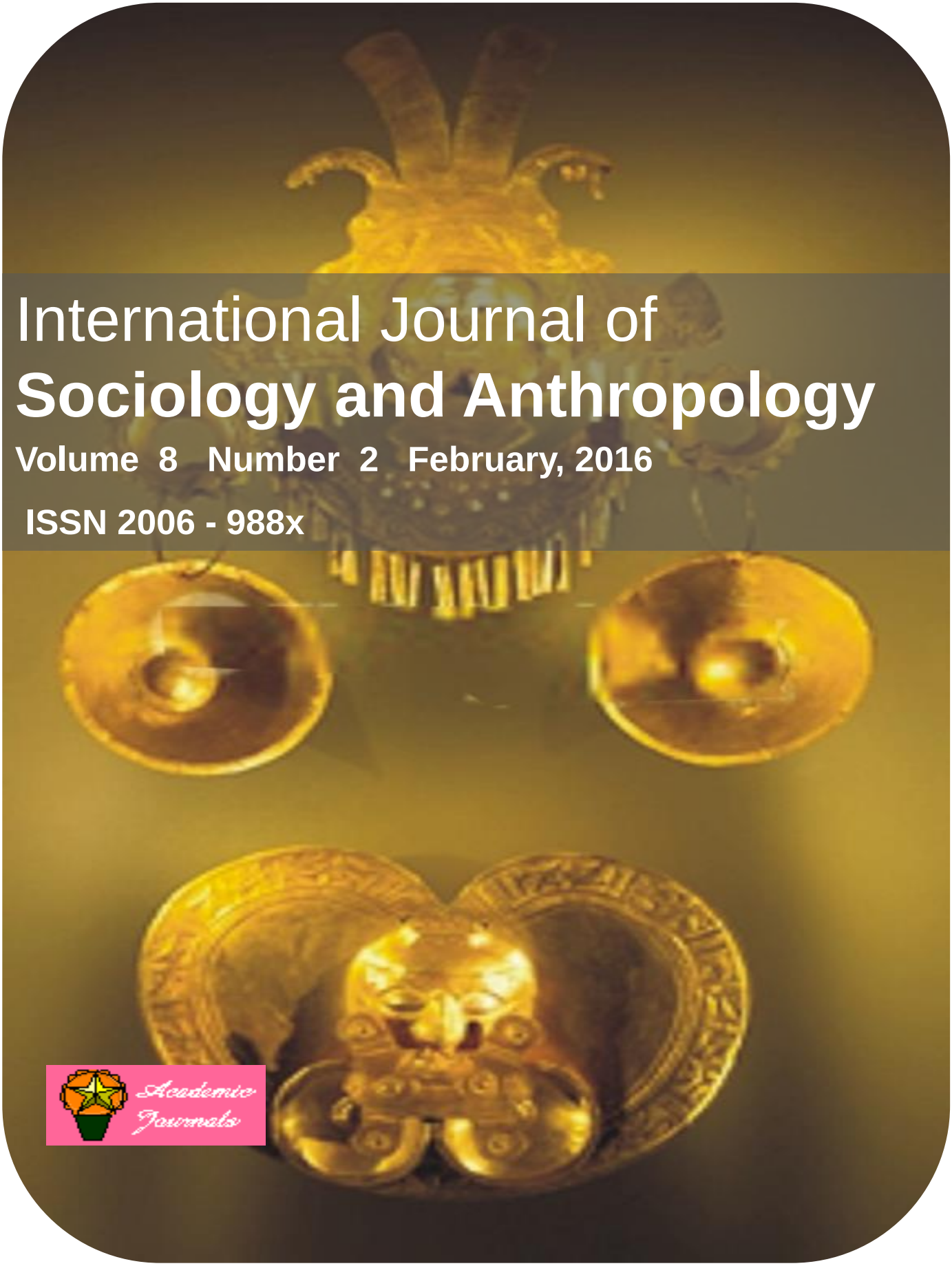

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Full Length Research Paper

Community empowerment through participatory resource assessment at Kathekakai settlement scheme, Machakos County, Kenya

Baaru M.W[1] and Gachene C.K.K[2]

[1]Department of Environmental Studies and Community Development, Kenyatta University, P.O Box 48344-00100, Nairobi, Kenya.
[2]Department of Land Resource Management and Agricultural Technology, University of Nairobi, P.O Box 29053-00100, Nairobi, Kenya.

