

**LOCAL COMMUNITY PERCEPTIONS OF THE CAUSES AND IMPACTS OF
DEFORESTATION OF KAPTAGAT FOREST, UASIN GISHU COUNTY**

Njeru*, J.M., & Bett, S. J.

Department of Environmental Studies, Chuka University, P. O Box 109-60401, Chuka

Received January 2017; Revised March 2017; Accepted June 2017

ABSTRACT

Understanding the local community perceptions and attitudes towards natural resource conservation is recognised a useful step in identifying strategies of involving community members in conservation programmes. The main aim of the current study was to determine the local community perception of the causes and effects of the deforestation of Kaptagat Forest. Descriptive research design was used to determine the causes of deforestation, extent of deforestation, the socio economic impacts, and the measures that have been put in place to control and stop further deforestation. Systematic random sampling was used to administer questionnaires to the target population and results analysed using chi-square tests. The results showed that the respondents differed significantly on the causes of deforestation. of Kaptagat.. Apparently illegal logging, charcoal burning and firewood were identified as the most important drivers of deforestation. Majority of the respondents felt that the forest has been highly deforested. The majority felt that reduction in water volumes in streams, changes in rainfall patterns, increased soil erosion and siltation were making the community worse off socio-economically. Furthermore, the community felt that there was a strong relationship between the level of poverty and the level of deforestation of Kaptagat Forest, thus revealing an understanding of the tripartite relationship between development, environment and conservation of the forest. In addition, the informants pointed out the need for increased local community involvement in conservation of the forest through strengthening of CFAs, creating more conservation awareness and encouraging sustainable use of forest resources. This study provides important insight and data on what has increasingly been recognised as crucial conditions for effective management of natural resources, particularly the management of forests in the rural settings.

Keywords: local community perception, deforestation, Kaptagat forest, natural resource conservation

*Correspondence to: **Justin Njeru**, Department of Environmental Studies, Chuka University, P. O Box 109-60401, Chuka. Email: jusmugendi@gmail.com

INTRODUCTION

All over the world, forests are crucial ecosystems that play major economical, ecological and social-cultural roles. Forests serve as a habitat for a variety of wildlife species which attracts tourists and thus earn the country foreign exchange (Mahanty *et al*, 2006). Forests are also water catchment areas and control soil erosion (Van Noordwijk, 2008). In addition, forests play a critical role in carbon sequestration thus mitigating the climate change challenge (Verbist, *et al*, 2011; Ribot *et al*, 2010; Carney, 1999). Unfortunately, though forests provide all these benefits, most of the forests especially within the tropics are facing serious deforestation (Porter-Bolland *et al*, 2011) and are decreasing at an alarming rate (FAO, 2010, Uriarte *et al*, 2010). If deforestation is not reverted, it can lead to decline in income, habitat destruction, soil erosion, water scarcity, flooding and siltation of rivers and streams (Fearnside, 2013). Therefore, it is imperative that stringent measures are put in place to eliminate the drivers of deforestation.

Drivers of deforestation tend to be varied and context specific (Porter-Bolland *et al*, 2011) but forest transition models have revealed that deforestation forces include lumbering, charcoal burning, clearance to provide land for agriculture to meet needs of the increasing population and also to create room for human settlement, (Hosonuma, 2012; Da Fonseca, 2007; Geist and Lambin, 2002). Increasing need for fuel in developing countries and the need to pave way for road and railway construction are also among the biggest drivers of deforestation (Laurance, 2009).

Although conservation of forests should be a matter of culture and ethics (Griscom, 2009) slowing down deforestation and forest degradation at both national and global scales remains an enormous challenge (Porter-Bolland *et al*, 2011; FAO, 2010). In Kenya for example forests occupy a paltry 2.8% of the total land area but despite the relatively small forest cover, there is a high dependence on forests for provision of wood and non-wood products (Guthiga and Mburu, 2011). The major forested areas in Kenya are the Aberdares, Mt.Kenya, Mt Elgon, Cherangani and Mau forests and these areas have witnessed alarming rates of degradation (Bailis, 2009; FAO, 1993). Kaptagat Forest is also a significant forest in Kenya as it is rich in biodiversity of conservation concern and is also one of the most important water towers in the country (County Government of Elgeyo-Marakwet, 2013, Matiru, 2002). Therefore, there is need to ensure that

workable strategies are put in place to safeguard the forest from farther destruction and also to reclaim the areas that have been degraded.

