

Impact of Joint Forest Management on Handeni Hill Forest Reserve and Adjacent Communities in Tanga, Tanzania

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Abstract

Most forests in Tanzania have been managed under state ownership regime but have been faced with enormous pressure leading to degradation. Joint Forest Management (JFM) was introduced in 1998 aiming at improving conditions of forest reserves and livelihood of the adjacent communities, one of which being the Handeni Hill Forest Reserve in north eastern Tanzania. Data were collected in 2001 and 2004 on forest inventory and socio-economic attributes of the adjacent communities. Comparisons were done to determine significant changes on forest conditions and livelihood. The study showed a non-significant positive impact on basal area (m^2/ha), and volume (m^3/ha), but had no impact on improving farming productivity. There were positive trends on reduced wood energy consumption, increased tree planting and promotion of non wood forest products (NWFPs). The realized benefit stream has positively influenced villagers on acceptance and participation in JFM related activities. It is concluded that a period of 3 years was not long enough to show a significant impact on the forest conditions and livelihood. It is recommended that more efforts are needed to strengthen JFM and more long term studies are needed to monitor the performance of JFM.

Key words: Income generating activities, livelihood improvement, sustainable forest management

Introduction

Tanzania like many other eastern and southern African countries, experienced a number of policy reforms most of which were geared towards devolving the management of common pool resources (Wily and Mbaya, 2001). Nearly everywhere, common pool resources have been massively reduced in modern times (Jodha, 1990). Privatisation, encroachment and government appropriation have been the main processes taking resources out of common use. A weakening or breakdown in local control management has often accompanied the erosion of the extent and quality of the resources on which people draw for their livelihoods (Luoga *et al.*, 2005).

The introduction of Participatory Forest Management (PFM) was sparked by several factors: both international and local. At the international level, treaties and accords such as the Tropical Forest Action Plan (TFAP), an outgrowth of the agenda 21 framework initiated in Rio-de-Janeiro in 1992, sought to reverse the loss of forests through the involvement of stakeholders, especially adjacent communities. The original argument for increasing community participation in the maintenance of rural conservation projects stemmed from the need to better target people's needs, incorporate local knowledge, ensure that benefits were equitably distributed and lower management costs (Wily, 1998).

Joint Forest Management (JFM) “allows” forest adjacent communities to use certain products, which tends to increase policing functions and relieves burdens of the state (Wily, 1998). It considers communities as “rightful beneficiaries” than as “logical source of authority and management”. There has been a long history of Joint Forest Management (JFM) in India, Nepal and elsewhere in Asia (Wily, 1998). There is widespread recognition that forest dependent communities cannot be excluded from the care and control of forests that surround them, regardless of the legal ownership of the forests, which may rest with the government. This is in contrast to the situation in most sub-Saharan Africa where traditional policies still dictate that forest reserves remain ‘free’ from local people, and in which local people have no management role. In Asia, it is realized that old custodial protection systems are not successful in protecting the forests (Wily, 1998).

In Tanzania and elsewhere in developing countries, Government’s capacity to protect forests has been progressively deteriorating because of declining budgets and human resources (Kajembe and Mgoo, 1999; Luoga *et al.*, 2006). With increased population and development needs, the situation tends to become worse, as people tend to exploit the forests beyond the management objectives. Major threats to Tanzanian forests include; rampant pit sawing, wild honey harvesting using fire, firewood and charcoal harvesting, harvesting for building materials, annual fires, settlements and cultivation (URT, 1998; Luoga *et al.*, 2005). Following the new forest policy of 1998, it is clear that the central government intends to gradually distance itself from direct management of the resources, thus Joint Forest Management (JFM) under the

umbrella of Participatory Forest Management (PFM) emerged (URT, 1998). Participatory Forest Management (PFM) or Collaborative Forest Management (CFM) is basically a common property regime (Dubois, 1999; Kajembe and Kessy, 2000; Luoga *et al.*, 2005) which entails two of Joint Forest Management (JFM) and Community-Based Forest Management (CBFM). The latter being more devolutional as it involves both user and ownership rights over the resource.

People in developing countries have legitimate aspirations for an improved quality of life. Any renewable resource such as forest, need to be exploited provided the rate of use ensures sustainability by maintaining regeneration and natural growths (WCED, 1987). In terms of socio-economic factors, Bromley and Cernea (1987) suggest important factors to be considered for sustainable resource management particularly when the resource is jointly managed. These factors include supply and demand conditions of the resource; the quality and quantity of the resources, and the characteristics of the legal and political environment in which the users operate.