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Participatory mapping is a power tool in resource management. Through this exercise communities are able to identify changes in natural resources and make decision on how best to manage the change. The study analyzed changes in natural resources in Kathakakai settlement scheme, Machakos County using participatory resource mapping, with the aim to discuss possible effects. The area, which used to be a ranching enterprise for nearly a hundred years, was sub divided in 1995 into individual farm holdings with average farm size of 2.5 hectares per household. Individual farmers cleared the land for agricultural activities and other land developments. The results show that natural resources have decreased since the ranch became a settlement scheme in 1995. Farmers indicated that the natural forests had decreased and were replaced by exotic trees. Vast land was cleared for cultivation, rivers, and dams had dried-up while soil erosion had increased. Majority of farmers (98%) said they had observed a general change in the climate of the area. They cited declining crop production (29%), increased drought (15%), and increased temperatures (10%) as some of the major pointers to climate change. However, farmers adopted various adapting and coping strategies. Drought tolerant crops (25%), early maturing crops (17%), and water harvesting (14%) were some of the strategies adopted by farmers in response to emerging changes. The results also show that resource based management at the community level is still a challenge and a lot of investment needs to be done in this field for sustainable management.

Key words: Community empowerment, land subdivision, human settlement, population growth, agricultural activities.

INTRODUCTION

Participatory mapping is the interactive approach that enables local communities create and represent visual and non-visual data based on their local knowledge. One of the strengths of participatory mapping as a research

*Corresponding author. E-mail: bmwamuyu@gmail.com. Tel. +254-020-722267824.

method is that it allows different features of a particular place, and the interplay between them, to be explored simultaneously. These features may range from natural physical features, resource and social cultural features known by the community.

Participatory mapping is a powerful tool to good governance, and this has lead to increased use of this initiative for the last 20 years throughout the world (IFAD, 2009). It is a useful medium for communities to communicate land related information at present, and future needs to government to better understand the community and environment (McCall, 2004). The exercise facilitates management of land, resources, and supports community advocacy on land related issues (Di Gessa, 2008). This is one of the best ways to 'empower' community, as participation prioritizes local decision-making and reinforces responsibilities. The ability of individual citizens and communities to share their understanding of the past, present and visions for the future is an important pre-requisite to informed planning and, through this, to building a consensus on complex issues such as sustainable development (Curwell and Hamilton, 2003). Through visual data, communities are able to communicate long but invisible history of managing resources. The process hence assists the community to articulate and communicate desired management plans to local or regional planners, which could enable the community to access productive natural resources and promote decentralized management of resources (Aberley, 1993). Participatory mapping therefore contributes to planning and management of local resources by enabling the community information to be incorporated and compared with government planning information and processes (IFAD, 2009).

In a number of cases worldwide, communities have succeeded to demand for legal recognition resource rights through maps (McCall and Minang, 2005). For instance; in Guyana, Amerindian people claimed ancestral land titles (Griffiths, 2002) as a result of participatory mapping of resources through Participatory Geographical Information Systems (PGIS); the Zuni pueblo of New Mexico prepared digital maps of 'non-graphic descriptions' of their appropriated lands to receive a quarter of a million acres as compensation (Marozas, 1991). In the Philippines, claiming Ancestral Domain Title is conditional on preparing a resource management map for the area (Rambaldi and Callosa-Tarr, 2002); and in Indonesia, through participatory mapping it was possible to identify traditional village territories and competing rights claims (Sirait et al. 1994), that were crucial for planning. Futherstill, the Ogeik, Sengwer and Yaiku indeginous communities in Kenya were able to initiate their own ancestral land rights, cultural rights and natural land resource management projects after a participatory resource mapping exercise carried out in 2006 (Muchemi et al., 2009).

