



Formation of Participatory Forest Management Boundaries for Governance of Arabuko-Sokoke Forest Reserve, in Kenya

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Authors' contributions

This work was carried out in collaboration among between both. Both authors read and approved the final manuscript.

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ABSTRACT

Many natural resource management studies have researched on participatory forest management of forests. But current literature indicates that studies on the formation of participatory forest management boundaries for governance of forests are scanty. Thus this paper uses Arabuko-Sokoke Forest Reserve as a case study to examine the extent to which its forest resource and resource users' boundaries are developed by utilizing a qualitative approach for data collection. The researchers purposively sampled 100 respondents from communities involved in participatory forest management and 90 non-participating communities in the participatory forest management arrangement. Also 30 key informants from heads of government agencies such as Kenya Forest Service, Kenya Wildlife Service, National Museum of Kenya, Non-Governmental Organizations such as Nature Kenya, Community Based Organizations and leaders from the business community working in the Arabuko-Sokoke Forest Management were utilized in the study. The analysis of qualitative data from written notes and audio recordings was coded into similar themes and used to answer the study objective. The results show that both participating and non-participating communities in the participatory forest arrangement are aware of the forest resource and resource users' boundaries. It is concluded that boundaries are essential in governance of forest resource and users' boundaries. It is recommended that policy makers need to clearly define boundaries for

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resource use and resource users' for enhanced conservation of forest resource and improved community livelihoods.

Keywords: Resource user; resource use boundaries; participatory forest management; arabuko-sokoke; Kenya

1. INTRODUCTION

The forest management boundaries, limit accessibility of unauthorized people to forest resources [1]. Before the introduction of forest management in Kenya in 1902, forests were handled by defined community management systems [2]. The state discouraged community-based woodland management systems in many types of woodland, therefore alienating the neighborhoods from the forest resources [2,4].

From the late 1970s to the early 1980s there was unprecedented accelerated destruction of forests in Kenya, which to a large extent was blamed on lack of appropriate and all-inclusive forest policy and legislation, since the policy that was used to manage forest resources in Kenya was developed in 1957 by the colonial government, and changed slightly after independence in 1968 [23]. The policy concentrated power to govern the country's forest resources on the Government thus excluding all the various stakeholders interested in the forest resources [5,3].

As [6,7,3], report in Kenya, until recently, state forest management objectives mostly excluded local resource users from forest decision-making. An official platform to provide the modification of forest management was provided in the forest master plan of 1994, as there was need for locals involvement, in the management of forest resources, an argument which was being taken globally and Kenya decided to adopt the Participatory Forest Management (PFM) approach where piloting started in Arabuko Sokoke Forest Reserve in 1997, which led to the generation of the Forest Act, 2015 [8] and later the 2016 Forest Act [9]. The Kenyan constitution of 2010, which promotes for degenerated governance, also espouses public participation in decision making process and offers reasonable sharing of what can be gained from natural resource administration [2,10].

Therefore in order to understand the participatory forest governance boundaries, Tucker [11] argues that successful common property institutions appear to share certain features that provide a set of benchmarks for evaluating common pool institutions. Further, Common Pool

Resource scholars, still support the importance of boundaries in the management of forest resource [12]. However, boundaries of the resource and community resource users' have to be clearly defined to ensure sustainable use of common pool resources [12].

According to [13] for sustainable management of forests, there has to be clearly defined boundaries where individuals or households have the rights to withdraw resource units from the common pool resources and the boundaries of the common pool resources such as forests should be clearly defined. Boundaries delineate natural resource lots with related access and use rights [12]. The growth of the forest boundaries also contribute towards accomplishing reliable defense of a forest from destruction or loss of forest resources [14,15]. As argued from above, resource use and users' boundaries play a great role in successful common pool resources management and governance. But there is need to understand the extent to which the participatory forest management boundaries in Kenya have been developed using the Arabuko-Sokoke Forest Reserve case study.