Tanzania's Development Vision 2025 provides the guiding framework for forest and several other policies. The vision is for Tanzania to move from a Less Developed Country (LDC) to a middle-income country by 2025, with a high level of human development. Specific targets include: a high quality livelihood, which is characterized by sustainable and shared growth (equity), and freedom from poverty; good governance and the rule of law; and a strong and competitive economy capable of producing sustainable growth and shared benefits (TDV 2025, 2001). JFM can be one of the vehicles towards reaching these targets.

JFM has been introduced under pilot basis since 1998 in several of Catchment Forest Reserves (CFRs) in various forests, including Handeni Hill Forest Reserve (HHFR) in Tanga region. However, there has been no qualitative and quantitative study for justifying JFM as a best management option on improving the condition of forest resource base in HHFR and livelihoods of the adjacent communities. Therefore after about five years since its inception, it was important to assess its impacts as conceptualised in Figure 1. The concept of impact is far broader as it includes both positive and negative consequences whether foreseen and expected or not (Kajembe *et al.*, 2004).

FIG 1 HERE

The study was guided by the following research questions:

- What is the impact of JFM in Handeni Hill Forest Reserve in terms of stand density, basal area and volume?
- What is the impact of JFM on livelihoods of adjacent communities to Handeni Hill Forest Reserve?
- What are the perceptions and extent of participation of adjacent communities in JFM activities?
- What are recommendations on existing management strategy in Handeni Hill Forest Reserve?

Methodology

Study area

The study was conducted in Handeni Hill Forest Reserve (HHFR) and within three adjacent villages of Vibaoni, Kwabaya and Kwamasaka. The study area is in Handeni District, Tanga region, located in north-eastern part of Tanzania. The area lies between latitude 5° 37' and 5° 42' S and longitude 5° 32' and 5° 37' E. Handeni Hill Forest Reserve lies between 5° 25' and 5° 27' S and 5° 1' and 5° 3' E at 1030 m a.s.l and is located about 1.5 km east of Handeni township (Holmes, 1995).

Handeni Hill Forest Reserve has two distinct vegetation types; miombo woodland stratum and semi-evergreen forest stratum (Malimbwi and Mugasha, 2002). The miombo woodland stratum covers the drier southwest, west and northwest slopes of the reserve. The semi-evergreen forest stratum covers the wetter northeast, east, south and southeast slopes. Miombo woodland is dominated by *Brachystegia spiciformis*, *B. boehmii*, *B. microphylla*, *Julbernardia* sp., and *Pterocarpus angolensis*, with a dense grass layer of *Hyparrhenia rufa*, *Panicum maximum* and *Themeda triandra*. The dominance of *Julbernardia* and *Brachystegia* indicates typical miombo vegetation. The semi-evergreen forest stratum with the canopy between 15 m and 25 m is dominated by *Brachylaena hutchinsii* with *Bombax rhodognaphalon*, *Cussonia arborea*, *Ficus thonningii*, *Ricinodendron heudelotii*, and *Scorodophloeos fischeri*

Handeni Hill is an important catchment reserve supplying Handeni township with water. In order to enhance this service, a reservoir was constructed in the 1950s to supply the town. However deforestation and cultivation around the reservoir had caused severe siltation in the reservoir (Lovett and Pocs, 1993).

Climate in HHFR is characterized by oceanic rainfall with continental temperatures. Estimated rainfall is 1500 mm/yr in the semi-evergreen forest stratum and 1000 mm/yr in the miombo woodland stratum, with a mist effect at higher altitudes. The forest is wetter at eastern and drier at western slopes. Dry season is from June to September. The estimated temperature in the study area is 24°C maximum in February and 20°C minimum in July (Lovett and Pocs, 1993).

Data collection and analysis

The Tanzanian Collaborative Research Centre (CRC-TZ), which is part of the International Forestry Resources and Institutions (IFRI) research program collected both biophysical and socio-economic data using IFRI protocol (IFRI, 2002) in September 2004.

In forest inventory, the reserve was stratified according to vegetation types in which 14 nested and concentric plots (with maximum radius of 10m) were laid in miombo woodlands and 16 plots in semi-evergreen forests. A systematic sampling design was used in which four transect lines were laid out at an interval of 350 m apart. The heights (in m) and diameter (in cm) of sampled trees were measured for stocking calculations.

Socio-economic data were collected using the Participatory Rural Appraisal (PRA) tools, group discussions and structured interviews (questionnaire surveys). The sampling intensity for questionnaire surveys was 5%, corresponding to 45 households as there are about 900 households in sampled villages. Secondary data were obtained at the village and district level offices.