This study sought to use farmers' knowledge to determine changes in natural resources (for example, land, water, forests, soil) at Kathekakai location, Machakos District and assess strategies used by community to cope with these changes

METHODOLOGY

Data was collected through focus group discussion (FGDs) during which a resource mapping exercise was also carried out. The discussions were conducted in a free environment where the participants commented, asked questions or responded to comments of others. Mulwa and Nguluu (2003) have recommended similar approach of collecting information using FGDs. Most of the studies on social economic dynamics as well as natural resource management employ FGDs (Odimegwu, 2000). In this study, FDGs were used to establish changes that have taken place since the first people settled in Kathekaka in 1995. A Participatory Rapid Appraisal exercise involving 30 farmers (13 men and 17 women) from Kathekakai location was conducted through focus group discussion and resource mapping. Based on the objective of the study, two FGDs consisting of 12 members each were formed. The first group consisted of farmers who settled before year 2000 and who visually presented Kathekakai as they found it when they first settled. The second group had farmers who settled after year 2000 and they drew visual representation showing the current resource situation of the area. Household interviews were carried out, with 62 farmers (36 men and 64% women) who expressed their views on changes that have taken place and the coping strategies used. A comparison of the two visual sketch maps was made.

Study site

The study was carried out at Katheka-kai Settlement Scheme, in Machakos County of Kenya (Figure 1a and b). The area, which was a ranching enterprise for nearly a hundred years, was sub divided in 1995 into individual farm holdings with average farm size of 2.5 hectares per household. Total population as per 2009 census was about 15000 Individual farms. The land was cleared for agricultural activities and other land developments. Climate in Machakos County is typically semi-arid with mean annual temperature varying from 15°C to 25°C and mean annual rainfall of 700 mm. Rainfall distribution is bimodal with the long rains starting from March and ending in May, and short rains from November/December to early January, recording average seasonal rainfall of between 300 to 400 mm and 310 mm respectively. Short rains are more reliable than the long rains and therefore most important for agricultural production. Soils are mainly luvisols and of low inherent fertility (Gicheru and Ita, 1987). The main agricultural practices are crop and livestock farming. Crops grown include maize, beans, peas, millet, and sorghum, while poultry and cattle rearing are the main livestock activities.

RESULTS

Farmers' characteristics

According to the farmers, the farm was initially a co-operative society. The enterprise was poorly managed and divided to individual shareholders and hence, the

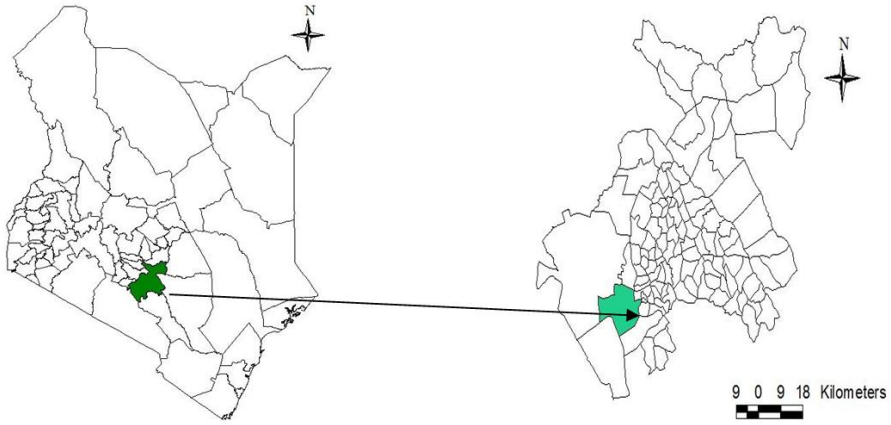

Figure 1(a): Map of Kenya showing Machakos district ; **(b)**: Map of Machakos showing Kathekakai location.

