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Full Length Research Paper

An assessment of community perceived impacts of participatory forest management on community livelihoods

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Participatory Forest Management (PFM) process was piloted in Arabuko Sokoke Forest (ASF) Dida beat in 1997 as an alternative forest management approach This was necessitated by national outcry over forest resource degradation, clamour for democratization and need for better forest governance. The motivation for introducing PFM were as diverse as were the stakeholders: for KFS and other government departments' it was forest protection and biodiversity conservation with communities being motivated by anticipated opportunity to access benefits and participate in forest management. Non-Governmental Organizations were motivated by pioneering PFM introduction in Kenya and community poverty alleviation. The objective of this study was to assess community perceived impacts of PFM on community livelihoods and forest management. PRA tools and household questionnaire were used for the survey of 40 randomly selected households. The study has shown that PFM can contribute to better forest management. About 87.5% of respondents perceived that the forest condition had improved since 1995. PFM contributes to improved livelihoods as indicated by 64% of the respondents in the PFM villages of Dida who perceived that household well-being overall improved between 1995 and 2005 compared to Vimburuni village (non PFM village) in which only 31% of respondents indicated improved wellbeing.

Key words: Participatory forest management, wellbeing, poverty, better forest management, perception.

INTRODUCTION

In Kenya gazetted forests cover a total of 1.4 million hectares representing about 1.7% of total land area which is 582,646 sq. km² (Ruotsalainen, 2004). Despite the proportionately small area covered by the closed canopy forest compared to the overall country's surface area, forests rank high as one of the important national assets for economic, environmental, social and cultural values. It is estimated that 80% of the population use biomass energy while urban development and hydro energy rely heavily on water (Ministry of Environment and Natural Resources, 2007a). Forestry management in Kenya for over a century has been through a centralist command and control approach until later in the 1990s. This management approach can be traced to 1902 when the British Colonial Government responded to perceptions of

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deforestation and uncontrolled exploitation, by declaring all the main forest areas to be government land (MENR, 1994). The local people were not informed and no attempts were made to relocate or compensate those evicted. At independence in 1963, the same management trend was retained by the Forest Department (FD) which was started in late 1890s and was transformed into Kenya Forest Service (KFS) in 2007. The KFS is a semi-autonomous government body which is expected to be more efficient.

The forestry sector in Kenya witnessed a wave of unprecedented high levels of forest degradation leading to clamour for change in the 1980s'. This was driven by demand for democratization, need to benefit from forest resources and involve more stakeholders including community and civil society participation in forest management. In 1994, Kenya Forest Master Plan (KFMP) indicated that Kenya forestry development beyond 2000 must have as one of its objective "increasing the forest and tree cover, in order to ensure an increasing supply of forest products and services for meeting the basic needs of present and future generations, and for enhancing the role of forestry in socio economic development". The Master plan further proposed that the government should shed its role as manager of the forest estate.

However, it opined that the government should continue to own much of the land and the trees and regulate their use, even when it hands over the management of these forests to specialized organizations (MENR, 1994). Further KFMP "identified forest dwellers and forest adjacent communities as one the biggest challenges facing Kenya forestry and the issue was how to turn these people into development partners" (MENR, 1994).

There is a worldwide trend towards increasing transfer of power, resources and responsibilities to the sub-national levels of government, semi-autonomous bodies and communities. In Africa, since the beginning of the 1990s, waves of natural resources management decentralization experiments are being implemented generating both positive and negative outcomes (Oyono, 2005). Further, Agrawal and Ostrom (2001) indicate that decentralization has emerged as a major strategy for many nation-states to achieve development goals, provide public services and undertake environmental conservation.

It took a while for Kenya to start initiatives to change the century old management approach. Unlike in Cameroon as stated by Oyono (2004), in Kenya the approach to change from command and control to multi-stakeholders involvement in forest management was not a state initiative but a result of several actors' interest and lobbying. Decentralization in both countries are also initiatives as a result of bilateral cooperation and multilateral funding programs requiring central states in developing countries devolve their powers as condition for continuing aid. This has not been achieved fully as Agrawal and Ribot (2000), state that Central governments in some countries have failed to decentralize all aspects of natural resources as was the case in Senegal where responsibilities in forest management were devolved to local elected councils without devolving access to the related commercial profits.

THE PFM PILOT PROCESS

The process of change of the forest management approach in Kenya was initiated through a pilot (experimentation) research work done in Dida sub location which is adjacent to Dida forest beat Arabuko-Sokoke Forest (ASF). The forest was selected as it had a socio ecological set up representative of most of the countries indigenous forests. Some these key aspects included communities perceived relations with the forests where in ASF, between 1993 and 1997, the local community's negative attitude towards the ASF changed from more than 80% of the community having the view that the forest was of no value to them and wanted its land use changed to agriculture (Maundu, 1993 quoted in Mbuvi et al., 2007) to only 16% supporting its conversion to another land use (Maundu et al., 1997 quoted in Mbuvi et al., 2007). In 2008, the communities in areas where sustained partnership integrated conservation and development projects had started Income Generating Activities (IGAs) perceived the idea of creating ASF reserve to be good (Mbuvi et al., 2007). The change was attributed to involvement of communities in forest management and influence by benefits accrued from Income Generating Activities (IGAs).