Inventory data from the two strata of the forest (miombo woodland and semi-evergreen) were separately computed for number of stems per hectare (stems/ha), basal area (m²/ha) and volume (m³/ha) using existing stocking models (Malimbwi *et al.*, 1995). The results of 2004 inventory were compared with those of previous study conducted in 2001 shortly after the onset of JFM (Malimbwi and Mugasha, 2002).

Most of the questionnaire data were analysed under the domain descriptive statistics in which frequencies, tables, histograms and pie charts were used to summarise the results. A two-tailed t-test at 5% level of significance was used to test if there was a significant change on stocking and livelihoods of the adjacent communities as impacted by JFM between year 1998/99 and 2003/04.

Results and Discussion

The results showed that the number of stems per hectare for both strata in year 2004 were significantly higher than in 2001. There was also a general increase in basal area and volume though not significant (Table 1). Field observation also indicated that, in both miombo woodland and semi-evergreen forest strata, there were very little signs of human disturbances. The increase in stocking can be attributed to reduced fire occurrences, controlled grazing and illegal harvesting of trees as a result of effective protection under JFM strategy, an observation which has also been reported elsewhere in the country (Luoga *et al.*, 2006).

Results from Table 2 show that under JFM, nearly 89 % villagers adjacent to HHFR established back yard tree nurseries as their main income generating activity after being trained on tree nursery establishment. Villagers sell tree seedlings to various institutions and individuals. The money obtained from selling seedlings assisted villagers for household expenditure and to purchase agricultural inputs, although the farming productivity was not improved.

Other income-generating activities include; crop farming practiced by 82.2% of the study population followed by beekeeping. Plate 1 shows one of the villagers inspecting his local beehive inside the forest reserve as part of the income generating activities.

Table 1. Tree stocking parameters by forest stratum in years 2001 and 2004 in Handeni Hill Forest Reserve, Tanzania.

Forest stratum	Stocking parameter	Years		t-Stat.	P-Value	Significance
		2001	2004			
Miombo woodland	N	355±144	817±182	2.145	0.014	**
	G	11.21± 3.38	12.7±1.55	2.068	0.210	NS
	V	108.99±44.6	111.34±14.6	2.085	0.504	NS
Semi-evergreen	N	342±103	1083±184	2.119	0.001	**
	G	10.94±4.11	15.06±2.06	2.048	0.172	NS
	V	125.24±64.9	153.52±27.14	2.052	0.513	NS

Where, N = Number of stems per hectare (N/ha), G = Basal area (m²/ha), V = Volume (m³/ha), ** =

Significance at 0.05 level, and NS = Non-Significance at 0.05 level

Source: Malimbwi and Mugasha (2002) and own field data (2004)

Table 2: Major income-generating activities implemented in villages surrounding Handeni Hill Forest Reserve, Tanzania

Main economic activity	Percent of households	
	Implement	Do not implement
Commercial tree nursery	88.9 (40)	11.1 (5)
Crop farming	82.2 (37)	17.8 (8)
Bee- keeping	68.9 (31)	31.1 (14)
Crop farming and livestock keeping	44.4 (20)	55.6 (15)
Making of burnt mud bricks	40 (18)	60 (27)
Small scale business	26.7 (12)	73.3 (33)

Figures in parenthesis indicate number of households (Total N = 45), not in parenthesis denote percent

.Almost all beekeepers use traditional beehives and the most preferable tree species for making beehives are *Albizia versicolor*, *Pterocarpus angolensis* and *Brachylaena hutchinsii*, which are also important timber species. These results show that most initiated income generating activities (with exception of farming and livestock keeping) were facilitated through JFM. Farming, which is an important attribute to food security, had not been improved. Luoga *et al.* (2000), suggested that one way to

build capacity for managing natural resources is to improve farm productivity as an important income generating activity.

Plate 1: Beekeeping using traditional hives as one of major income -generating activities in villages surrounding Handeni Hill Forest Reserve, Tanzania

The rate of brick making for building of low cost and modern houses (Plate 2) was increasing. This was another activity influencing livelihoods of the people through having safe and permanent houses but also boosting their income through selling bricks to other people within and outside the villages. Under JFM strategy villagers are being discouraged to use forest products as building materials. This is an indication that JFM impacted positively on house construction and consequently reduced wood consumption.