Strategies that can be applied to revert the trend in deforestation tend to be contentious because the factors that explain the causes of deforestation are divers (Porter-Bolland *et al*, 2011). However, there seems to be a general agreement that local people are central to the success of sustainable management of natural resources such as forests (Guthiga and Mburu, 2011; Bray *et al*, 2008; Naughton-Treves *et al*, 2005; Tanya, 2004). In this regard, the concept of Participatory Forest Management (PFM) is widely used in developing countries (Agrawal *et al*, 2008; Koech *et al*, 2009; Mbuvi *et al*, 2009) whereby people with a direct stake in forest resources are involved in all aspects of forest management, including policy formulation processes and implementation. In order to garner local community support in forest conservation, the Kenyan government encourages local communities living in forested areas to form Community Forest Associations (CFAs) to enable them participate in forest conservation and on the process improve their livelihoods (Agevi, *et al*, 2012; Thenya, *et al*, 2007; GoK 2005, GoK, 2007). For example in Kaptagat Forest there is the Kaptagat Forest Users Group which practice forestry as an income-generating activity through seedling farming.

Over the last few years, Kaptagat Forest has witnessed rapid deforestation and degradation despite the fact that it has been gazetted as a forest reserve (County Government of Elgeyo-Marakwet, 2013). The main drivers of deforestation have not been fully documented but information available suggests forest fires and increased felling of trees mainly for charcoal, timber and fuel-wood. Unfortunately, there is no data that is available to substantiate this argument and provide the necessary background information upon which the forest managers can come up with conservation strategies that enjoys the support of the local community. Faced with this problem, the current study sought to determine the underlying factors that have led to deforestation of Kaptagat forest and the various forest conservation strategies employed by various forest stakeholders to conserve and manage the forest. The objectives included establishing the extent of deforestation, determining the drivers of deforestation, and evaluating the forest conservation strategies employed by the local community to conserve and manage Kaptagat Forest.

METHODOLOGY

Study area

Kaptagat forest is located in the Rift Valley, at latitude S 1⁰ 15.4726” and longitude E 36⁰ 45.068196” which is North West of Eldoret town, between the border of Uasin Gishu County and Elgeyo Marakwet. The present study was carried out in Kaptagat ward, in Ainabkoi Constituency of Uasin Gishu County.

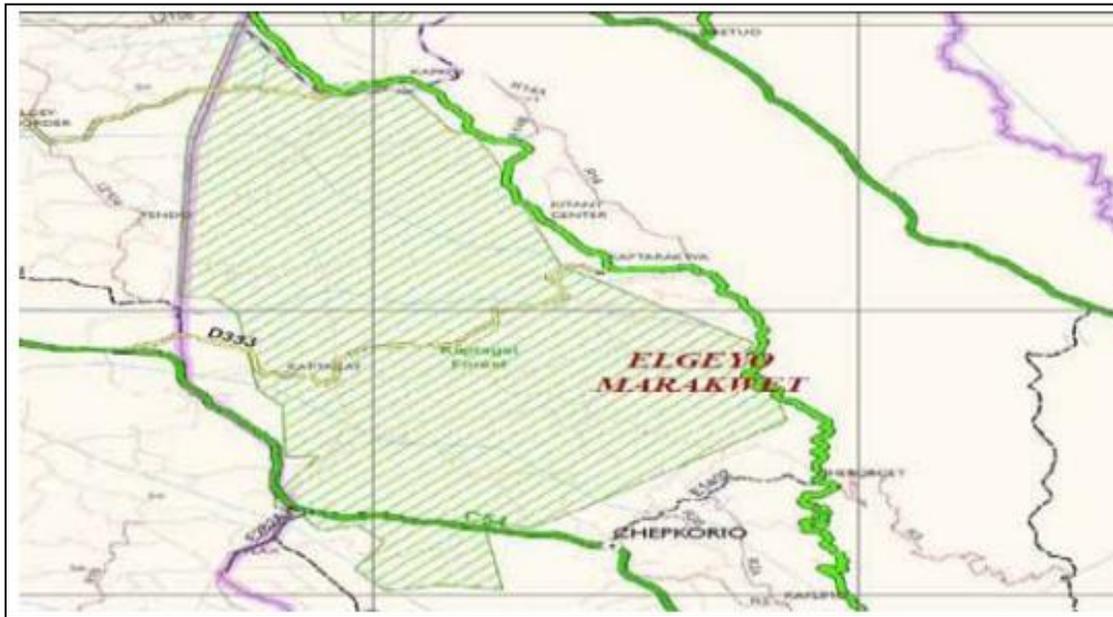


Figure 1. Map of Kaptagat Forest. (Source: County Government of Elgeyo-Marakwet, 2013)

Kaptagat Forest is an important water catchment area for rivers Naiberi, Elgarini, and the Torok Falls. It's a highland plateau in altitude falling gently from 2700m above sea level to about 1500m above sea level. The topography is higher to the east and declines gently to the west. Rainfall in the area ranges between 624.9mm to 1560.4mm with two distinct peaks occurring between March and September, May and August and dry spells that occur between November and February. Temperature generally, ranges from 8.40⁰C to 26.20⁰C with a mean of 18.0⁰C.