The pilot PFM project started in 1997 with funding from the European Union coordinated by Birdlife International (BI). The key partners were: Kenya Forestry Research Institute (KEFRI) Kenya Forest Service (KFS), Kenya Wildlife Service (KWS), National Museums of Kenya (NMK), Forest Adjacent Communities (FAC) and Civil Society Organizations (CSO). The project was implemented at a time when the forest was being managed by KFS; known as the Forest Department then. Forest management was centralized and the policy and legislation did not support community participation in forest management though Kenya Forestry Master Plan (MENR, 1994) had proposed adoption of multi-stakeholder participation in forest management.

This paper focuses on the area in ASF where PFM piloting was introduced in Kenya in 1997 and the impact the process has had on forest management and community livelihoods in a period of 10 years (1997 to 2007).

RESEARCH QUESTIONS

The study sought to answer the following research

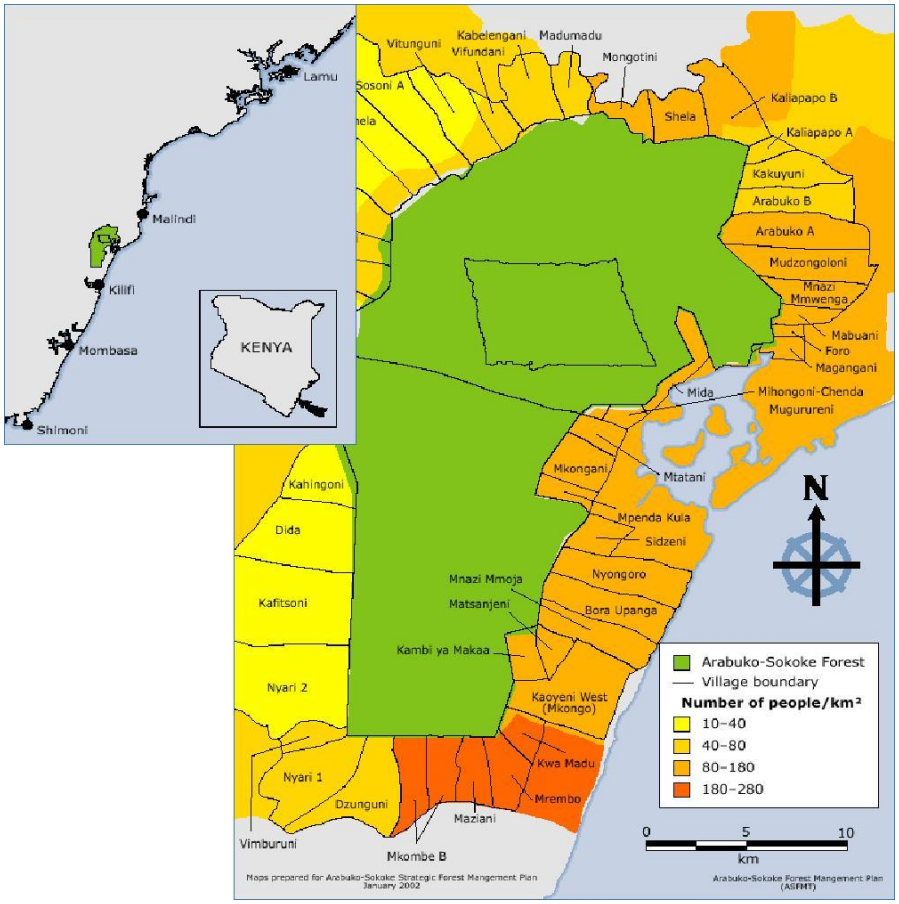

Figure 1. Location of Arabuko-Sokoke Forest Reserve and area of focus.

questions:

1. Can PFM contribute to poverty reduction by providing rural people with a sustainable and equitably distributed stream of net benefits greater than those obtained under a non-PFM situation?

2. If yes, how significant are the benefits (in relation to other income-generating activities and sources of livelihood) for different well-being groups? If no, what are the key negative impacts of PFM – and on whom do they fall?

3. How do the impacts (both positive and negative) on poverty and equity affect the community members and the forest condition?

4. What changes in policy, institutions and legal frameworks have the potential to enhance the contributions of PFM to poverty alleviation?

METHODOLOGY

Study area

The study area is located in the Coast province which is one of the poorest in Kenya with 62% of the population living below the poverty line (UNDP, 2006). Average annual per capita income in the province is Kes 55,682 (UNDP, 2006). Data from the present survey suggest that many people in the Dida area are even poorer than this: while the wealthiest groups had annual gross per capita incomes of between Kes 60,228 to 73,092 and the poorest groups survived on between Kes 9,018 to 14,650.

