

## **Integrating Indigenous Knowledge in forest Management in Kenya: A case Study of the Ogiek community inTinet Forest, Nakuru County, Kenya**

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Integrating indigenous knowledge and practices into natural resource management is increasingly being recognized worldwide as crucial for sustainable resource utilization. This study investigated how indigenous knowledge of the Ogiek Community, traditional forest dwellers can be integrated in the management of Tinet forest resources in Kenya. Specifically the study focuses on establishing the indigenous knowledge and practices used by the Ogiek community in management and conservation of Tinet Forest, determine the mechanisms of acquiring and transferring indigenous knowledge and practices. The study used both secondary and primary data which was analyzed both qualitatively and quantitatively. It was established the Ogiek people have evolved ways of coping with forest resource management in a sustainable manner. Their attitude towards and the general knowledge of the forest shows that Tinet forest is intimately connected with their culture as it offers all the resources necessary for their existence and survival. The findings established that Ogiek community have unique traditional practises which conserve the natural forest.

*Keywords:* Indigenous knowledge, forest management, Ogiek community

### **Introduction**

Many forest communities possess considerable knowledge of the natural resources they use. Such knowledge can inform scientific approaches to management, either as a source of baseline data to fill information gaps that cannot otherwise be addressed or to provide alternative management approaches from which scientists and managers will learn. In general, however, little attention has been given to the relevance of quantitative forms of such knowledge for resource management.

Local community knowledge, perception and participation is significant to the scientific understanding of forest resources and is a principal participant in the resource stewardship (Weber 2000). Within forestry professional circles, much effort has gone

into the development of approaches away from purely technical, timber-oriented strategies to people's needs-oriented social community forestry strategies. The growing input of rural sociologists, anthropologists as well as gender specialists into forestry work was crucial for exposing certain underlying assumptions and biases about the needs of target populations assumed by western and western-trained foresters. Foresters have now recognized indigenous forest management regimes and the importance of considering them in the implementation of the community forest work. However, these recognitions are only, slowly being put into practice (Stiles, 1993). Traditional, Indigenous, and Local Ecological Knowledge (TEK, IEK, and LEK, respectively) have all been used to refer to sources of knowledge about species, ecosystems, or practices held by people whose lives are closely linked to their natural environment (Freeman 1992, Gadgil *et al.*, 1993, Berkes 1999). The distinction between traditional/indigenous and local knowledge is of greatest significance because the first two terms imply the development of knowledge over a longer timescale (Gilchrist *et al.* 2005). However, some communities with a more recent association with an area or resource still possess a detailed culturally acquired knowledge or understanding of the ecology and management of that area and the resources they use. Communities that are dependent on natural resources can rapidly develop insight into factors influencing resource availability or quality. Such information can be shared among users and can develop into a substantial body of knowledge (e.g., Acheson *et al.* 1998, Hanna 1998). Thus, knowledge recently acquired by local communities can be as important as "traditional" information generated over a longer timescale (Mallory *et al.* 2003). Although we recognize the value of more recently developed bodies of knowledge, we use the term IEK because it has predominant usage among conservationists and resource managers and is not restricted in application to indigenous peoples alone. The use of IEK has found favour in conservation planning and resource assessment for three reasons: efficiency, additionality, and community engagement (Berkes *et al.*, 2000, Pierotti and Wildcat 2000, Sheil and Lawrence 2004, Drew 2005). Resource users often interact with a landscape at a much larger scale and over longer periods of time than are possible in standard scientific investigations (Fraser *et al.*, 2006, Wehi 2009). In addition, programs that garner the support of local people through their participation have a greater chance of acceptability and therefore long-term sustainability (Schwartzman *et al.*, 2000; Bowen-Jones *et al.*, 2002, Danielsen *et al.*, 2005)

IEK can not only add to an existing body of scientific knowledge, but can present a completely different picture of reality, especially when held within a different cosmological and ethical framework. When knowledge about the consequences of management is scarce, these alternative narratives can be of great value. The practical application of IEK is growing. Many studies have used such knowledge effectively to address conservation aims (Colding 1998, Johannes 1998, Fraser *et al.* 2006), sustainable resource use (Berkes 1999, Castello *et al.*, 2009), and climate change (Couzin, 2007). The demonstrated complementarity between traditional and scientific sources of information has validated the use of IEK in ecological research, including in harvesting assessment (Berkes 1999, Castello *et al.*, 2009).