The Kaptagat Forest has three ecological zones which include the lower highland, upper highland and upper midland.

Within these zones vegetation varies a lot but mainly comprises of open grassland, scattered acacia trees, natural highland forest and bush land.

Kaptagat forest is rich in biodiversity ranging from animal to plants. Kaptagat forest as its own unique nature since it has the largest canopy after the Mau forest. Plants include shrubs in some parts lianas and climbers. It also contains tree species like cedar, rose wood and figs and the planted forest including the pines, cypress and eucalyptus species among others. Animals include the antelopes, black and white columbus monkey, snakes, rock hyrax, mice, and hare among others. Due to abundance of biodiversity the forest is of significant conservation concern and has been gazetted as Kaptagat Forest Reserve.

Within Kaptagat Forest the local communities engage in various economic activities, which include livestock rearing especially dairy farming. The local community also practices agriculture due to availability of deep fertile soils. Among the crops cultivated include maize, beans, peas, potatoes among others. Horticulture is also practiced in the area.

Sampling Procedures and data collection

Kaptagat has a population of about 41,105 people and a population density of 68.50 per square kilometer (KNBS, 2009). The female population is higher compared to that of men. The population lives in a rural setup which forms villages. To ensure effective coverage of the villages, we used systematic random sampling technique. We first obtained informed consent from the village elders. In every village, we marked the first household and then we used every third household. A questionnaire was given to the household head or in the absence of the household head, an adult family member. A total of 145 questionnaires were issued to sampled households in Kaptagat but usable questionnaires returned were 136, a 93.79% response rate.

Data were summarised into frequencies and percentages and chi-square test of goodness of fit was used to test the level of differences between the observed frequencies of responses and the expected responses. Open-ended questions were grouped into different categories based on similarity and analyses carried out.

RESULTS AND DISCUSSIONS

Extent and rate of deforestation

Results showed that 91.18% (124) of the respondents were aware of the ongoing deforestation within Kaptagat Forest. The respondents differed significantly ($\chi^2 = 40.181$; $df= 2$; $p=0.001$) on

their perception of the current extent of deforestation of Pombo, Pennon and Sabor forest blocks (Figure 2). Generally, most of them believed that Pombo was the most deforested forest block, (with 63.20%; 86 of the respondents). This situation was attributed to intensification of illegal logging particularly on the reforested areas. In addition, it was observed that Pombo forest block had seemingly large natural forest where there was evidence of charcoal burning.

The informants also differed significantly ($\chi^2 = 50.697$; $df = 4$; $p < 0.001$) on their perception of the current rate of deforestation taking place in Kaptagat forest. Apparently, most of the respondents gave a score of ‘high rate’ of deforestation (42.65%; 58) and an additional 28.68% (39) rated it as ‘very high’ as shown in Figure 3 below. They argued that despite the efforts that have been put in place to conserve the forest, destruction of the forest was still going on.

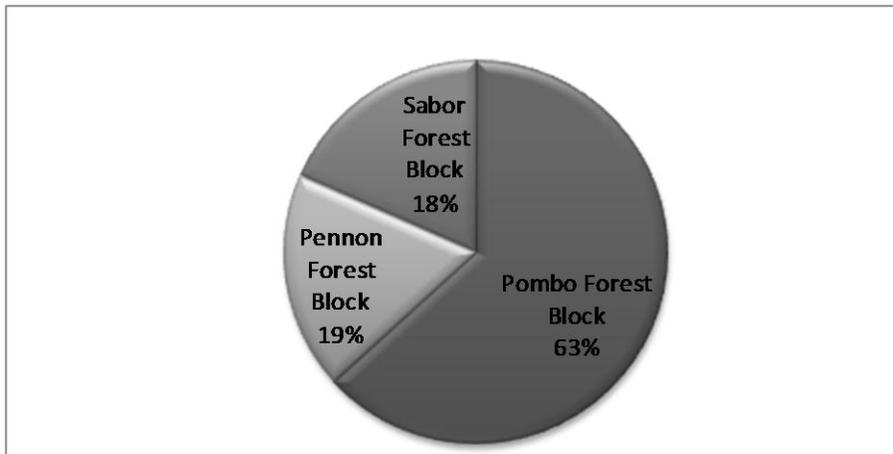


Figure 2: Community perception of the extent deforestation in Kaptagat Forest.