The study was undertaken among the Dida and Vimburuni community members living adjacent to Arabuko-Sokoke forest (ASF). Arabuko-Sokoke forest is located in Kilifi County about 110 km North of Mombasa at latitude of 3° 20' S and a longitude of 39° 50' E. (ASFMT, 2002). The forest is a lowland dry forest in the Kenyan coast province, starting at sea level with the mangroves at the Mida Creek (Figure 1).

The survey targeted PFM pilot villages of Dida sub location of Kafitsoni, Dida and Kahingoni which occupies about 42 km². Vimburuni village which is adjacent to Dida was the control (Non PFM) community as PFM was implemented. The study site is located in a low agricultural potential area where farmers mainly grow maize and cassava. Cashew nut is the main cash crop

Table 1. 2006 Wellbeing ranks for the study villages.

	Dida	Kahingoni	Kafitsoni	Vimburuni
A	5	7	2	3
B	36	69	20	16
C	42	199	32	37
D	136	3	96	4

for the area but is only grown by a few households.The forest experiences bi-modal rainfall pattern with short rain season occurring between November and December and the long rains falling between April and June. The average annual rainfall fluctuates from 900mm to 1100mm. The forest is located in a humid and hot climate zone and its temperature averages about 29°C (Muriithi and Kenyon, 2001).

Arabuko-Sokoke forest was declared a crown forest in 1932 and gazetted in 1943 (ASFMT, 2002). Of the mosaic of forests that covered the East Coast of Africa from Somalia to Mozambique, the ASF is the largest remnant of intact forest of the remaining patches with total area of 420 square kilometres. The forest is the most important in the conservation of biodiversity that is endemic to this type of ecosystem. In Africa, ASF ranks second in importance for the conservation of birds (Collar and Stuart, 1988) and are one of the 19 important Bird Areas in Kenya (Bennun and Njoroge, 1999). Arabuko-Sokoke forest is also part of the East African Coastal Forest complex that ranks amongst the top 25 global biodiversity hotspots (Myers et al., 2000).

Arabuko-Sokoke forest being an indigenous forest, direct use of products like timber and poles by communities is hardly possible. This is because the draft policy 2007, states that “indigenous forests will be put under efficient and sustainable multipurpose management, which combines biodiversity conservation and water-catchment functions together with the production of tangible benefits for forest adjacent communities” (MENR, 2007a). This scenario poses a challenge as the adjacent communities are poor and view the forest as a means to escape from poverty and perceive their participation in forest management as the start of the that shift (Mbuvi et al., 2005).

The process of involving communities in forest management in Kenya has been referred to as Participatory Forest Management (PFM). The approach has been defined as “a forest management approach, which deliberately involves the forest adjacent communities and other stakeholders in management of forests within a framework that contributes to community’s livelihoods” (MENR, 2007b).

Data collection methods and instruments

The process involved holding meetings with key stakeholders in their offices and villages to collect information and agree on the field survey programme. Participatory Rural Appraisal (PRA) tools such as mapping were used to get the community perception of the area resources, stakeholder mapping to get information on the community resource use and relations. Through focus group discussion the communities were able to undertake household listing and wellbeing characterization and ranking of households. This further provided community perception on PFM impacts on community livelihoods and the forest management.

Additionally Key Informants (KI) were used to collect qualitative data. Key informants were identified as people knowledgeable about the area and the community. Focus group discussions were held sometimes separately with men and women and with groups of different well-being ranks. Semi-structured questionnaire were administered to 40 households to collect quantitative data on livelihood status perception at community and household level under the livelihood Framework of Analysis (LFA). The households were selected randomly within each well-being rank (determined through a participatory well-being ranking exercise) to reflect the approximate proportions of people in each rank and to include both PFM members and non-members. Table 1 shows the distribution of the households surveyed. Some data were compared with similar data collected in Vimburuni, a neighbouring community in which there are no PFM activities.

Data analysis

This study generated both qualitative data from PRA tools and quantitative data from household surveys. The qualitative data obtained through PRA tools were subjected to in-depth analysis and used to complement the discussion of analysed quantitative data. The quantitative data were cleaned, sorted, summarized, and stored using Ms Excel. The data was presented in forms of charts and tables where necessary.

RESULTS AND DISCUSSION

Dida community, residing in Kilifi County was the first community in Kenya to be engaged in PFM piloting formally through a letter authorising their participation from the Permanent Secretary, MENR. This authority was necessary as the pilot project was started when the policy and legislative framework for such a management approach was non-existent.

The introduction of PFM was meant to have KFS cede management responsibilities to communities and have their involvement lead to improved livelihoods of the forest adjacent communities and better forest management. The survey to assess the impact of PFM on forest management and community livelihoods was

undertaken in ASF Dida beat adjacent community where PFM piloting had been done for almost 10 years. As PFM was almost fully established in Dida, it was expected that communities had started benefiting from PFM initiatives and the forest was relatively better managed.