### *The Ogiek people*

An estimated 11,400 households are located within 2 km of the forest boundaries and a further 3,800 households of Ogiek live within the Southwest Mau. The Ogiek are one of the most widely distributed people in Kenya inhabiting or having inhabited in the recent past, all the high forests. Traditionally, they have made their living by hunting animals and collecting honey although today, nearly all the Ogiek people keep livestock or cultivate crops or both. They are a Kalenjin speaking people though some groups living near the Maasai now speak the Maa language. In their social life and beliefs, they are closely related to other Kalenjin speaking people, the Kipsigis, Nandi, Keiyo, Marakwet, Tugen, Sabaot, Sebei, (Blackburn, 1982). Their different lifestyle, however, sets them apart in the eyes of other peoples of Kenya. They are mostly referred to as the ‘Dorobo’ a Swahili word from the Maasai term *iltorobo*, meaning poor people who have no cattle and therefore must eat the meat of wild animals- a regrettable state of life in the Maasai eyes (Blackburn, 1982).

### *Indigenous knowledge*

According to biodiversity support program (BSP) (Bruce, 1993a), the value of indigenous knowledge has been recognized as the first principle in monitoring and evaluation of the biodiversity conservation initiatives. Indigenous knowledge and practices that conserve or advance biodiversity should therefore be employed as the basis for developing future conservation strategies. This not only integrates local knowledge into program planning but also increases the program sustainability.

Indigenous knowledge is local knowledge that is unique to a given culture or society (Warren, 1991). Indigenous knowledge is a systematic body of knowledge acquired by local people through accumulation of experiences, informal experiments and intimate understanding of their environment in a given culture (Rajasekaran, 1993). According to Havrkott *et al.*, (1994) indigenous knowledge is the actual knowledge of a given population that reflects the experiences based on traditions and includes more recent experiences with modern technologies. Local people including farmers, landless labourers, women, rural artisans, pastoralists and cattle rearers are the custodians of the indigenous knowledge systems.

### *Diversity of Indigenous Knowledge*

Indigenous knowledge systems are adaptive skills of local people usually derived from many years of experience that have been communicated through “oral traditions” and learned through family members over generations (Thrupp, 1989).

Indigenous knowledge is dynamic, changing through indigenous mechanisms of creativity and innovativeness as well as through contact with other local and international knowledge systems (Warren, 1991). These knowledge systems may appear simple to outsiders but they represent mechanisms to ensure minimal livelihoods for local people.

Indigenous knowledge systems often are elaborate; they are adapted to local, cultural and environmental conditions (Warren, 1990). They are tuned to the needs of local people and the quality and quantity of available resources (Pretty and Sandbrook, 1991). They pertain to the various cultural norms, social roles or their physical conditions. Their efficiency lies in the capacity to adapt to the changing circumstances.

Indigenous knowledge includes practical concepts that can be used to facilitate communication among people coming from different backgrounds such as local populations, agricultural researchers and extension workers (Warren, 1991) indigenous knowledge helps to ensure that end users of development projects are involved in developing technologies appropriate to their needs.

One of these strategies entails having an intimate knowledge and strategies reflected in understanding, skills, techniques and practices which have evolved, developed, accumulated and institutionalized using local resources by the local people, passed and tested through various generations for the purpose of solving natural resources management (Ochieng E.A.O, 1992). This study focused on the indigenous knowledge of the Ogiek community on the management of Tinet Forest.

## **Materials and Methods**

The study population consisted of communities living in three administrative divisions namely Kiptororo, Kuresoi and Tinet. Two locations were selected from each of the administrative divisions. Using stratified and proportionate random sampling a total of 150 household were chosen from the list prepared by the local chiefs. Household heads considered as the main sample units for the study consisted of men and women who use forest resources.