2. METHODOLOGY

The study area consists of a 420 km² of forest in Kenya, the most significant and likewise most undamaged seaside forest in East Africa [16]. Arabuko-Sokoke forest is found in Kilifi county 110 kilometres North of Mombasa at latitude of 3°20' S and a longitude of 39 ° 50' E [17]. The forest is lowland completely dry forest in the Kenyan Coast [18,3]. There are about 54 villages surrounding the forest dependent on it for their survival [3] (Fig. 1).

The study used a case study research design by utilizing a qualitative approach for data collection [19]. The researchers purposively sampled participating and non-participating respondents in the management of the Arabuko-Sokoke Forest Reserve and the heads of government agencies such as Kenya Forest Service, Kenya Wildlife Service, National Museum of Kenya, Non-Governmental Organizations such as Nature Kenya, Community Based Organizations, and Leaders from business community working in the

Arabuko-Sokoke Forest Management. However, because of the fact that the research made use of a qualitative data collection process, the sample size for data collection stopped when saturation point was attained [20]. Hence the sample size for the study stopped at 100 for forest management participating communities and 90 non-participating communities in forest

management (Table 1). Semi-structured sets of questions were administered to the participating and non-participating forest management households for collection of data to answer the study objectives on the formation of boundaries for forest resource and resource users' boundaries.