Demography and resource ownership

The total population based on social mapping in 2007 of the three villages which make up the Dida PFM area was 735 households (Kafitsoni - 164, Kahingoni - 309, Dida - 262). The community in Dida is composed of immigrants with the majority being Giriama (87%) and other few people of tribes such as Kikuyu (3%), Kamba (3%), Taita (3%) and Chonyi (3%).

Land in Dida is individually owned. Based on the 40 survey respondents in Dida, the minimum land size is 0.4 ha and the maximum is 16 ha with an average land size of 3.2 ha. There are also people who have leased land for farming, charcoal burning and fuel wood collection, and a few squatters. Land use is determined by the household head who in most cases is a man.

PFM introduction motivations

The motives were varied with the community anticipating to benefit and participate in forest management. KFS and other government departments' were motivated by: biodiversity conservation, sustainable provision of forest products, forest protection and piloting of PFM process and development of PFM implementation guidelines that would be applied in other forests. The NGOs motivating factors included; introduction of PFM in Kenya, building their profile and alleviating poverty.

Forest resource ownership/access rights

KFS and KWS were perceived to have had the strongest rights and most power over the forest respectively. The community association scored low on the same parameters because the partnership is still developing. The forest is owned by the state and the PFM arrangement confers management rights to community as they shall be stated in Forest Management Agreement (FMA). Arabuko Sokoke forest being indigenous offers very minimal opportunities for communities to directly benefit from the resource. The income generating potential has to be done through non forest based Income generating Activities (IGAS).

Decision-making in forest management

Dida PFM area has a structured committee where individual member elect user group representatives who go to elect their representatives in the village committee.

The committee then elects the Community Forest Association (CFA) which later signs a forest management agreement with KFS. The CFA has a good working relationship with KFS and its guidelines require that the KFS officer is an ex-officio member. The committee has scheduled meetings and also meets when need arises.

Impact of PFM on different livelihood capitals at community level

To reflect a multi-dimensional definition of poverty, this discussion was ordered around the different capitals making up a sustainable livelihood (economic, physical, human, social and political, and natural). Perceptions on the PFM impacts were assessed at household-level and whole community level.

Economic capital at community level

The main sources of income for Dida community were ranked in order of importance as: farming (maize and cassava), business (village shops), poultry, livestock, butterfly farming, beekeeping and tree nurseries.

The Dida community ranked household expenditure in order of importance as shown:

1. Food
2. Water
3. School uniforms
4. Agricultural inputs
5. School expenses
6. Livestock management costs
7. Medical services
8. Clothing
9. Transport
10. Household goods
11. Construction of houses

When PFM was starting in 1997, there was no shop. However, PFM has contributed towards the development of the Dida shopping centre owing to increased cash flow in the area from IGAs that have been initiated.

PFM spin-off income is obtained from;

- Milk sales from livestock bought
- Chicken sold
- Calves sold
- Maize sold from farming done with PFM funds

In Dida through PFM, income was generated through:

- Butterfly farming
- Beekeeping
- Agroforestry involving sale of poles and seedlings
- *Aloe vera* farming for aloe gel to make products such

as soap and shampoos for the local market.
Improvement in overall household well-being was felt between 1995 and 2005 by 64% of respondents while 16% felt that they had experienced a decline in their well-being and 20% felt no change.

For neighbouring Vimburuni community, only 31% indicated improved wellbeing, 8% with no change and 61% with a decrease in well-being. This suggests that the higher rate of perceived improvement in wellbeing in Dida could be attributed to PFM as the changes occurred during the project time and there has not been any other intervention in the area which could bring such change.

Physical capital at community level

There are more iron sheet-roofed houses than in 1997 when PFM started. The other physical capitals at community level are:

- Main water pipe and a storage tank
- Electric fence to confine elephants within the forest
- High frequency of vehicles especially public service ones
- More communities have dug toilets
- Some communities have mobile phones due to PFM

Human capital at community level

Education

According to the census data (Government of Kenya, 2001), 36.7% of people in Kilifi District have never attended school and 70% of these are women. In this survey in Dida, only 20% were found to be illiterate with half of this group being women. In general, this is an indication that literacy levels have improved since the 1999 census was held. They are certainly much better than in neighbouring Vimburuni, where the survey found illiteracy levels of 57.5%. Given the time lag between educating children and increased literacy rates, this change is unlikely to be directly linked to PFM. However, PFM has contributed to education through purchase of uniforms and books.

Food security status

In 2006, 37.5% of survey respondents in Dida had enough food for the household to have three meals per day that is breakfast, lunch and dinner. 32.5% lacked food for one to three weeks while 30% lacked food for more than 3 weeks. This is nevertheless better than in Vimburuni village bordering Dida where only 18% of respondents had enough food to have three meals per day all year round while 43% experienced hunger for more than 3 weeks per year. Food insecurity in Dida was very high amongst the poor and very poor (groups C and D).