## **Results**

Data gathered was analyzed using descriptive statistics. Proportional data analysis made use of frequencies and percentages used to compare proportions of responses. Responses from each lead question were tallied manually, totaled and grouped accordingly. The data was analyzed using SPSS computer software.

### ***Indigenous Knowledge and Practices***

#### ***Perception of Forests***

On the general knowledge of what forests are 104(69.3%) of the respondents know the forest as a home of Ogiek and wild animals. Another 23 (15.3%) know the forest as group of resourceful trees while 22(14.7%) know the forest as a habitat for wild animals. Only 1(0.76%) had no idea. Taking a habitat as a home would give a good reason for keeping it intact and this is done through conservation. As the respondents talk of trees and wild animals it reflects the resources which they obtain from it. This can be contrasted with the answers given by respondents when they were asked whether they get resources from the forest or not 145 (96.7%) responded in the affirmative while only 5

(3.3%) had no idea. None admitted that they do not get resources. At least the respondents knew of resources except very few which can be considered negligible.

### *Attitude of Ogiek towards the Forest*

The respondents were asked to give the general attitude (value) of Ogiek towards the forest. Some 121 (80.7%) of the respondents said that the Ogiek view (value) the forest as a source of livelihood. Another 20 (13.3%) saw it as source of rain which supports life. While 9 (6.0%) saw the forest as a source of food and medicine. During focus group discussions, it was established from participants that Ogiek gets all their daily requirements from the forest. This range from those products which can be quantified such as timber, firewood, other non-wood products, honey, medicinal herbs, water storage, grazing, recreational and homage facilities. On the other hand are the indirect values which include environmental benefits necessary for human survival but difficult to quantify in monetary terms e.g. nutrients cycling and carbon storage. This could further be distinguished from intrinsic value which leads to satisfaction associated with the existence of forest. This is in association with such values as cultural values, shrines, sacred trees, aesthetic and heritage value.

The respondents were asked to give at least six tree species, which are commonly used by the community. The respondents mentioned Thirty-seven (37) plants among others. The importance of these trees was then ranked based on the frequency of mention in order to give summarized information. The plants were put in four different categories basing on frequency as mentioned by respondents as follows; - Those mentioned 1-7 times were classified as not important, 8 – 14 least important, 15-21 important and 22 and above as very important. 15 plants were in the ‘not important’ category, 8 in the “least important” category while 9 were in the ‘important’ category and 5 were in the “very important” category. Those plants in the important and very important categories formed 37.8% of all the trees mentioned by the respondents.

These plants are either used for one or more purposes. Different portions of these tree species are used for different purposes. The main uses and other uses were determined from the frequency table where the highest frequency was taken to indicate the main use as indicated in Table 1 below.

**Table 1: Value of Forest to Ogiek**

<b>Nature of Value/Use</b>	<b>Examples</b>	<b>Frequency</b>	<b>Percentage</b>
<b><u>Direct Values</u></b> That which can be quantified or seen.  130 (86%)	Medicinal herbs,	105	80.8
	Honey,	73	56.2
	Non-Wood Products,	60	46.2
	Meat,	42	32.3
	Firewood,	33	25.4
	Timber,	28	21.5
	Water Storage,	21	16.2
	Grazing,	15	11.5
	Recreation,	7	5.4
	Homage	2	1.5
<b><u>Indirect Values</u></b> (i) Environmental benefits necessary for human survival but difficult to quantify in monetary terms. (ii) Intrinsic value associated with the existence of forest. 121(80.7%)	Nutrient cycling,	12	60
	Carbon storage,	9	45
	Reduction of air pollution	4	20
	20(13.3%)	45	37.2
	Cultural values	21	17.4
	Shrines	17	14
	Sacred Trees	6	4.9
	Aesthetic value	5	4.1
Heritage value			

### *Common Forest Resources Obtained*

The respondents were asked to say whether they obtain resources from the forest or not. 145(96.7%) of the respondents obtain resources from the forest. None said they do not obtain resources. Five (5), (3.3%) had no idea. The small number of respondents who had no idea could have been either that they misunderstood the question or are new comers in the area. However the high percentage (96.7%) of the respondents at least obtains resources from the forest. Subsequent information on resources will be based on the views of this group. Nearly all portions of trees yield some resources for the majority of the plant species commonly used for a given purpose(s).