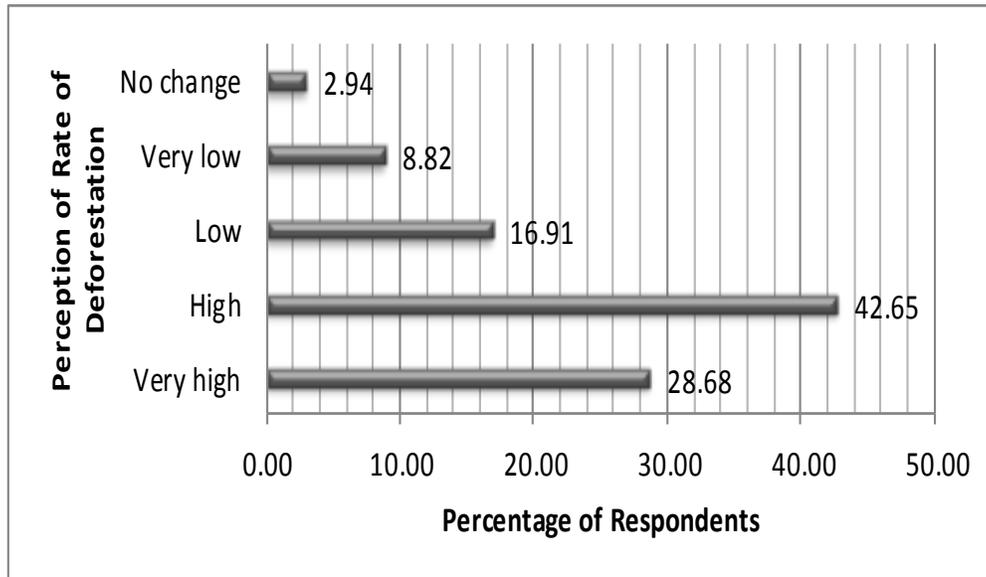


Figure 3: Community rating on the rate of deforestation in Kaptagat Forest

Forest benefits

Kaptagat Forest is beneficial to the local community in various ways as shown in the Figure 4. Although the informants differed significantly when asked to give the benefits of conserving Kaptagat Forest, ($\chi^2 = 149.864$; $df = 9$; $p = 0.000$), it was clear that most of the respondents (68.38%; 93) felt that the forest was an important water catchment area.

The most plausible reason for this observation could be that the community is well enlightened on the role of the forest in stabilizing the climate of the area. In this regard, 8.09% (11) of the respondents felt that the forest was important in enhancing the hydrological cycle of Kaptagat. In addition, the informants felt that the forest was beneficial to them by serving as a source of fuel-wood (32.35%; 44), providing habitat for wildlife (31.62%; 43), source of food (21.32%; 29), and a source of income to the households (15.44%; 18). Other benefits included tourists attraction (13.24; 18), and a source of medicinal herbs (5.15%; 7).