The results showed that nearly 32% of total households use energy saving stoves (Plate 3), as opposed to the situation before JFM when none of the household used energy saving stove. It was also revealed that before JFM the amount of firewood collected for cooking per month per household was 15 head loads as compared to only 4 head loads because of the introduction of energy saving stoves. This means that JFM had a positive impact on reducing wood energy consumption

Plate 2: Simple and low cost house built by using burnt bricks in Kwamasaka village surrounding Handeni Hill Forest Reserve, Tanzania

Plate 3: A typical wood-energy saving stove in villages surrounding Handeni Hill Forest Reserve, Tanzania

Table 3 shows adoption of various alternatives for reducing utilization rate of forest products. There was a general positive trend on the adoption of alternative means in reducing rate of wood use after JFM. This can be attributed by among other reasons; the awareness created among the communities and increased monitoring of forest resources through regular patrols by villagers This view is also shared by Mialla *et al.*,2004 and Luoga *et al.*, (2006) in other catchment forests under JFM.

Table 3. Adoption on various alternatives before and after Joint Forest Management by villagers surrounding Handeni Hill Forest Reserve, Tanzania

Activity	Unit	Years	
		1998/99	2003/04
Initiation of alternatives for reducing use of forest products	%	15	100
Harvesting of forest products from HHFR	%	96	44.4
Total trees planted	Number	28952	286770
Agro forestry plots	Number	0	3
Energy saving stoves (villagers)	Number	0	201
Beekeeping (Villagers adopted)	Number	22	302
Beehives installed in HHFR	Number	40	507
Promotion of non-wood products	Adopters		
• Fruit trees	Number	18	22
• Mats	Number	68	77
• Honey	Number	77	90
• Wax	Number	3	4
• Traditional medicines	%(users)	90	90
• Hunters	Number	100	107

Figures indicated in years 1998/99 and 2003/04 are presented in percent or in numbers and they represent the entire population in three villages.

When villagers were asked about their views on JFM, they perceived that it was a positive approach towards improving the management of HHFR and livelihoods of the adjacent communities (Figure 2).

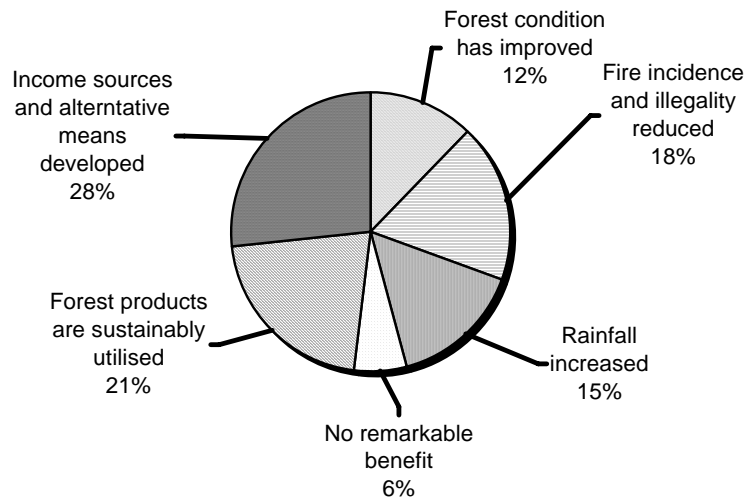


Figure 2. Perceptions by communities on the benefits of Joint Forest Management in Handeni Hill Forest Reserve, Tanzania

Since the inception of JFM, adjacent communities increased their participation efforts in the management of HHFR. Activities that they participated include: attending forest meetings, conducting forest patrolling, forest boundary clearing, planting, and weeding, gap restoration, forest fire fighting, forest boundary resurveying, trees planting, formulation of village bylaws and preparation of JFM agreements, demarcation of village forest management areas and preparation of village forest management area plans. Income generating activities was the major reason that motivated people to accept and be involved in JFM activities (Table 4). Improving livelihoods of the adjacent communities will imply sustainability of JFM strategy (FAO, 1987). Other reasons include; formulated Village Natural Resources Committees (VNRCs) as working tool to organize and supervise JFM activities, technical support by foresters and good cooperation from the district authority (local government).

Table 4. Reasons for participation on Joint Forest Management activities in villages surrounding Handeni Hill Forest Reserve, Tanzania

Reasons	Agree	Not agree
Income generating activities motivated villagers	84.4 (38)	15.6 (7)
Formulation and effectiveness of village bylaws	66.7 (30)	33.3 (15)
Thorough follow-up by foresters	64.4 (29)	35.6 (16)
Good cooperation from the district authority	40 (18)	60 (27)
Villagers' intention to alleviate poverty	62.2 (28)	37.8 (17)

Figures not in parentheses represent percent, and those in parenthesis indicate number of households (Total Agree and Not agree = 100%, Total households (N) = 45)

Conclusion and Recommendation

Making the people living adjacent to forests the guardians of the forest resources in the neighbourhood appears to be the most viable, effective, cheaper and long lasting way to manage natural forest resources. Under right conditions, such as appropriate incentive structures, these people are likely to become the strongest and most effective managers of natural forests at low cost. The burden of policing by the government would fall out and the foresters would become technical advisers and not policemen. Generally the study has shown that for successful JFM in the long run, more tangible benefits are needed to attract villagers' full commitment to forest management. It can however be concluded that although JFM had a positive impact on stand stocking parameters, and improvement of livelihood of adjacent communities, a period of 3 years was not long enough to show a significant impact on the forest. Therefore more efforts are needed to strengthen JFM and more long term studies are needed to monitor its performance.