One portion yields one or more purposes. 123(82%) of the respondents said fruits are used for food, 23(15.3%) of the respondents said they use fruits for medicine, 2(1.5%) of the respondents use it for aesthetics while another 2(1.5%) had no idea.

The main use of branches is beehive holding as shown by 64(42.7%). Some 32(21.3%) of the respondents said they are used for building while 24(16%) gave fuel wood as a main use while 15(10%) said they are used for sacred purposes. Another 9(6%) of the respondents said branches are used for aesthetic purposes. Another 4(2.7%) said they are used for beehive making and 2(1.3%) did not have an idea. The main use is that

of beehive holding which in essence conserve them, as it does not involve removal. The total percentage for the non-consumptive use of branches is (58.7%) while consumptive use is only (40%) thus suggesting sustainable use.

On the uses of leaves, one hundred and twenty two (81.3%) said the leaves are used for medicine, Fifteen (10%) gave the use as thatching houses, seven (4.7%) said it is used as food, Two (1.3%) gave the use as forage for both livestock and bees, Two(1.3%) gave the use as shelter and another Two (1.3%) had no idea. Shelter is given by large leaves of such trees as Sasuriet (*Allophlus Abyssinicus*). Much of the trees in the forest are valued and conserved for the medicinal yields. The leaves are important as medicine, which are either taken directly or boiled depending on a given family recipe.

Beehive making was given by 82 (56%) respondents as the use of trunks. Forty nine (49) (32.7%) said it is used for building, six (4%) gave the use as that of shelter while four (2.7%) said it is used for beehive holding. Only 3 (2%) and 2 (1.3%) gave the use as fuel-wood and charcoal burning, respectively. Two (2) (1.3%) of the respondents had no idea. From the above, the major use of trunks is that of beehive-making. For most of the uses they are sustainable, especially where the trunks of fallen trees are used for such purposes. Charcoal burning which is a new phenomenon in the area is only known to 2 (1.3%). This is the only unsustainable use but its effects on the forest may be negligible but if left unabated then it will have far reaching effects on the forest.

Barks have their major use being medicine as shown by 70 (46.7%) responses. Beehive making comes as the second use 62 (41.3%). Barks are also used for thatching 10 (6.7%). In some its used for aesthetic, fuel wood 2 (1.3%), building 2 (1.3%) and 2 (1.3%) had no idea. The main use is for medicine and any conservation will be based on this. Barks of trees are valued for their medicinal and beehive making practices.

Another portion of trees that the respondents were able to identify the uses are the roots. Eighty three (55.3%) of the respondents gave the use as medicine, 33 (22%) gave the use as sacred, 27 (18%) said it is used for beehive making, 2 (1.3%) said it is used as fuel wood, another 2 (1.3%) identified building as one of the uses while 2 (1.3%) stated that the use as aesthetic. Only 1 (0.7%) of the respondents did not have an idea. It can generally be said that the main use of roots is medicine and sacred purposes. Roots form the base of any tree.

From the focus group discussion, it emerged that where roots are taken from a tree, one or two have to be taken at a time and thus is sustainable. Those roots which when removed looked like the horns of certain animals are kept for ceremonial purposes and in the mean time preserved for aesthetic purposes.

The majority of the respondents 76 (50.7%) recognize the use of flowers as forage for bees and livestock. Honey is an important food for Ogiek and is also used for ceremonial purposes. Bees are therefore regarded very highly and flowers are not to be interfered with lest bees disappear and there will be no honey and this by extension will affect ceremonies. Honey is also important as an ingredient to be mixed with medicine. Flowers from certain trees are used for sacred purposes. Some 30 (20%) of the respondents supported this.