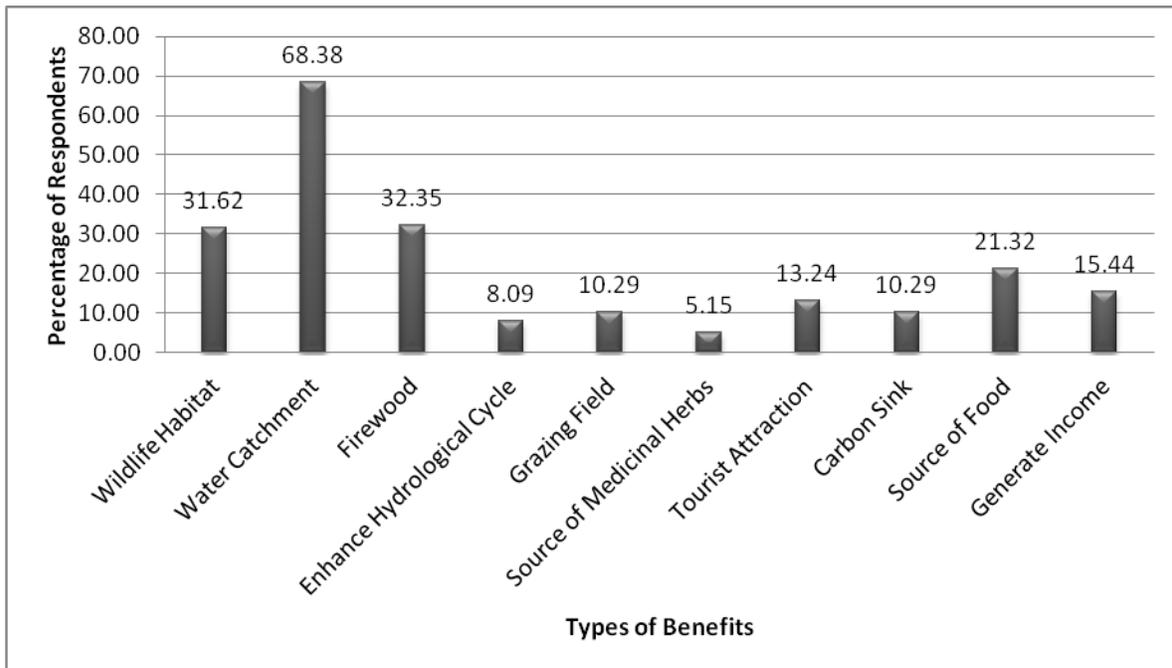


Figure 4: Perception of the community towards types of benefits derived from Kaptagat Forest

Community Perception of the Causes of Deforestation

The respondents felt that there were various factors that have led to deforestation of Kaptagat Forest. Although they differed significantly ($\chi^2 = 59.679$; $df = 9$; $p = 0.000$) concerning the causes of deforestation, it was clear that the majority of them believed that the process of deforestation within Kaptagat Forest was being driven by anthropogenic factors. Most of the informants (47.06%; 64) cited illegal logging; charcoal making (41.91%; 57) and fire-wood collection (38.97%; 53) as the most serious drivers of deforestation of Kaptagat Forest.

Socio-economic impacts of deforestation

The informants revealed that various challenges have arisen due to deforestation within Kaptagat (Figure 5). In this case the respondents differed significantly about their perception about the impacts of deforestation ($\chi^2 = 62.964$; $df = 6$; $p = 0.000$) but it was clear that the main impacts include reduced water volume in rivers (44.85%; 60) and alteration of rainfall patterns in the area (36.76%; 50).

Table 1 : Community perception of the causes of deforestation of Kaptagat Forest

Cause of Deforestation	Frequency	Percentage of response
Charcoal Burning	57	41.91
Timber	29	21.32
Firewood	53	38.97
Settlement	21	15.44
Corruption and Mismanagement	21	15.44
Illegal logging	64	47.06
Wild fires	32	23.53
Ignorance	7	5.15
Unemployment	25	18.38
Poverty	43	31.62
Other causes	47	34.56

These respondents related destruction of Kaptagat Forest with prolonged droughts that have been experienced within Kaptagat in the recent past. They felt that this has led to decline in agricultural production in the area, but this was not quantified. They also argued that the destruction of the forest has led to decline in the volume of water in River Naiberi and Pombo that they depend on. In addition, according to 30.88% (42) of the respondents, deforestation has caused loss of revenue to the community. They gave example of the inability to get firewood. According to 21.32% (29) of the informants, the community also felt that deforestation was leading to loss of biodiversity in the area. They explained that most of the indigenous trees in the forest such as cedar and fig as well as animal species like the Columbus monkeys were in serious threat due to the intense deforestation of the forest.

Conservation measures

Most of community members who participated in this study indicated that most of the measures that had been put in place to conserve Kaptagat forest had not helped much to control of deforestation. As shown in Figure 6, most of the respondents suggested creation of conservation awareness in the community (57.35% 78), enforcement of law and tough penalties to curb illegal logging (60.29%; 82), and supporting and strengthening the work of CFAs in Kaptagat (36.76%; 50).