Table 1. Coping strategies to change

Coping strategy	% of respondents
Drought tolerant crops	25
Early maturing crops	17
Water harvesting	14
De-stocking	10
Conservation agriculture	6
Irrigation	5
Off-farm employment	8
Change of livestock breeds	3

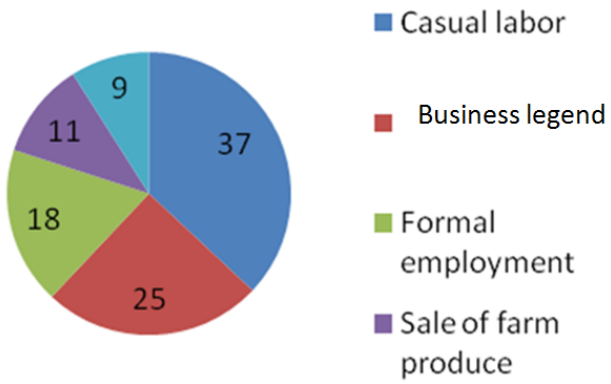

Figure 2. Source of income.

land is now under private ownership. About 71% of the land is owned by men. Women own 8% mostly through succession after death of the husband. The rest (21%) is under family ownership. Although this is a farming community (92%), most households derive their income from casual labor (37%), business (25%), formal employment (18%), sale of farm produce (11%) and remittances (9%) (Table 1).

Community resource base recall

Figure 2 shows group one using their local knowledge to draw a visual sketch map of resources at Katheka-kai location before year 2000. Different types of old natural and traditional trees and shrubs were available at the time of settlement (Figure 3). A range of Acacia tree varieties was common in the area. The rivers that passed through the area had clean, safe drinking water and that the rivers flowed throughout the year. Big earth dams for water harvesting had been constructed and wind vanes were used to pump water into well established water tanks throughout the ranch, both for livestock and human drinking. The roads, though not many were well maintained during that time.

Changes in resource base

Figure 4 shows the two focus groups drawing sketch map of resources at Katheka-kai location by year 2009. The ranch was endowed with a lot of natural resources according to farmers. Presently, the scenario has changed as most of the resources are no longer in existence (Figure 5), and even where they exist, they are in poor condition. The number of people settling is increasing year after year, a situation farmers associated to its proximity to Nairobi, the capital of Kenya. This has led to more land being cleared to pave way for cultivation and other developments. Natural trees have also been

Figure 3. Group one drawing resources before 2000.