Another 23 (15.3%) respondents stated that flowers are also used as medicine. Flowers of certain trees are crushed, dried and burned to form soot, which is then taken for some ailments. In some cases it is inhaled. Flowers are also used for aesthetic purposes. This is done during ceremonial occasions. Some flowers are also crushed

against a beehive so as to attract bees. Four (2.7%) of the respondents gave this. (Two) 2 (1.3%) of the respondents also gave flowers as fuelwood. They said flowers of certain trees are crushed and used to start fires.

As for the use of gum, 83 (55.3%) of the respondents gave the use as medicine. Not all trees have gum. Trees such as *Sakawaita (Zanthoxylum Usambarense)* produce gum for the treatment of Asthma. Gum from *Tinet (Schefflera Volkensii)* is used for the treatment of various ailments such as Rheumatic fever, Asthma and other respiratory track infections. Table 2 below gives the main uses of each portion of trees in summary form.

**Table 2: Major uses of portions of trees**

PORTION	USE	FREQUENCY	PERCENTAGE
Fruits	Food	123	82.0%
Branches	Beehive holding	64	42.0%
Leaves	Medicine	122	81.3%
Trunks	Beehive making	84	56.0%
Bark	Medicine	70	46.7%
Roots	Medicine	83	55.3%
Flowers	Forage for bees/livestock	76	50.7%
Gum	Medicine	83	55.3%

### Precautions taken to save resources

#### *Protection of sacred trees*

Certain tree species such as *Sinendet (Periploca Linearifolia)* are considered sacred. They are preserved and are not to be cut unless on ceremonial occasions or for medicinal purposes when a small portion of it is cut. Some 77 (51.3%) of the respondents said that sacred trees are to be cut. (Seventy four) 74 (96.1%) of these said it is only on ceremonial occasions that they can be cut. Seventy three (73) (94.8%) felt that they can also be cut for medicinal purposes. One key informant said that where the trees are to be cut, it is done by use of free hand (without any implement such as an axe). Where it is used for medicinal purposes, it is imperative for an individual to cover back with soil the point where roots have been removed.

In case of the bark, a leaf and some soil is used to cover the portion. This is believed to appease the spirits and if this is not done, it may fail to heal the ailment it is meant for. One or two roots are to be taken at a time. Some 87 (58.7%) said that sacred trees are not to be cut. Sacred trees if cut are believed to annoy the ancestral spirits (*Oiik*) who in turn register it as '*Ngaungisto*' (a general

curse). This brings about misfortunes not only to an individual but also to the whole immediate family. Similarly another 62 (41.3%) felt that cutting of these trees would result in dishonour to God (*Tororet*) who will refuse to give blessings.

During the focus group discussion, it was pointed out that lack of blessings would bring about *Kemei* (prolonged drought), which causes the failure of flowers, and hence no honey which is important in the life of Ogiek both as food and for ceremonial purposes. The practice where one root or a small portion of a tree is harvested either for ceremonial or medicine and the general preservation of sacred trees ensures conservation of such tree species for posterity. Alongside this is the preservation of other sacred grooves such as seclusion portion. During and after circumcision of boys, they are kept in seclusion for a period of time. Such areas are not to be interfered with and thus ensure regeneration of plants.

#### *Regulations and taboos on use resources*

The respondents were asked if they were aware of any regulations and taboos that relate to the use of resources. One hundred and forty four (144) (96%) said they are aware, 4 (22.7%) were not aware while only 2 (1.3%) had no idea. The majority of the respondents are aware of the regulations that govern use of resources.

Use of regulations and taboos to conserve resources is one practice used traditionally to conserve resources. The regulations are to be adhered to lest it brings misfortunes. Such regulations are contained in the table 5 below.