The strategies used by the community to cope with household food shortages were highlighted as borrowing (60%) and relying on relief food/charity (32%). The main sources of funds for emergency costs were stated as borrowing (38.9%), own savings (36.1%) and remittances (25.0%). Majority of the respondents in Dida (45%) perceived that their health status was worse in 2005 than in 1995 whereas 42.5% believed they were healthier than in 1995. About 12.5% said their health status had not changed. However, when comparing PFM participants and non-participants, it is clear that a much greater proportion of participating households perceive a positive change in their health status. This was attributed to the additional income provided by PFM-related IGAs.

Social and political capital at community level

Participation in meetings and elections

General (non-PFM) meetings were attended by majority of the respondents in Dida (87.5%), and almost half (47%) spoke in those meetings. The fact that only 68% of respondents in neighbouring Vimburuni said they attended meetings is perhaps an indication that mobilisation around PFM has raised general interest in community development issues in Dida. 78% of the respondents indicated that they attended more meetings in 2006 than in 1995. The increase in the number of meetings attended was due to: awareness (45.8%); being retired or unemployed hence had free time (37.5%); and being development conscious (16.7%).

In Dida, 60% of the respondents took part in community elections during the last 12 months. This compares with only 28% in Vimburuni. The group type of election they were involved in included: self-help groups (27.8%), Parents Teachers Association (44.4%), agriculture (11.1%) and forest committees-PFM (16.7%). During those elections, 71.4% voted and 28.6% stood for elections. The community involvement in elections changed since 1995 for 78.6% of all cases. They attributed this change to awareness creation (94.4%) and having time due to being a retiree or unemployed (5.6%).

Capacity building

Involvement in community development projects and courses also increased during the same period (64%). The main types of community development projects they were involved in include: participation in different types of courses (40%), livestock management and agriculture (20%), bee keeping and butterfly farming (20%), herbal, tree seeds and tree nurseries (8%), water projects (4%),

bursaries, Constituency Development Fund, HIV-Aids and school development activities (4%) among others.

Natural capital at community level

The CFA has bought land to build offices in each village. An electric fence is being constructed to reduce elephant crop raids which will enable farmers to return to their land adjacent to the forest.

Forest condition and its importance to households

Majority of the respondents (87.5%) perceived that the forest condition had changed for the better since 1995. They attributed this to a reduction in forest use due to the national logging ban, and co-management of the forest by KFS and the community. Matiku et al. (2012) further affirmed this where he observed significant higher measures of forest quality in the PFM zones than in the non PFM zones .Although there is no physical evidence as to whether PFM had led to an improvement in the forest condition, the community and KFS and KWS officers perceived that poaching reduced in the PFM area. Main reasons for improved forest condition according to the community members included: reduction in forest use due to logging (54.6%) and co-management of the forest by the KFS and the community (42.4%).About half of the respondents perceive the forest as more important to their household in 2006 than in 1995; while 20.5% perceived no change and 17.9% perceived it to be less important. Comparable figures in Vimburuni are only 18% who feel the forest is more important to their livelihoods, 48% no change, and 31% who say it is less important.

Impact of PFM on different livelihood capitals at the household level

The households are crucial in the PFM implementation process. The benefits accessed further influenced their levels of participation.

Economic capital at household level

This was done through determining well-being categories through participatory wellbeing ranking in 2007 in the villages. It resulted in categorisation of households into four categories: A (Very Rich), B (Rich), C (Poor) and D (Very Poor). The main characteristics of the resulting four wellbeing categories are outlined in Table 2.

As highlighted by the participatory well-being ranking, land holding size is one of the most important indicators of well-being. However, there is very little difference in land holding size between the D, C and B well-being groups with only category A having significantly larger land holdings (Figure 2). The land wellbeing differentiating criteria is not size but use. Interestingly, within groups A, B and C, it seems to be the larger land owners who are active in PFM.

PFM general impact on household well-being

The surveyed households gave various causes for positive and negative changes in their household well-being. About 50% of those who had experienced an improvement in household well-being attributed this to PFM. Other reasons for improved well-being included better health facilities (25%), joining Heifer International development projects among others (12.5%), earning extra income from agriculture/leasing farms (6.25%) and remittance (6.25%). Negative change in household well-being was associated with economic hardships due to unemployment, low yields, death of bread winner among others as well as drought and illness or old age.

PFM-derived incomes at household level

PFM members and non-members in each well-being group that earn an income from any PFM-related activity include; beekeeping, butterfly farming, Casuarina poles, production of seedlings (mostly of *Casuarina equisetifolia* for sale to fellow community members, projects and KFS) and *Aloe vera* cultivation. With the exception of a few respondents in groups C and D (who had only recently become involved in PFM activities), all PFM members were earning an income from PFM-related activities. Few non-PFM members earn money from PFM-related incomes, mostly from growing Casuarina poles and from selling pupae as there are no mechanisms to prevent non-members from entering into these activities.