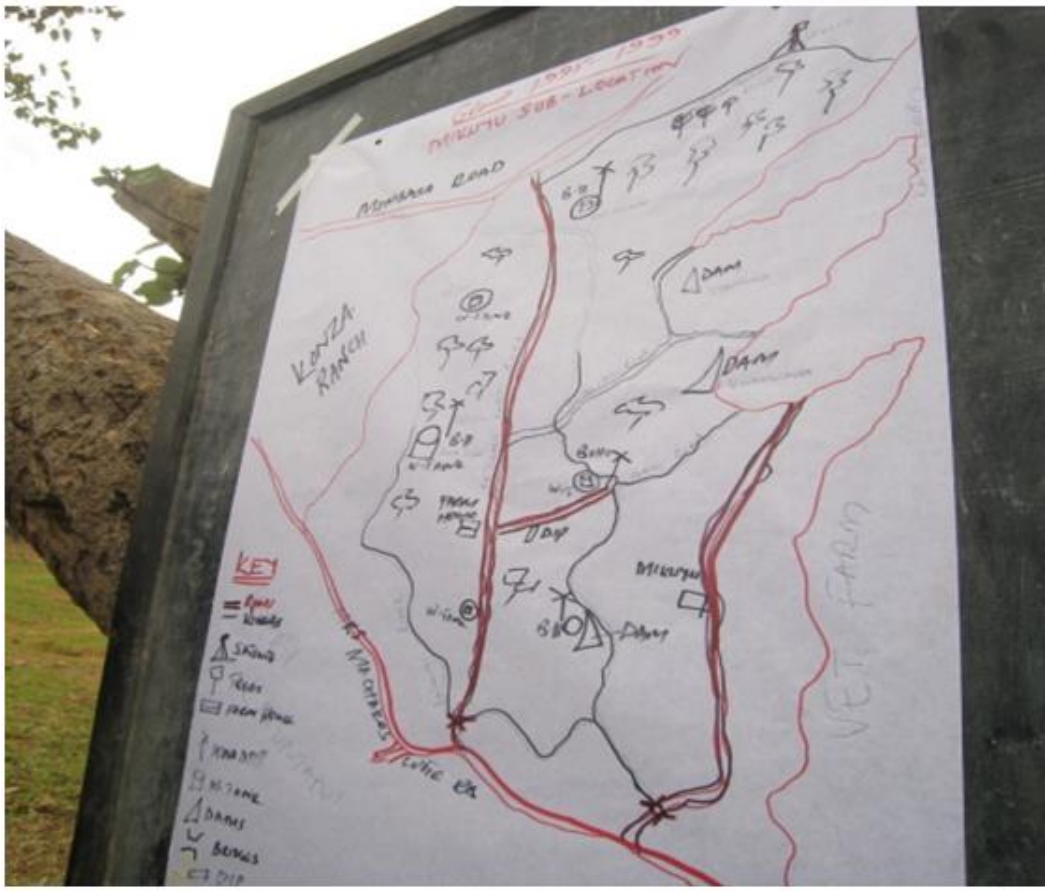

Figure 4. Sketch map showing resources at time of settlement.

Figure 5. Group two drawing sketch of resources at present.

cut down to cater for various uses including building, firewood and charcoal, and have been replaced by exotic trees for example, grevillea. Farmers reported the opening of new land and cutting down of trees as major contributing factors to increased soil erosion that has led to declining land productivity, a situation that has increased food insecurity and poverty in the area. The study observed this during household interviews between September and October, 2009 where school going children were still at home due to hunger. This was later confirmed when during one of the meetings, the Ministry of Agriculture staffs were seen distributing food and planting seeds to the farmers.

Rivers that used to be annual have now become seasonal and piped water never runs anymore. Most households either go afar off distance to draw water or buy from people who have either dug boreholes or constructed dams. The trend, according to the residents is worrying as the ever increasing population has forced people to settle on mountains, hills and cultivate along the riverines which has essentially interfered with river water source and flow. This, according to residents has accelerated the rate of soil erosion and has caused most of the river water to be unfit for consumption. The activities have also affected the transport system as most roads get filled up with mud from soils eroded from the hills rendering them impassable (Figure 6).

Farming systems

Farmers in this area practice mixed farming with about 45% of them practicing crop production. However, farming systems have changed with time. Although a larger number of farmers grow traditional crops, the traditional crops for example are sweet popato (19%), cassava (16%), sorghum (15%), green grams (9%), millet (8%), a few able are abandoning them for modern and high value crops for example, fruits and vegtables mostly for economic purposes.

Livestock takes about 31% and is hence an important component of the farming systems in this area, highly contributing to food (40.2%), income (33.5%), manure (12.3%) and family labour (7.9%). In order of importance, farmers keep poultry (mostly local chicken), cows, sheep, goat's bulls and oxen. From an area that was 100% free range grazing system, other systems have since come to play for example, semi- grazing (33.9%) and zero grazing (19%). Residents identified land and subdivision as the main cause of these changes. However, free range and semi-grazing systems also accounts for increased soil erosion as large numbers of livestock usually graze on

Figure 6. Settlement on one of the hills in Katheka-kai location, Machakos district.

land with very low vegetation.

Farm forestry (14%) is also an important farming practice system in Katheka-kai. About 64% of farmers have planted different trees for example, agroforestry trees such as Grevillea robusta and Melia volkensii (34%), fruit trees for example, mangos, citrus and tree tomatoes (4.9%), and leguminous trees such as Calliandra calothyrsus (2.4%). The trees are planted for various reasons including wind breaking (12%), shade (11%) and firewood (10%). Fruits are planted for household use as well as income generation.