#### *Delineating / Zoning forests for different uses*

The respondents were asked to identify different forest zones and their major uses. The respondents identified five different forest zones. Blackburn (1982) agrees with this research in the different zones. The Ogiek as in Blackburn (1982) distinguish five different zones as shown in table 3 below. These zones include;

*Soyna*: The relatively dry open forest and grassland

*Sasaonet* or *Lolwet*: Dry forest with no grassland and different trees

*Tirap*: A wetter forest with large trees and thick bushes

*Sisiywet*: A wet forest with large trees

*Mau*: Open glades and moorlands

**Table 3: Different zones and their major uses**

<b>Zone</b>	<b>Frequency</b>	<b>Percent</b>	<b>Main use of portion</b>	<b>Frequency</b>	<b>Percentage</b>
Soyna	131	87.3%	Hunting	67	44.7%
Sasaonet/Lolwet	140	93.3%	Cultivation	99	66%
Tirap	120	80%	Settlement	100	66.7%
Sisiywet	98	65%	Sacred groove	125	83.3%

Mau	111	75%	Water catchment	72	48%
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The zones are very important in understanding the Ogiek way of life as they determine when and where food, animals, honey (*Kumaat*) and animals (*Tiongik-Banyok*) can be found at different times of a year. The flowers of the forest blossom at different times of the year and so honey is made at different times in each of the five forest zones. An Ogiot will place the beehive (*Muiynget*) at an appropriate position and time. This practice is important in conservation of forests. It regulates the use of zones in such a way that one zone will not be over utilize

During the focus group discussion, the participants (respondents) highlighted the zoning of forest according to family lineage. This issue was a follow-up to the answers given by most respondents to the question on traditional ways of conservation of forests. Most of the respondents, when asked to give the way Ogiek ensured that resources were not over-exploited; some 125 (83.3%) of them gave division of forest into ridges (*konoito*) as one. This prompted a follow-up during the focus group discussion.

The researchers also sought more information from key informants. Most notable of all the key informants are Mr. Tulach arap Mulany aged 87 years and Mr. Kerere Arap Milgo aged 80 years both of whom were born and brought up in Tinet forest. Every family lineage (*Kap*) was given exclusive rights to make beehives and place them on the land of one ridge (*Konoito*) between two streams. The ridge extends upwards through all the forest zones (types) to the top of the *Mau*.

Each lineage territory is sub-divided into small parcels of land called *Korosiek* (Singular, *Koret*). Anyone, Arap Mulany said, has the right to walk through, hunt over or live in another lineage's *Konoito* but only one lineage can make hives and collect honey there. When hunting over to another ridge, Mr. Kerere agrees with Arap Mulany that one has to seek permission by letting the elders of that *Konoito* know when an animal being hunted has crossed over to another ridge.

#### *Transfer of knowledge from a generation to the other*

One objective of the study was to determine the mechanisms of acquiring and transferring IK from one generation to another. Over time IK has been preserved and used by the community accordingly. It has the disadvantage of not having been captured and stored in a systematic way. The main reason for this constraint is that it is handed down orally from generation to generation. This creates an implicit danger that IKSP may become extinct (Guchteneire *et al.*, 1999). The process of modernization through urbanization and education and their interrelationship are great threats to IK. Pertaining to the environment, emphasis is placed on the age-old knowledge passed down through the generations which is often stored in songs, proverbs and stories. (Davis, 1994). The following were observed as the agencies and processes of transmitting IK: family, apprenticeship: initiation time: village elders' meetings: sayings and proverbs, taboos, songs, narratives, prediction of rains and punishments.

## Threats to forests

### *Indigenous Threats*

Some 147(98%) of the respondents felt that there are no indigenous threats to forests. This group felt that that except where fire was handled carelessly, would a threat be realized. Three (3) (2%) had no idea. Those who said there were no threats felt that this was due to the existing taboos and regulations.

### *Role of new inhabitants*

Some 108(72%) of the respondents felt that the new inhabitants are destroying the forest. Forty (40) (26.7%) felt that the new inhabitants are not destroying it while 2(1.3%) had no idea. The percentage of those feeling that the forest is being destroyed is high. This shows that the new inhabitants view the forest differently. The indigenous communities feel that the new inhabitants are posing danger to the forest.