The amounts earned from PFM activities by non-members tend to be quite low compared with those earned by PFM members. Gross household income from PFM-related activities is very variable both between well-being groups and within groups (Table 2). The highest earning individual was in the better off category A and average earnings declined in the lower well-being categories (C and D). This is attributable to the requirement of some upfront investment, e.g. membership fee, land, seedlings, hives for beekeeping and a breeding cage for farming butterflies (a 4 × 4m cage costs KES15, 000).

Although the absolute amounts earned from PFM are generally lower for households in the poorer well-being groups (C and D), they may make an important contribution to the households' overall livelihood.

However, average earnings of KES 21,300 in the poor

Table 2. Wellbeing characterization as perceived by community members.

Category A (Most well off or very rich)	Category B (Well off rich)
• Owns land more than 10 acres • Has more than 5 grade cattle and more than 10 local breads • Has ability to employ/ hire casual labour • He/ she is on a permanent employment • Owns more than 4 rooms of a permanent house • His/her farm is arranged in an organized manner • Able to educate children above 4th form • Owns a vehicle • He/she is educated up to or above forth form • Owns at least 20 goats and above • Has tap water • Owns high class radio, TV, and mobile phone • Owns at least 20 local breed hens • Has savings in a bank account	• Owns land between 2 to 9 acres • Owns a semi-permanent house • Owns at most 4 local breed and 2 crossbreed cattle • Owns a bicycle • Able to educate children up to primary level • Able to employ casual labour occasionally • Owns between 10 to 19 goats • Has tap water • Owns more than 5 beehives • Owns middle class radio, TV and mobile phone • Has 10 and above local breed hens Has savings in a bank account
Category C (poor)	**Category D (very poor)**
• May own large pieces of undeveloped land, between 12 to 16 acres • He/she can't afford a balanced diet, three times a day • Stays in a mud walled makuti house • He/she is not able to educate children • Puts on moderate clothing • Relies on water from a water pan or buys from a water kiosk • Can't afford basic medical services • Relies on his/her own feet for walking • Five and less goats • Ten hens and below	• Squatters • Half-finished house • No meal or once a day • Mostly casual labour • Relies on relief food • No medical care • Two hens • Survives on hand to mouth • Relies on conman ship • Heavy alcohol consumption • Sometimes steals • Travels by foot • No clothing – begging when travelling • No basic education

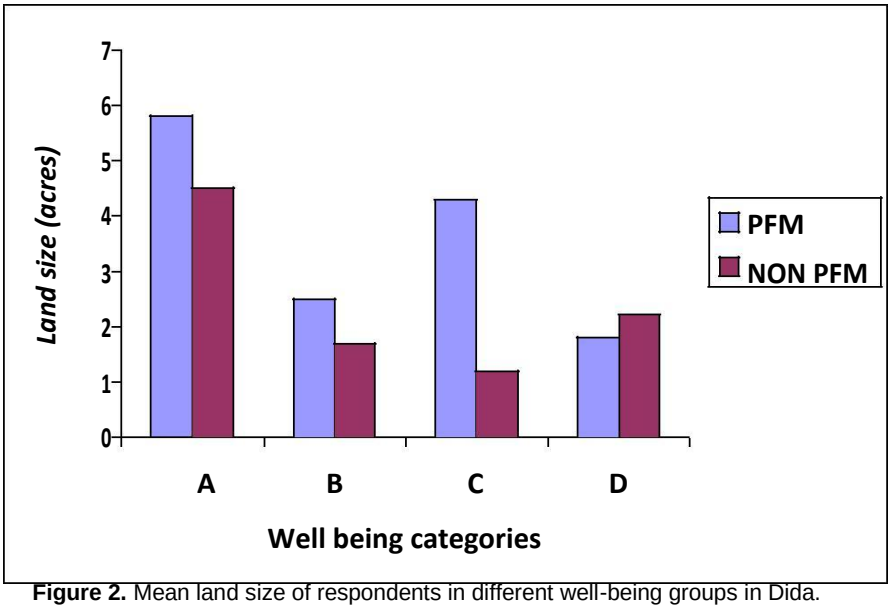

Figure 2. Mean land size of respondents in different well-being groups in Dida.

Table 3. A breakdown of PFM-related income and expenditure in one household (Case study 1).

Name of household head	IGAs	Contribution of PFM activity to household income (KES)	Annual income (KES)
Joyce Masha	Butterfly farming	School uniforms skirt 450	450
		Contribution to food 3000 per month	36,000
		Contribution to medical bills @ 500 per month	6,000
		Bought 30 iron sheets at Kes 540 = 16200	16,200
		Bought 10 hens @ 150	1,500
		Contribution to fees 3000 per year	3,000
		Building materials poles @ 2000	2,000
		Mason @ 8000	8,000
		Merry go round 100 per week in Gede	5,200
		Travelling 200 per week	10,000
		Chemical for Aloe plants @ 1000	1,000
		Tractor hire for ploughing @ 3000 per year	3,000
		Purchase of tap water @ 2 per 20 litre jerrycan on average spend 5 per day	1,825
		Total annual contribution to household income	94,575
	Aloe vera farming	Just started	
	Beekeeping	• Bought hives • No honey due to drought	
	Tree planting	• Sold seedlings for 2000	2,000
	Firewood	Monthly per @ 45	Is cost to the individual

Source: Key informant interview (2006).

category C are equivalent to about 27% of total household income, an important contribution.