Coping strategies

Most (98%) of the farmers believe that climate has changed with time. Some factors identified as contributing to change include cutting trees, clearing land for cultivation, sand harvesting, increased population, increased fuel wood demand and lack of planting trees. They agreed that this change had decreased crop production (29%), increased drought and temperatures (15 and 10% respectively). However, farmers have adopted measures to adapt and cope with climate change (Table 1).

DISCUSSIONS

Changes in resources have been observed at Kathekakai location, Machakos District since 1995 when land was subdivided to private owners. The new settlers were at liberty to use land in a way to get maximum benefits. It has been reported that when individual members acquire private land with title deeds, they get rights to make land use decisions based on the returns (Mundia and Muranyan, 2009; Serneels et al., 2001). According to Mundia and Muranyan (2009), changing land tenure policy results in expansion of agricultural land. Due to its proximity to Nairobi, the capital city of Kenya, the area has continued to attract a big population as a periurban area. Farmers at Katheka-kai location have continued to clear more land and cut down trees to pave way for agricultural land to meet demands for the households as well as for the ever increasing population. Therefore, small farmers are forced to work harder, often on shrinking farm sizes on marginal land, to maintain household incomes. A study carried out by Laukkonen et al. (2009) reported population growth as a major driver of environmental change in Africa, causing significant impacts on the natural resource base with the primary and most direct impact as land cover change mainly through opening of new land for agriculture, and other developments. Work carried out in the same area also confirms this (Gathaara et al., 2010).

The area has witnessed changes in farming systems. Only a few able farmers have abandoned local and traditional crops and adopted those deemed to have high returns and preferred by the swelling population. The very few able farmers have embarked on irrigated agriculture and green house farming. It has been reported that population growth shapes patterns of production and consumption in the world usually by increasing demand for food, water, arable land, fuel wood, and other

amenities (UNEP, 2008), and hence determines the farming systems in an area. However, the increased agricultural activities lead to increased encroachment into forests and woodlands, soil erosion and infertility and ultimately food insecurity and increased poverty levels (MOA, 2008).

As good as these activities are in sustaining household livelihoods in the short-run, if poorly managed they may have detrimental impacts on environmental resources. For example felling of trees for agricultural land and timber products, settlement on mountain have left water-sheds bare, threatening water catchment functions of forested watersheds (MOA, 2009). Extensive economic activities and population congestion has increased pressure on water for various uses including domestic, livestock and industrial use, among others, causing water allocation and use conflicts. This may result in natural resource base degradation, which in turn impinges on the livelihoods, with most of the consequences more pronounced in the rural communities (Laukkonen et al., 2009).

With climate change setting in, diversification in the agricultural activities becomes paramount to cushion against adverse effects. It has been indicated that in the absence of alternative opportunities, lack of sustainable management of natural resource and alternative opportunities to meet the needs of the increasing population results in environmental degradation and resource depletion (Laukkonen et al., 2009). Farmers in this area are taking precaution by adopting some of the coping strategies for example, drought tolerant crops, early maturing crops, water harvesting and de-stocking. However, a lot of advocacy on mitigation and adaptation strategies should be done for increased adoption rate.

Community mapping is based on that fact that “Knowledge is Power”. By pooling, sharing and making information widely available, takes decision making from the hands of gatekeepers to community at large (Roaf, 2005). The experience enable local people make independent, self-mobilization initiatives, aimed at making their situation better, which is a strong indicator of empowerment. For instance, a community in Cameroon was able to reclaim a forest and develop a forest management plan that could benefit both community living around and country at large. By gathering local perception on trend of resources in Kathekakai, Machakos, farmers acknowledged that there was evident change and that if “Business as Usual” continued, the natural resource risked being degraded beyond restoration and that there was need for the community to act and save their resource base.

Conclusion and recommendation

The process of resource mapping seemed to open the mind of farmers to understand the past, present and future situation, and the problems facing the community. Decreasing trend in natural resource base after settlement was witnessed and associated with increased population and poor management especially of communal resources. Farmers in this area are aware of environmental change though issues on mitigation and coping strategies need to be addressed.

Most of the farmers still rely on their past farming experience, and this poses a great challenge to sustainable development of the study area.