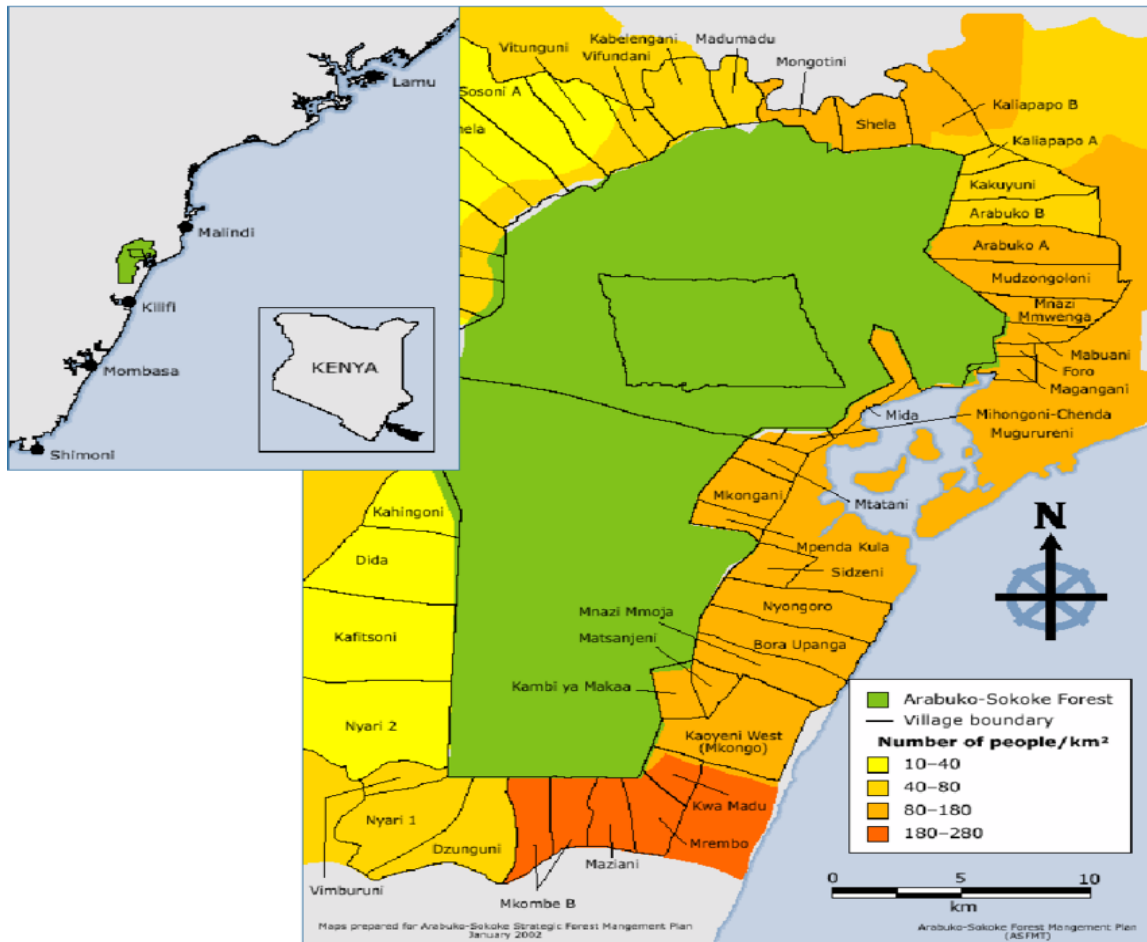


Fig. 1. Map of study communities

Table 1. Sample size for the study participants

Type of respondent	PFM participating communities	Non-PFM participating communities
Households staying adjacent to the Arabuko-Sokoke Forest Reserve	100	90
Kenya Forest Service officials	5	-
Kenya Wildlife Service Officials	8	-
Officials from National Museums of Kenya	3	-
Officials from KEFRI	5	-
Village elders	4	-
Chiefs	1	-
Leaders from business community	4	-
Total Participants	130	90

This study utilized a qualitative data analysis technique. Thus, the notes written and audio recordings from the respondents were coded into similar themes to answer the study objectives.

3. RESULTS AND DISCUSSION

3.1 Participating Forest Management Boundaries in Arabuko-Sokoke Forest Reserve

The study was meant to understand, the extent to which forest management resource use and resource users' boundaries in Arabuko-Sokoke forest reserve are defined [13,21], by interviewing the participating and non-participating households in the Arabuko-Sokoke participatory forest management arrangements. It became apparent from about 88% of the participating communities that they knew the meaning of resource user and resource boundaries. The following three quotes represent these findings:

The person who depends on the forest for his/her livelihood is the resource user and boundaries are areas he is supposed to benefit and where he is not supposed to benefit from (PH3).

Forest resource users are the communities living adjacent to the forest and boundaries are limits that hinder the community from accessing the forest (PH 23).

Resource users are beneficiaries of the forest resources, i.e., those using forest-related products for their income, while boundaries refers to areas that separate the community with the forest and people are not supposed to go beyond that boundary (PH26).

Despite the fact that about 12% of PFM participating communities did not know the meaning of the resource users' or resource boundaries, it can be argued that their definitions were clear in terms of resource use and resource users' boundaries [13].

Surprisingly, 71% of PFM non-participating communities knew the meaning of the forest resource users' and forest resource boundaries. They defined resource users' and resource boundaries as follows:

Resource users' are people using anything from Arabuko-Sokoke (NPH1).

Resource users' are those adjacent to the forest and resource boundaries mean the limit to which the resources are restricted (NPH8).

Resource users' are people using directly or indirectly anything from Arabuko-Sokoke Forest Reserve and are adjacent to the forest, while boundaries entail the limits that curtail the sovereignty of those resource users' (NPH5 NPH 2).

The reason why the non-participating communities were able to define the meaning of resource users' and resource use boundaries could be attributed to the fact that both the participating and non-participating communities in PFM live in the same location and often interact [22].

The study additionally explored the type of forest resources that one can access from the forest from those participating in PFM. The majority of the resources from the forest consists of butterflies, bee keeping and snakes (48%). The mangrove forest and dry coastal forest resources (18%), eco-tourism (9%), and food that included mushrooms and bush meat (4%), tree seedlings (6%) and other types of forest resources such as fire wood included (15%) (Fig. 2).

Notably, as indicated bee keeping, butterflies and snakes are the type of forest resources that members access from the forest to a large extent.

The non-participating communities in participatory forest management reported that more respondents were not familiar with forest resources accessed from the forest given the fact that they were not directly involved. But nevertheless a few of them suggested the type of resources one can access from the forest as follows:

Fuel wood, building poles, medicine and textile dyes, are the types of forest resources that you access from the forest (NPH7).

Beekeeping is the resources found in the forest (NPH13)

Dry costal forest (Arabuko Sokoke Forest) is the forest resource (NPH17).

Firewood, timber, poles, butterflies, honey, mushroom and herbs are the forest resources (NPH43).