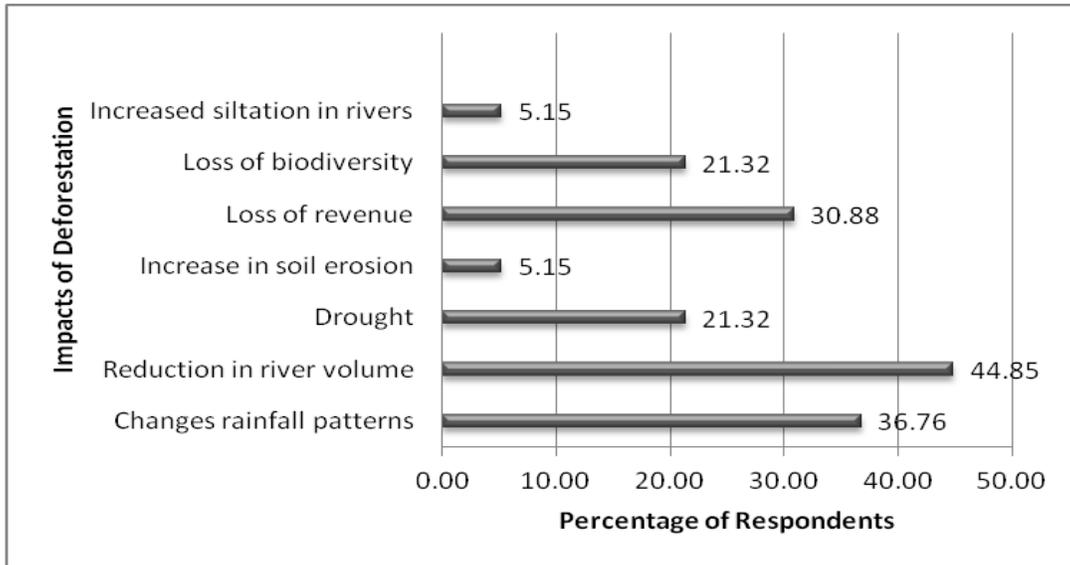


Figure 5: Socio economic impacts of deforestation

. Other measures suggested include establishment of more tree nurseries (8.09%; 11), reclaiming the degraded areas through afforestation and reforestation (15.44%; 21), encouraging agroforestry in the area (21.32%; 14) and promoting the shamba system (10.29%; 29).

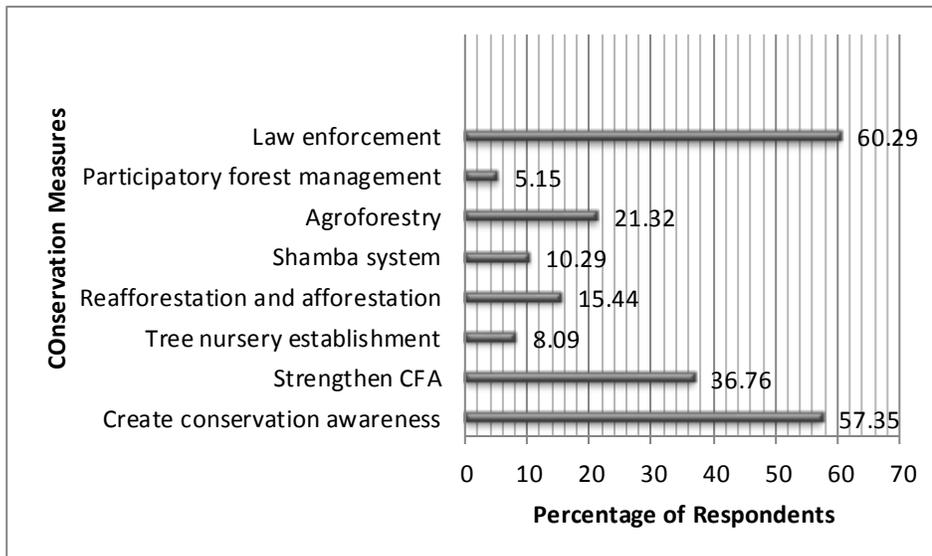


Figure 6: Community perception of the conservation measures for Kaptagat Forest

Though some of the suggestions given by the community to mitigate deforestation in Kaptagat have been implemented, it was observed that the strategies have not been successful. For instance reforestation and afforestation have been implemented but has not been successful since there is lack of cooperation among the community and the Kenya Forest Service (KFS) for example by allowing their livestock graze on the seedlings.

Finally, the respondents also suggested that foresters should encourage the effectiveness of CFAs that will ensure community involvement in conserving forest resources. With a proportion of 87.5%, most of the respondents were members of CFAs are members and only 12.5% are non-members (Figure 7). These differences in community membership to the CFAs were statistically significant ($\chi^2 = 8.53$; $df = 3$; $p = 0.036$)