The respondents felt that the new inhabitants are clearing the forest for sale especially of rare hardwood such as *Prunus africana* and *Podocarpus falcatus* 3(2.8%). This threatens the very existence of these trees, which are useful for their medicinal value. Another 3(2.8%) of the respondents felt that the new inhabitants are using poor methods of exploitation of resources. At most they overexploit thus threatening the sustainability of these resources. Another 23(21.2%) felt that the new inhabitants are clearing water catchments zones for cultivation, a practice that interferes with the streams both at their source and down streams. Clearing open routes for animals and livestock to access the source of rivers and also accelerate erosion of silts into the streams. Alongside this, some 30(27.8%) said that the new inhabitants are clearing the forest indiscriminately for cultivation without considering the different zones. This practice leads to cultivation of fragile zones, which would otherwise have been left uncultivated. Some 25(23.1%) again assert that the new inhabitants burn the forest anyhow. They burn the forest even during the wrong seasons knowingly or unknowingly through careless handling of fire in the forest.

### *Problems associated with forest conservation*

The respondents were asked to identify some significant problems associated with conservation of forest in the area of study. Some 18(12.0%) said that due to the new practise of cultivation there is human wildlife conflict. Animals destroy crops on the cultivated portion of forest due to reduction of their habitat. 14(9.3%) respondents feel that the government is preventing people from using resources as they please. Another 18(12%) feel that there is a general degeneration of resources particularly the hardwood. 23(15.3%) said that fire outbreak is a problem in conservation. Forest fires destroy both the mature and immature trees. Regenerations often take a long time and even where trees are left they are not exploitable for such sustainable uses as medicine. Some 30(20%) said that the presence of squatters in Conglomerate settlements often lead to overexploitation especially in their immediate neighbourhood. Another 42(28%) see the issue of clearing forest for settlement as a major problem of conservation. These

categories of respondents feel that the forest could have been subdivided into clans instead of apportioning five acres of land to one individual.

### ***Towards Sustainable Management***

#### *Institutional Framework for the management of forests*

During focus group discussions it was established that the Ogiek community had an institutional framework for the management and conservation of forests. Each of the institutions was vested with different levels of forest management. They range from the community level (tribe) being led by a tribal Chief. Below this is the Council of Elders who meets from time to time as need may arise to discuss issues related to conservation and management. Below this is the clan with the clan elders and then to the head of the household. Within the household each individual had specific roles to perform. This division of labour is to be overseen by the head of the household. This included such functions as collecting of honey (by men), firewood (women and girls), hunting (Men /boys) medicine collection (both men and women) depending on the nature of medicine required.

### **Discussion**

The study was concerned with studying indigenous knowledge of the Ogiek community with a view to integrating it in to forest management in Tinet Forest and other forests in Kenya. The high population of Ogiek in Tinet Forest provide the justification of integrating their traditional knowledge in the management of Tinet Forest. Ogiek have lived in the forest from time immemorial and have therefore evolved ways of coping with forest management in a sustainable manner. Their ways therefore provide a basis for initiating forest management strategies through effective and properly planned utilization of locally available resources.

The study found out that the Ogiek view the forest as their home for wild animals. Ogiek attitudes towards and their general knowledge of the forest shows that Tinet Forest is internally connected with their indigenous cultures as it offers all the resources necessary for their existences and survival. This study found out that 80.7% of the respondents view the forest as giving "life" to the forest itself, river and diverse range of flora and fauna. Many of those resources are useful for medicinal and cultural purposes that enhance a better quality of life.

For this reason the Ogiek feel tremendous respect for the forest and they live harmonious with nature as an intrinsic part of their being. This study further established that several plants that grow in Tinet Forest are of great value to the Ogiek community. Some plants had more uses than the others. Those with more uses were being regarded as most valuable and therefore important. The value attached to resources are either quantifiable such as timber, firewood and herbs while others have indirect values which include environmental benefits necessary for human survival in terms of physical and spiritual needs.

The major plants which are highly regarded for their medicinal and other contributions include *Polycias Kikuyensis* (Aonet), *Ekebergie Capensis* (Aroruet), *Schefflera Volkensii* (Tinet), *Podocarpus Falcatus* (Saptet), *juniperous Procera*

(Tarakwet), *Olea Africana* (Olernit). These plants are earmarked for conservation. This study concurs with Guchteneire *et al.*, (1999) who found out in their study that 80% of Africans population relies on plants and animals based medicine to meet its health care requirement. For most parts, the plants and animals used in traditional medicine are collected from the wild.