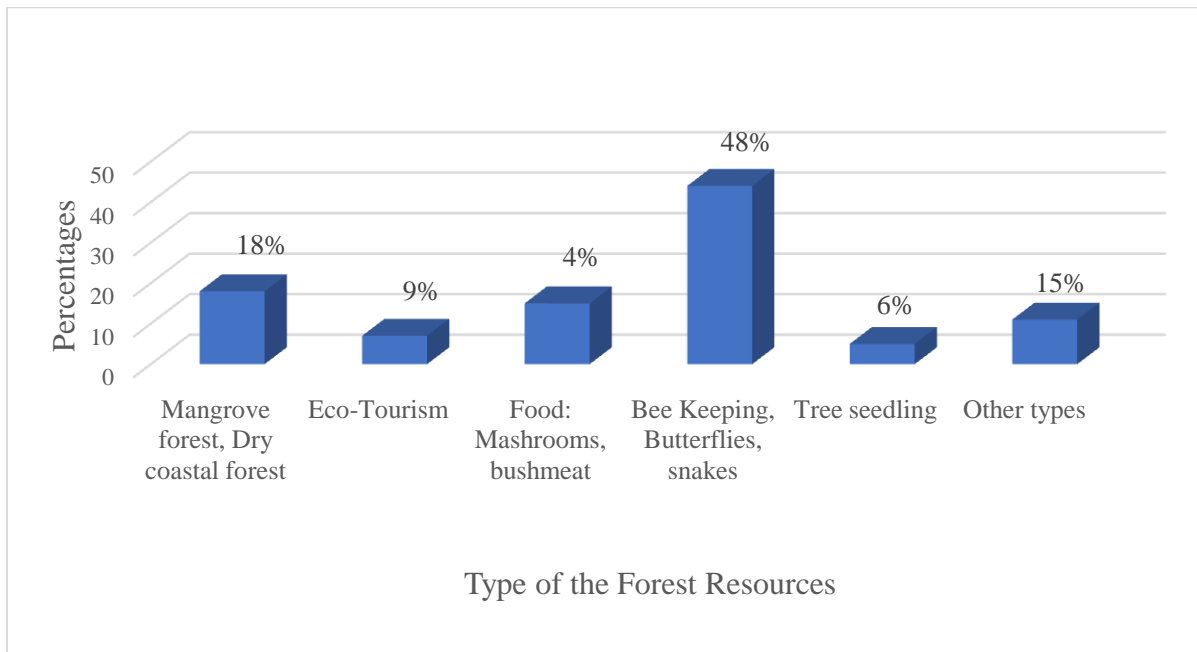


Fig. 2. Types of forest resources

Mangrove seedlings are the types of forest resources that you access from the forest (NPH75).

Butterflies, grass, herbals, firewood are the types of forest resources that you access from the forest (NPH26).

It also became apparent that the government guidelines support the application of the establishment of boundaries for forest resource use and users:

The forest act 2016 is significant in guiding the utilization of forest resources. The monthly collections of fuel-woods are regulated by KFS and certificates are required for services and fishing permits, especially at the Mida Creeka (PH5).

The resource users are required to have a conservation group registered with a valid certificate and have knowledge on reptile care and conservation as a rule governing the collection of the resources from the forest (PH57).

In summary, these findings demonstrate as indicated by both participating and non-participating communities in forest management that, there are numerous types of forest resources available in Arabuko Sokoke Forest Reserve (e.g), honey, fruits, mushrooms, fire

wood and butterflies) and only users group/registered members are allowed to use a particular resource from the forest as long it is acceptable and does not endanger the species extinction [23,24,25].

The respondents were then asked to explain the boundaries for gathering the various forest resources from both participating and non-participating communities. The study revealed that one of the boundaries is that one has to be a member of a CFA or user group in order to be eligible to get resources from the forest:

Before you go in the forest, you must be a member of a particular user group (PH1, PH17 and PH66).

Also obtaining a permit from KFS was also identified as one of the procedures as demonstrated by the following respondents:

You have to get a permit from the respective department like KFS for collecting the resources in the forests (PH2).

Obtaining permit from KFS is the procedure for collecting the resources in the forests (PH4).