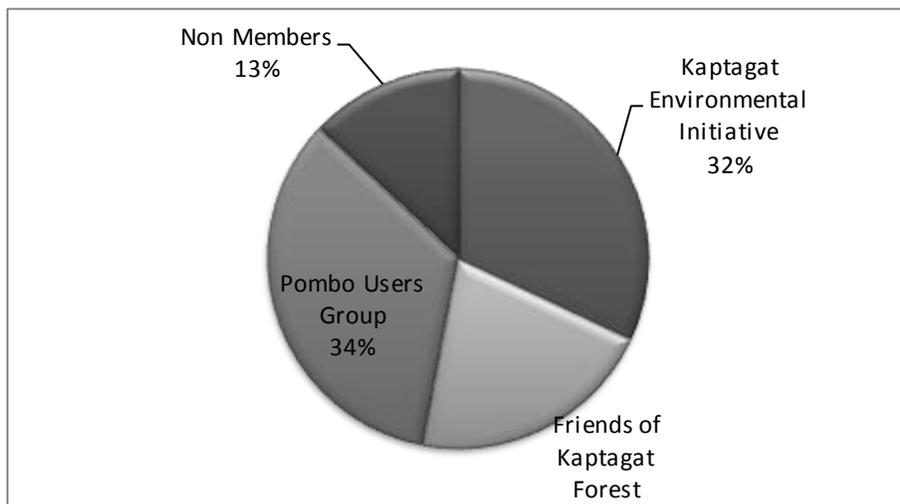


Figure 7: Community membership to CFAs in Kaptagat

CONCLUSION

Deforestation has a long term environmental implication for sustainable development as evident by global warming, biodiversity loss and soil degradation. While its negative consequences are undeniable, forest degradation has also contributed tremendously to community living standards. In the first place, forest is beneficial in that it is ascertained that, the exploitation of both NTFPs and TFPs aids in supply of food, energy, and materials for local craft and shelter. There is also the generation of personal income for individuals. Based on the findings from this study, three

important conclusions were made. Firstly, the community felt that there has been increased rate of deforestation of Kaptagat Forest. Apparently illegal logging, charcoal burning and firewood were identified as the most important drivers of deforestation.

Secondly, the respondents felt that deforestation of Kaptagat Forest has led to depressed rainfall, reduction in water volume in rivers, destruction of habitat for wildlife, loss of indigenous tree species and loss of revenue. The community felt that there was a strong relationship between their societal wellbeing and the level of deforestation of Kaptagat Forest, thus revealing an understanding of the tripartite relationship between development, environment and conservation of the forest.

Thirdly, the community felt that although the Kenya Forest Service (KFS) has adopted various strategies to promote sustainable management of Kaptagat Forest, it was evident that the community felt that the strategies being used are not effective in saving the forest from destruction. The respondents suggested more law should be enforced strictly and tough penalties should be given to curb illegal activities in the forest. They also suggested afforestation, reforestation, encouraging participatory forest management (PFM) and supporting CFAs in Kaptagat especially in establishment of more tree nurseries and encouraging sustainable use of forest resources. It was noted that the major limitation was ineffective community participation in the design and implementation of the strategies. KFS Kaptagat station is therefore highly recommended to emphasize the collaborative role of all stakeholders especially the community of Kaptagat.

REFERENCES

- Agevi, H, Wabusya, M, Tsingalia, H. M. (2012). Community Forest Associations and community-Based Organizations: Redesigning their Roles in Forest Management and conservation in Kenya. *International Journal of Science and Research*. 3(9), 1916-1922.
- Agrawal, A.A., Chhatre, A. and Hardin, R. (2008). Changing governance in the worlds' forests. *Science* 320: 1460-1462.
- Bailis, R. (2009). Modeling climate change mitigation from alternative methods of charcoal production in Kenya. *Biomass and Bioenergy*, 33(11), 1491-1502.