The study found that Ogiek people had their own ways of passing IK from one generation to another. The methods are seen to be very effective as they cut across a person's developmental stages that are from childhood to adulthood. The non-formal and informal methods are used in a holistic manner through someone's "wake-up" time. The methods are taught right from family level to societal level using such mechanisms as apprenticeship, initiation, sayings and proverbs, taboos, songs and narratives. The second organizing hypothesis is confirmed.

The study established that most of the Ogiek people feel that the government practices used in management of Tinet Forest is not compatible with indigenous ones. There is a general feeling that the scientifically trained foresters together with the Forest Ministry and Department's practices tend to "protect" the forest from the local people's "destructive" practices. In effect, they feel that the control over the use of natural resources was "illegally" transferred from the locals to the government without involving them in decision-making process. The effect of this scientific forest management by government forest service has been to create conflict of interest and this has exacerbated the problem of deforestation, which has led to degradation of resources. The confrontation between the government and indigenous Ogiek over the use of forest resources has been created. The Ogiek people lost to a greater extent their previously held control over Tinet Forest. Their traditional "indigenous forest management practices" are at the verge of collapse as it is almost being seen as illegal. The conflict is aggravated by forest departments allowing new inhabitants and outsiders to harvest certain species from the forest. In essence this will affect the long term sustainable management of Tinet Forest. Fundamental changes in power relations between indigenous and government actors are inevitable for any meaningful changes towards the sustainable use of forest resources in Kenya. Most important of all, the study established that a sensitive approach to the interaction between indigenous and government scientific knowledge about the use of forest resources has the potential to open up space for fundamental questioning, negotiation and redefinition of what conservation entails. This in essence will lead to establishment of compatible avenues for sustainable forest management.

It was also established that for sustainable management of Tinet Forest to be realized, a co-management initiative should be adopted which would greatly facilitate the planning and implementation stages and lead to conservation. This would mean sharing of forest profits and other benefits, which would make the Ogiek own up the whole process of conservation which in turn results in better management of Tinet Forest. This will call for concerted efforts from both the government and the indigenous community.

The study revealed that human Ecology theory was also useful in understanding the Ogiek's intimate knowledge and strategies reflected in their understanding, skills, techniques and practices which have evolved, developed, accumulated and institutionalized using local resources found in Tinet forest. It proved useful in establishing the mechanisms passed and tested through various generations for the purpose of solving natural resource management as contained in the taboos and

regulations.

## **Conclusion**

This study was concerned with looking at the ways in which IK best practices could be integrated into forest management in Tinet Forest and its application in other forests in Kenya that have the same environmental conditions. Their integration would lead to development of cost effective and sustainable survival strategies for natural resource management. From the study, it was evident that IK is dynamic as it results from a continuous process of experimentation, innovations and adaptation and therefore can blend well with knowledge in science and technology and should therefore be considered complimentary to science and technological efforts to solve problems of forest resource management. More systematic techniques of capturing and storing IK is required to alleviate the danger of becoming extinct as they are handed down orally.

Integrating Ogiek's IK into forest management will enhance stakeholder empowerment in running of their resources. This would bring about local initiative in directing, controlling and sustaining all forms of Tinet forest resources management from planning to control and evaluation over along period of time. In the Ogiek's traditional structure, forest conservation was the community affair. The forest and its resources were managed through a recognized hierarchy and binding beliefs. One can conclude that the indigenous Ogiek people practiced popular participation in the conservation of Tinet Forest. However, the recent excision and demarcation of land into small parcels leading to sedentary life will affect the practices with time. It is recommended that new knowledge, value and management systems be set up to conserve the natural forest resources especially the indigenous ones.

The existing local institutions and the Ogiek's traditional institutions can be empowered, blended with modern management systems and strengthened to initiate, control and maintain Tinet Forest and other forests in Kenya for posterity.

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