By getting a permit from KFS and going to the forest 3 days a week (Monday, Wednesday and Friday) is the procedure for collecting the resources in the forests (PH37).

Also, LBC 5 reported that:

The rules governing the forest dictates that forest users need to limit the collection of endangered species to avoid population decline.

Furthermore, PH47 said that:

There are specific times and duration for the forest user to access the utilization zone.

PH 69 stated:

Members of the CFA are not allowed to use an axe saw when collecting firewood. If a person is found using an axe or saw to collect firewood, he or she is barred from the forest.

Furthermore, LBC 3 stated:

There are specific days for firewood collection, notably Monday, Wednesday and Friday and children are barred from collecting resources from the forest.

It was surprising that the non-participating communities were fully aware of the forest resource use boundaries. They explained the boundaries as follows:

One has to present to the forest management authority the relevant documents and interviews done before collecting resources in from the forest (NPH48).

One also has to be a user group member to get resources from the forests (NPH61 and NPH5).

When collecting resources from the forest you are not required to engage in unlawful activities such as deforestation, felling down live trees and killing of the wild animals (NPH7).

Any interested individual member willing to carry out any activity from the forest must first be registered by the user group and have an identity to access the utilization areas (zones) in the forest (NPH73).

You have to apply for a user license for the collection of the resources from the forestry (NPH81). The results agree with the findings of [3, 4, 10, 26, 27, 28, 31 and 32].

The study examined the advantages of forest resource use boundaries to the forest depended communities living adjacent to the forest. They gave the following advantages. In the case of

PFM participating communities they explained that the benefits for the forest resource use and users' boundaries aid in making sure that there is continuous income for the community (PH2). Further, (VE2) reported that forest limits are windbreakers and source of rainfall attraction. Additionally, they help them in getting food-like wild fruits and edible caterpillars which are collected and consumed by the communities. In addition, (PH21) reported that they aid in maintaining honey through bee-keeping. (LBC4) said that resource use and users' boundaries help in the provision of fire wood for cooking. Also the community forest organization and groups market the forest resources e.g. pupae to get money for buying products and services which greatly support their living standards (PH40) among other benefits.

The majority of the non-participating members in forest management suggested that they have not directly benefited from the establishment of the PFM forest management boundaries. However, it emerged that the non-PFM community are also indirectly gaining from the resource use and users' boundaries as this has actually boosted the protection of the forest, which functions as the source of rainfall attraction in the place, thus making it possible for them to farm cassava, pepper and other crucial products as a result of appropriate rains.

Furthermore, from interview sessions with the KFS3 and KEFR11 informant, reported that resource use and users' boundaries establishments are necessary to curb encroachment, enhance conservation of forest resources and reduce human-animal conflict.

Moreover, KFS 1 reported that:

Livelihoods of Community Forest Association members were poor and depended mostly on poaching both trees and wild animals before resource users' and forest boundaries were establishments and there was also an uncoordinated system of life before introducing the user groups. The findings on the benefits of the forest resource use boundaries are supported by [31, 32, 26, 29, 30, 14 and 1].

4. CONCLUSION AND RECOMMENDATIONS

Based on the findings on the extent to which participating forest management boundaries in Arabuko-Sokoke Forest Reserve are developed,

it is concluded that forest management boundaries in Arabuko-Sokoke Forest Reserve are essential in enhancing forest management. The advantages of forest resource use and users' boundaries are that they control the unlawful exploitation of forest resources. Boundaries establishments are essential to suppress infringement of forest management laws, destruction of forests and boost conservation of forest resource. Based on the above conclusions, it is recommended that, policy makers need to clearly define boundaries for resource use and resource users' for enhanced conservation of the forest resource and improved community livelihoods. There is also need for continuous collaboration of the government agencies and the forest adjacent communities in the establishment of the forest resource and users' boundaries for sustainable forest resource governance.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

Ethical consideration was considered during the study. The researcher clarified research advantages to all participants and ensured privacy during data analysis and obtained approval letters for the study from Kenyatta University Ethical Review Committee and a letter of authority from National Commission for Science, Technology and Innovation which is responsible for research authorization in Kenya.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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