- Bray, D.B., Duran, E., Romas, V.H., Mas, J.-F., Velazquez, A., McNab, R., Barry, B.D., Radachowsky, J. (2008). Tropical deforestation, community forests, and protected areas in the Maya Forest. *Ecology and Society* 13, 56.
- Carney, D. (1999). Approaches to Sustainable Livelihoods for the Rural Poor. Overseas Development Institute (ODI) Briefing.
- County Government of Elgeyo-Marakwet (2013). Elgeyo-Marakwet County Integrated Development Plan,(ICDP) 2013). Accessed online 27th November, 2016. <https://roggkenya.org/wp-content/uploads/docs/CIDPs/ElgeyoMarakwet-County-Integrated-Development-Plan-CIDP-2013-2017.pdf>
- Da Fonseca, G.A.B. (2007). No Forest Left Behind. *PLoS Biology*. 5: p. 1645-1646.
- FAO. (2010). Global Forest Resources Assessment. *Forestry Paper* 163. Rome, Italy.
- FAO. (1993). The challenge of sustainable forest management: What future for the world's forests? Food and Agriculture Organization of the United Nations, Rome, Italy.
- Fearnside, P. M. (2013). Impacts of Brazil's Madeira River dams: Unlearned lessons for hydroelectric development in Amazonia. *Environmental Science & Policy*, 38, 164-172.
- Geist, H.J. and E.F. Lambin. (2002). Proximate causes and underlying driving forces of tropical deforestation. *Bioscience*,. 52(2): p. 143-150.
- Government of Kenya (GOK), (2007). *Sessional Paper No. 1 of 2007 on Forest Policy*. Government of Kenya Printers, Nairobi, Kenya.
- Government of Kenya (GOK), (2005). *Kenya Gazette Supplement Acts: The Forest Act, 2005*. Government of Kenya Printers, Nairobi, Kenya.
- Griscom, B. (2009). Sensitivity of amounts and distribution of tropical forest carbon credits depending on baseline rules. *Environmental Science & Policy*. 12: p. 897-911.
- Guthiga, P and J. Mburu. (2011). *Local Communities' Incentives for Forest Conservation: Case of Kakamega Forest in Kenya*. A Paper Presented at the 11th Biannual Conference of International Association for the Study of Common Property (IASCP). Theme: Survival of the Commons: Mounting Challenges and New Realities. Bali, Indonesia June 19th to June 23rd 2006.
- Hosonuma, N., Herold, M., De Sy, V., De Fries, R. S., Brockhaus, M., Verchot, L., & Romijn, E. (2012). An assessment of deforestation and forest degradation drivers in developing countries. *Environmental Research Letters*, 7(4), 044009.

**Journal of Applied Sciences, Engineering and Technology
for Development JASETD, Volume 1, Issue 1, June, 2017**

- Koech, C.K., Ongugo, P.O., Mbuvi, M.T.E. and Maua, J.O. (2009). Community Forest Associations in Kenya: Challenges and Communities. Kenya Forestry Research Institute (KEFRI).
- Laurance, W. F., Goosem, M., & Laurance, S. G. (2009). Impacts of roads and linear clearings on tropical forests. *Trends in Ecology & Evolution*, 24(12), 659-669.
- Mahanty, S, Mike, J. Nurse and Malla. Y. (2006). Reducing Poverty through Community Based Forest Management in Asia. *Journal of Forest and Livelihood* 5(1). 78-89.
- Matiru, V. (2002). Forest Landscape Restoration: Analysis of Existing Initiatives and Policy and Legal Framework in Kenya. IUCN-EARO and WWF-EARPO.
- Mbuvi, M.T.E., Maua, J.O., Ongugo, P.O., Koech, C.K. Othim, R.A. and Musyoki, J.K. (2009). Status of the Participatory Forest Management impacts on Poverty for Buyangu non-PFM area adjacent community: Kakamega Forest; Kakamega District. Kenya Forestry Research Institute (KEFRI).
- Naughton-Treves, L., Holland, M., and Brandon, K., (2005). The role of Protected Areas in conserving biodiversity and sustaining local livelihoods. *Annu. Rev. Environ. Resour.* 30, 219–252.
- Ongugo, P.O., Obonyo, E., Mogoi, J.N. and Oeba, V.O. (2008). The effect of internal Human conflicts on Forest Conservation and sustainable development in Kenya. Paper presented in the IASC Conference, England.
- Ribot, J.C., Lund C., and Treue, T. (2010). Democratic decentralization in sub-Saharan Africa: its contribution to forest management, livelihoods, and enfranchisement. *Environmental Conservation*. 37: p. 35-44.
- Uriarte, M., Schneider, L., Rudel, T.K. (2010). Synthesis: land transitions in the tropics *Biotropica* 42, 59–62.
- Tanya, M. H. (2004). Collaborative Management: An Institutional Analysis of Community-State Cooperation to Conserve the Rio Plátano Biosphere Reserve, Honduras. Center for the Study of Institutions, Population, and Environmental Change, Working Paper No.CWP-04-03.
- Thenya, T. B. Wandago, and E. T. Nahama, (2007). “Participatory forest management experience in Kenya (1996–2006),” in Proceedings of the 1st National Participatory Forest Management Conference, KEFRI Headquarters, Nairobi, Kenya.

van Noordwijk, M. (2008). Facilitating agroforestation of landscapes for sustainable benefits: Tradeoffs between carbon stocks and local development benefits in Indonesia according to the FALLOW model. *Agriculture, Ecosystems & Environment*. 126: p. 98-112.

Verbist, B., P. Moonen, and B. Muys. (2011). *The undervalued role of ecosystem carbon in climate change mitigation*, in KLIMOS Policy Brief 1. KLIMOS: Leuven.