# Financial Analysis of Villages' Forests in Sennar State-Sudan

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**Abstract-**The aim of this paper was to assess the success and financial feasibility of villages' forests establishment in Sennar State, Sudan, focusing on the experiences and lessons learned from development projects\*. A social survey was carried out in the study area where respondents were selected through simple random sampling. A total of 33 respondents were interviewed in the study area. The data were analyzed using the Statistical Package for Social Sciences (SPSS) for Windows (Version 18) and using MS Excel for financial feasibility analyses. The results of the study revealed that all respondents in villages' forests ascertain that all silvicultural operations are done by local people themselves with a technical guide from forest authorities. Results also showed that villages' forests in the study area are financially profitable and not sensitive to a 5% increase in total costs nor a 5% decrease in revenues.

**Keywords:** villages' Forests; profitability; economic; livelihood

## I. INTRODUCTION

Sudan has different options for the forest management, with special interest in the role of the community forestry. In the last few decades forest land degradation, which is mainly a result of misuse, led to increasing poverty in rural areas that led to increased pressure on forest resource. Forest fires, pests, and climate change are other causes of degradation. Sennar State faces negative impacts on natural resources, particularly forest land. [1] found that community forestry (in its different forms) contributes significantly to the economy of farmers. Farmers prefer exotic tree species like *eucalyptus spp.* at the expense of the indigenous trees due to their high market demand, fast growth and relatively small area needed by a tree compared to that needed by indigenous tree species. [2] reported that community forestry also offers opportunity to local people, who are often blamed for the destruction of the forest, to establish a long-term source of income.

The aim of this paper is to study the financial feasibility of villages' forests establishment in Sudan, focusing on the experience and lessons learned from community development projects in Sennar State in particular.

## II. MATERIAL AND METHODS

The study was undertaken in Sennar State which is located in the south-east corner of the country between longitudes 32° 58' and 34° 42'E and latitudes 12° 5' and 14° 7'N about 300 km south of the capital Khartoum. The climate of the area is savannah, with an average annual rain fall of 191–544 mm. The main physiognomic vegetation type is woodland savannah which generally reflects the semiarid climate. The vegetation is characterized by several *Acacia species*, of which important multi-purposes species. The area is inhabited both by settled and nomadic population, their economy is dominated by mechanized agriculture and seasonal off-farm income.

### A. Data Sources:

The data were collected from both primary and secondary sources. Primary data were obtained through both formal and informal interviews using a questionnaire as well as group discussion to gather information from village leaders and key informants. The questionnaire was designed to obtain information on forest type, cost of the establishment of community forests, benefits and costs of villages' forests. The questionnaire was administered to 33 respondents from the selected villages. Selection of villages was done relative to the distribution of the existing community forests. 33 villages, that represent 4 localities in

Sennar State, were covered. Economical data were collected to enable the researcher to make an economical analysis of villages' forests.

*B. Sample size and selection of respondents :*

Random sampling technique was employed for this study. This technique has the advantage of maintaining the representation of the desired variables. Besides, it makes it easier to compare variables and helps reduce the sampling error. Since a representative sample could be obtained from the accessible population, the findings from the sample could be generalized [3]. For statistically adequate sample size, the study followed what is mentioned by [4] that selection of a sample size of 30 ensures the benefits of central limit theorem. He argues that for most behavioral researches a sample size of 30 will be adequate.

Sources of the secondary data used in this study included previous inventories, project documents, published and unpublished research papers, statistics and relevant internet sites. The secondary data were also collected from the reports, records and archives of the relevant institution.

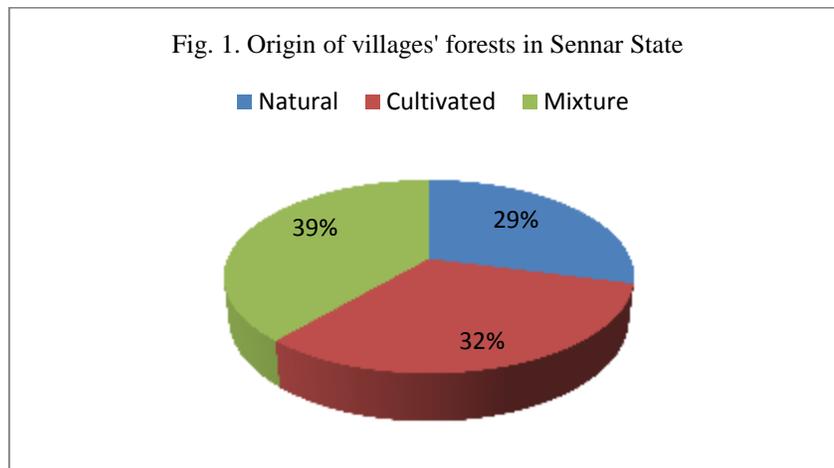
*C. Data analysis:*

Data collected were coded, computerized and analyzed using the Statistical Package for Social Sciences (SPSS) for Windows (Version 18). Descriptive statistics were generated using MS Excel program, financial analysis was made using Net Present Value (NPV), Benefit/cost ratio and payback period as decision criteria. Sensitivity analyses of NPV of villages' forests to 5% increase of total costs and 5% decrease in total revenue were made. In this study descriptive statistics including frequencies and cross tabulations were used to obtain the percentages to interpret the qualitative information collected from the respondents. Chi-square test was used to compare observed sample frequencies with expected frequencies, to determine whether or not the difference between them is statically significant.