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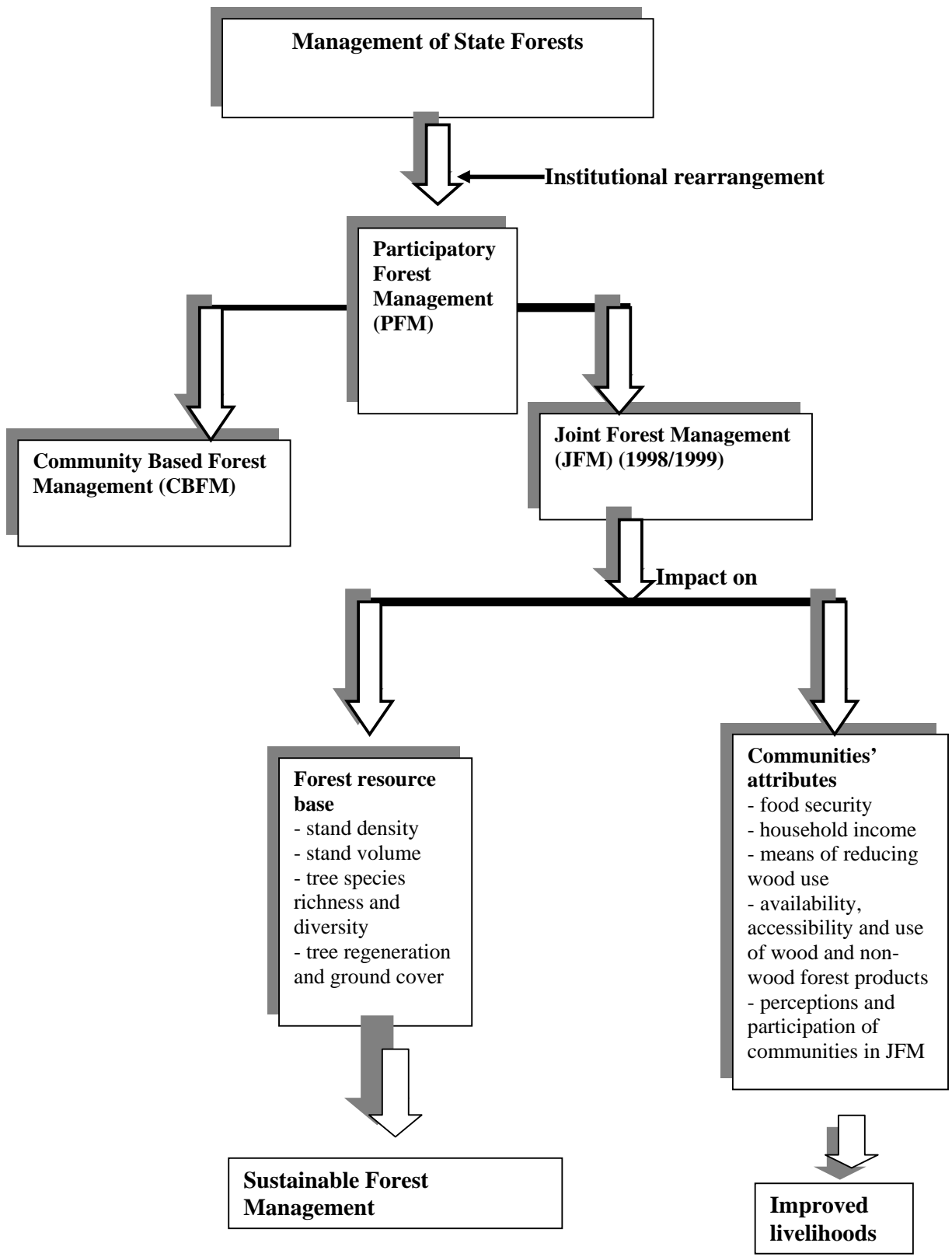


Figure 1: Conceptual framework of the study.