The challenge was how many people could potentially benefit from these different PFM activities

Physical capital at household level

The noticeable change was an increase in the number of iron roof houses and households which had dug toilets. Several houses had also established woodlots. Very few of the respondent households in the well-off ranks (A and B) had connected tap water for use in their households. Those respondents who experienced positive change attributed it to PFM. How income gained from PFM activities was used to improve a household's physical assets is shown by the example of the PFM case study of Joyce Masha (Table 3). Within the five year period between 2000 and 2006, she changed wellbeing category status from D to B category.

The overall change in assets was still low as those whose assets increased is almost the same as those who did not realize an increase. The general changes in assets for Dida and Vimburuni, the non-PFM site shows that the situation was better in Dida (45%) than in Vimburuni, where the majority of respondents (57%) felt that they had fewer assets in 2006 than in 1995.

Further analysis of the Dida data shows that households perceived their assets to have changed since 1995 as follows:

- For households interviewed in the PFM group, 60% had experienced an increase in household assets since 1995. In the non-PFM group, only 30% had experienced an increase while the majority (55%) had experienced a decrease in assets over the same period. The figures for the non-PFM group are almost identical to those in Vimburuni.
- Looking at the results by well-being category, it is clear that, with one exception, very rich households were able to increase their household assets whether or not they participated in PFM. PFM participation also seems to have made no difference to very poor households, all of whom experienced a decrease in assets regardless of membership. The requirement for upfront investment affected their participation in IGAs
- However, for the middle well-being category (C and B) households, PFM membership played an important role in determining whether their assets decreased or not amongst PFM participants. About 60% experienced an

increase, whereas the reverse was true for non-PFM participants where only a single household experienced an increase and 67% experienced a decrease in assets.

Human capital at household level

The Forest Adjacent Households interviewed perceived their health status to have either declined or improved between 1995 and 2006. While 60% of PFM-participating households experienced an improvement, 65% of non-PFM participants experienced a decline. Differences between well-being groups, also suggests that while PFM-participation may not make a difference to wellbeing category A, several members of this category experienced improvements in health status regardless of whether or not they participated in PFM. However, it does seem to make a difference to the middle-income groups (B and C).

Political capital at household level

About 81% of respondents indicated they attended more community meetings in 2006 than in 1995, while 19% said they attended fewer meetings in 2006. Most of these meetings were school meetings (30%), while 14% related to forestry issues. Most of PFM respondents (71%) indicated that they could access records from the officials and representatives. This was an indication of transparency and accountability acquired through practicing PFM. In Dida a deliberate attempt by the PFM project to involve the poor, women, the youth and other disadvantaged groups, ensured that all these categories were represented in the CFA committees and sub-committees. However, continuous monitoring and targeted facilitation is necessary to ensure that the poor continue to participate fully.

Social capital at household level

The Dida community relies on social networks to get support in times of need with own savings and contribution from relatives accounting for more than 60%. The PFM IGAs have contributed to enhancing the sources of local support as they have enabled CFA to open a bank account. This account could provide cash that could only be borrowed by PFM members in the three villages.

Natural Capital at household level

The Dida community have access to individual land holdings for farming. The land is used for:

- Settlement
- Farming (crop, trees planting and livestock)
- Can be sold in times of need like education, sickness and marriage
- Leased

The land use pattern has not changed since 1995. However, new crops have been introduced under PFM such as *Aloe vera*, Mulberry and *Casuarina equisetifolia.*

Most non PFM members do not cultivate these crops in their farms though a few wealthier households have planted *Casuarina* for pole production and begun *Aloe vera* cultivation.

Intra-household differentiation

PFM participation tends to be a household matter whereby both husbands and wives are active though in some households they agree on who will participate based on their availability and the activity. If a woman decides to participate she has to seek the husband's permission. In the area, there were more women than men participating more in PFM. The women are found in nearly all user groups of the PFM. Of the respondents, 83% indicated that their income had increased between 1995 and 2006. However, the women felt that they do not have adequate control of the funds accruing from PFM assets like woodlots and livestock.

The PFM process has brought change to the community enabling women to participate in activities which they previously could not get involved in. As members of CFAs, women can participate in decisions on forest management and IGAs which previously were carried out by men.

All PFM members have equal access to training opportunities as the guidelines deliberately ensure equitable distribution between men and women, between different age groups and between poorer and wealthier members of the community. The chairman cannot make decisions without consulting other officials and at times has to call the village committee or the user groups. All these provide checks which are necessary for good governance.