### III. RESULTS AND DISCUSSION

*A. Origin of community forests*

Villages' forests in the study area are grown in depression areas such as valleys, bottom of the basin (Mayaa) of Blue Nile and lagoons, in which the water stays for about 3-4 months. This helps the growth of some trees such as *Acacia nilotica* because it tolerates water logging. In the study area, most of the respondents (80%) in private and village's forests assured that the tree type in their forests was *Acacia nilotica*. Figure 1 reveals that the origin of villages' forests was almost equally shared between natural, cultivated and mixed forests.



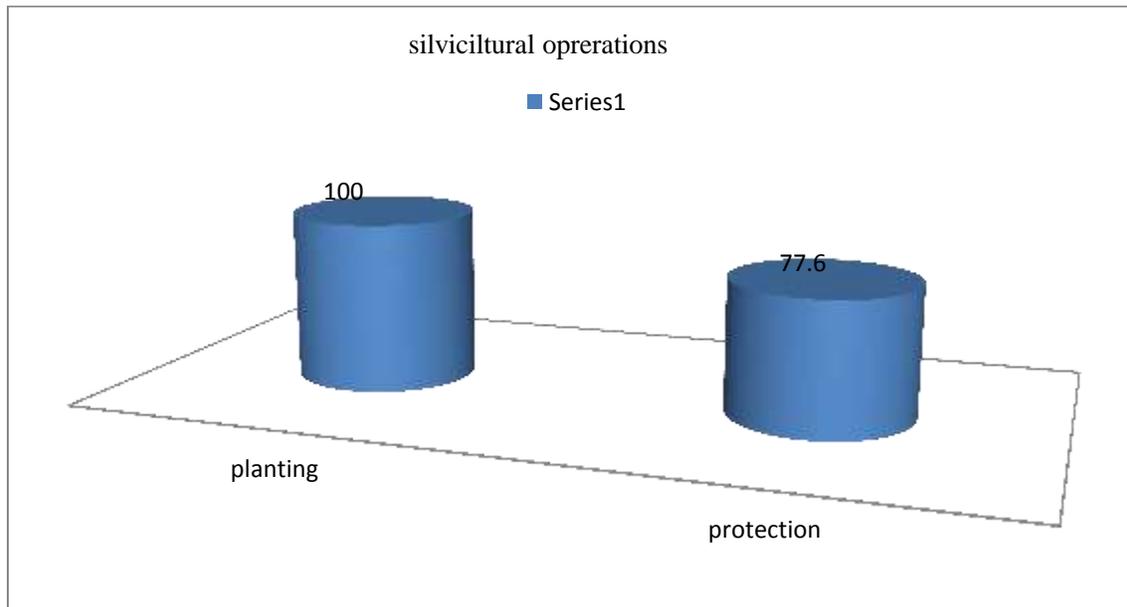
Source: Field survey (2014)

*B. Silvicultural operations in community forests:*

All respondents in villages' forests indicated that all silvicultural operations, such as trees planting by spreading seeds in water courses and thinning, were done by local people themselves (Figure 2) in a co-operative activity known locally as 'Nafir'. They organize their activities in such a way that assist them in meeting their own needs from the forests. The silvicultural operations included are planting and protection.

In fact; both activities have been implemented by villagers under supervision of FNC which provides them with seeds. The reason of community commitment may be due to that the local communities have the sense that forests are owned by them and the income can serve their community in terms of basic services such as school, water, electricity, road and health. [5] reports that silviculture is a part of community forest management, and management of community forest is the responsibility of the villagers (forest committees) . The silvicultural operations are done under the supervision of the FNC in the locality. Local community has indigenous knowledge utilized in land preparation, furrowing, weeding, thinning, coppicing etc. The technical supervision of the FNC staff is to demonstrate to villagers the new techniques and methods. This is usually what is known as the join forest management which is a developing partnership between the user groups and forests services.