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Conflict of Interests

The authors have not declared any conflict of interests.

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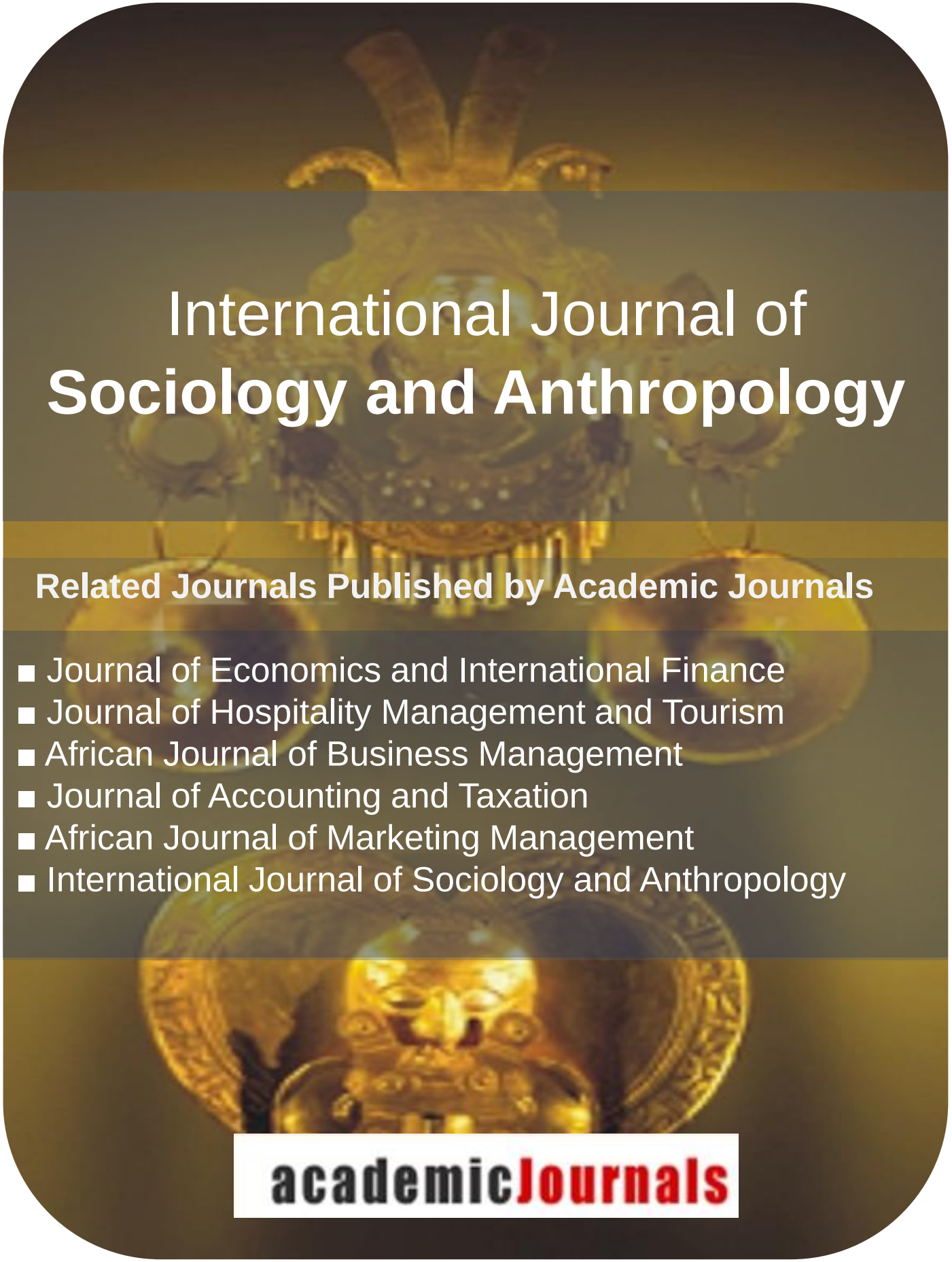

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