Overall livelihood and equity impact of PFM

About 55% of the respondents in Dida perceived PFM to be good as it increased benefits, while 40% perceived it as good because of its role in forest conservation. This is an indication that if rightly implemented, PFM will achieve the two key objectives of better forest management and improved livelihoods of forest adjacent communities. PFM has increased all the capitals for at least some households. However, non-members also benefit from skills in beekeeping and *Aloe vera* farming and projects like the electric fence.

In terms of impacts on households in different well-being categories, it is likely that category D would not have benefited at all had it not been for the PFM programme's special target on the poor and other disadvantaged members of the community. However, the requirement for payment of membership fees remains an obstacle for participation by the poor.

Costs and benefits to different stakeholders

The benefits and costs to the different stakeholders varied. Three main types of costs incurred by stakeholders were: monetary costs, time costs and costs in terms of foregone use. Most of the respondents (83%) perceived that their income increased between 1995 and 2005, a situation many attribute to sale of products from IGAs. This has reduced the vulnerability of members. The challenge is that most of the PFM income is seasonal. However, for some activities like butterfly farming, the income is particularly helpful as it comes during the non-agricultural season.

PFM has had a positive impact by reducing game damage through the building of an electric fence which prevents elephants from raiding farms adjacent to the forest. PFM has also had an impact on health by leading to improved health status of PFM participating households, particularly those in wellbeing groups B and C. In terms of the two most important risks that is death in the family and drought, PFM has provided additional cash income to help deal with these events.

There is little chance of people resorting to informal access to forest products owing to increased surveillance of PFM resources by the community. In 2005, only 2% of respondents were fined for illegal forest product use. With respect to the PFM-related IGAs, the challenge is whether demand for the resulting products (e.g. butterfly pupae, honey, Casuarina poles, Aloe vera gel) will be sufficient for all community members to benefit from these activities. To-date PFM-related IGAs have been introduced by external projects and government institutions who have built capacity of communities on both technical and organisational aspects.

The fact that only two IGAs, beekeeping and butterfly farming are directly dependent on the forest raises the question of whether this would be an adequate motivation to ensure conservation of the forest through community participation in the long run. The key constraint to achieving these benefits is failure to operationalize guidelines agreed with the community.

CONCLUSION

The Dida PFM pilot experience shows that PFM can contribute to better forest management and improved livelihoods of the community even at the household level. PFM has proved to be popular and over 300 individuals (out of 735 households) have joined various user groups. Benefits have accrued to individual PFM participants through income from PFM-related IGAs) as well as to the community as a whole through the building of an electric fence and through increased social status and political capital.

Though the Dida PFM implementation was still in its initial stages by the time of the survey, several lessons have been learnt from this process. The period from 1995 to 2006 has witnessed several positive developments in the Dida community. Some of these are: Iron roofed houses as opposed to makuti thatched houses, piped water, woodlots, *Aloe vera* gardens, toilets, and livestock.

POLICY IMPLICATIONS

- Costs of initiating PFM were borne mainly by NGOs and other development partners. There is need for policy to support more government resources to be voted to support PFM at the County level.
- Location of IGAs: Several IGAs are implemented on farms adjacent the forest. While these activities have begun to provide incomes to participants, the fact that most have no direct link to the PFM forest means that they provide no long-term incentive for forest conservation. Mechanisms for linking the IGAs to forest conservation (e.g. an explicit requirement that the community will continue implementing PFM as a pre-requisite for continued participation in IGAs) should form part of the forest management agreement being signed with KFS.
- Participation in PFM: To encourage broad participation in PFM, it would be necessary to increase the range of different IGAs that would be attractive to different individuals and can provide a sustainable stream of benefits over time including allowing direct but sustainable forest use.
- Benefiting the poorest: The worse-off categories (C and D) are participating and benefiting from PFM. This shall only be supported if policy demands that PFM process should embrace pro poor approach.
- Benefits for non-participants: Non-members also benefit indirectly because the increased cash-flow from the IGAs boosts the general village economy. The policy has to have clear benefits for participants and sanctions for Non participants recognizing that their support is necessary for successful PFM implementation.
- Good Governance and Transparency: The user group and overall community structure should be effective in passing information both vertically and horizontally. Mechanisms have to be developed to enable communities decide how they should be governed
- Institutionalising the process: The implementers need to be adequately informed and involved to navigate the process as it evolves along the steps.

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Abbreviations: ARPIP**,** Action research in to poverty impact of participatory forest management; ASF, Arabuko-Sokoke forest; ASFMT, Arabuko Sokoke forest management team; CDFC, community development funds; FMA, forest management agreement; CFAs, community forest associations; FAC, forest adjacent communities; FGD, focussed group discussion; IGAs, income generating activities; KFMP, Kenya forest master plan; KEFRI, Kenya forestry research institute; KFS, Kenya Forest Service; KWS, Kenya Wildlife Service; NGO, Non-governmental organizations; PFM, participatory forest management; MENR, ministry of environment and natural resources; EMPAFORM, strengthening and empowering civil society for implementation of participatory forest management in East Africa; PRA, participatory rural appraisal; SPSS, statistical package for social scientists.

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