Figure 2. Silvicultural operations in villages' forests :-



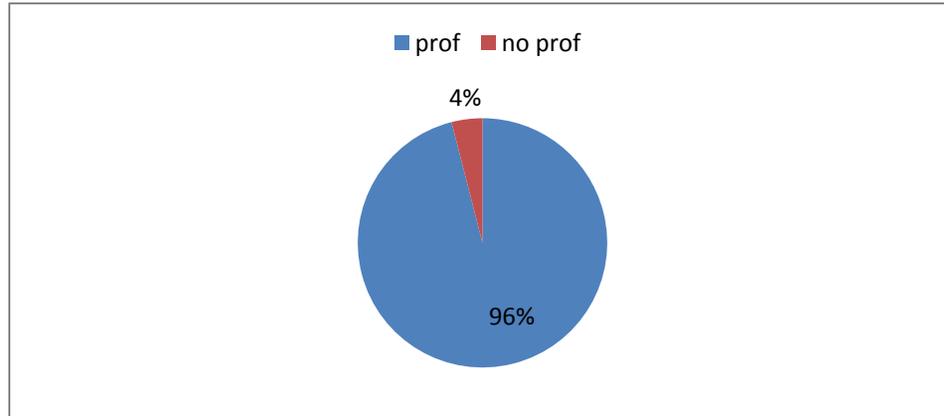
*A. Harvesting of village forests:*

All respondents in villages' forests in the study area asserted that forests harvesting is controlled by the government. The decision regarding harvesting of villages' forests is usually taken by the villages' forests committee and approved by FNC. The forests are harvested under the supervision of the FNC to ensure the application of scientific methods and appropriate tools and to raise awareness of forest owners in forests management, harvesting and marketing. Moreover, the follow up of FNC of villages' forests may improve relationship between FNC and local communities.

*B. Profitability of villages' forests:*

Despite the challenges that communities have in making collective decisions and gaining access to technical expertise, communities are able to compete with the private sector as ongoing enterprise and to generate profits in a sustainable manner [6]. Respondents in the study area were interviewed whether villages' forests represent a productive form of land use that is profitable and able to survive in the future. The result shows that about 97% of the respondents accentuated that the community forests are profitable. This means that it generates revenues covering total labor and materials costs in addition to a profit margin. Those respondents mentioned that the revenue from villages' forests is invested in the provision of the basic social services. It is used to support the village fund. Some respondents stated that the community forest, as an investment, is not costly, and so irrespective to the size of the revenue they believe that it is profitable [7].

Figure 3. Profitability of villages' forests :-



These findings confirmed what was mentioned by [8] who stated that community forests contribute in rural poverty alleviation by providing the population with more sustainable livelihoods in the long term. The cost of community forests operations in the study area is difficult to be assessed in monetary terms because it is mostly executed by social collaboration “Nafir”. This is why some respondents mentioned that community forestry activities are not costly. Community forests are economically profitable and environmentally friendly when compared with a situation without them, highlighting improvements in the communities’ livelihoods while providing the basis for more sustainable management of forest resources. However, the profitability of community forestry is highly conditional on a number of factors, in particular the technical and managerial capacities of the communities as well as access to and use of natural, infrastructural, financial and information and legal resources {9}.

Table 1. Financial analysis of the villages' forests (SDG per fedden)

Year	Total costs	Total revenue	Discounting factor	PVC (SDG)	PVR (SDG)	NPV (SDG)	Payback period
0	54.4	0	1.000	54.4	0.0		
1	53.9	0	0.893	48.1	0.0		
2	59.9	0	0.797	47.8	0.0		
3	45.9	0	0.712	32.7	0.0		
4	45.9	505	0.636	29.2	320.9		
5	45.9	0	0.567	26.0	0.0		
6	45.9	0	0.507	23.3	0.0		
7	45.9	750	0.452	20.8	339.3		
8	45.9	0	0.404	18.5	0.0		
9	45.9	0	0.361	16.6	0.0		
10	45.9	1000	0.322	14.8	322.0		
11	45.9	0	0.287	13.2	0.0		
12	45.9	0	0.257	11.8	0.0		
13	45.9	900	0.229	10.5	206.3		
14	45.9	0	0.205	9.4	0.0		
15	45.9	2999	0.183	8.4	547.9		
				385.3	1736.3	1351.0	4.50

Legend: Discounting rate = 12%, PVC = present value of costs, PVR= present value of revenues, NPV = net present value.

The results of the financial analysis show that villages' forests were profitable at 12%. Net present value (NPV) was 1351.0, Benefit/cost ratio was 4.50 and IRR was 13.08 %.

The financial analysis of villages' forests shows that they were profitable under the specified discounting rate. Additional benefits of villages' forests include providing local communities with their needs for fire wood, charcoal, building materials, provision of fodders for animals, protection of villages from winds and storms and increasing the areas of forests in the state.

#### IV. CONCLUSION

This study showed that communities depend on the forest for meeting their needs and essential services. It also concluded the effect of transforming the local people into dynamic citizens capable of contributing to a large range of activities. This study has also financial feasibility analysis of the villages' forests are the viability of an idea.

#### V. RECOMMENDATIONS

1. Income generation activities, as they provide immediate and considerable income of Basic services in the community, should be taken into account. Emphasis should be given to management of commercial products.
2. Involvement of forest users in income generation activities should be encouraged. It contributes to create employment opportunities and reduce poverty.
3. Further studies investigating total indirect benefits including ecosystem services and multiplier effects of villages' forests as well as respective impacts on rural livelihoods and poverty alleviation are suggested.

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