

*Full Length Research Paper*

# **Communities' attitudes and perceptions towards the status, use and management of Kapolet Forest Reserve in Kenya**

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**Forest communities play a vital role in the conservation of forest resources. Understanding communities' use, attitudes and perceptions of forests and management measures is significant in attaining conservation goals and reducing forest resource use conflicts. This study sought to assess local community' forest resources use and their perception towards forest status, use and management. Data was collected through household surveys using semi-structured questionnaires, participant observation, Key Informant Interviews (KII), and Focus Group Discussions (FGD). A total of 112 respondents from three adjacent villages within 5 km from the forest boundary were randomly sampled for the household survey while descriptive statistics were used for data analysis. Most (94.6%) of the households reported using products from forests. These products formed an integral part of the households' energy needs, construction materials, medicine, income generation and daily dietary needs. Firewood was the most collected product from the forest (76.4%) whereas bush meat was the least (4.7%). There were mixed views on the forest management with more than half (54.5%) expressing dissatisfaction with the current management regime citing insecure land tenure system, inadequate integration of the community in forest management and corruption. There was perceived forest degradation due to illegal logging, illegal grazing, forest fires, climate change and encroachment for farming. For sustainable forest management practice therefore, there is a need for incorporating Indigenous knowledge (IK) in forest management plans and putting in place grievance address mechanisms to cater for the needs of local communities when designing forest policies and implementing forest restoration programs.**

**Key words:** Cherang'any hills, Community Forest Association, non-timber forest products, indigenous knowledge, sustainable forest management, forest restoration.

## **INTRODUCTION**

Forests are a significant source of livelihood to many poor and forest dependent communities as they provide them with both consumptive and non-consumptive uses.

The consumptive uses of forests include provision of fuelwood, fodder, timber, Non-Timber Forest Products (NTFPs) and recreational experience while the indirect

non-consumptive uses comprise biodiversity, air and water purification, carbon sequestration, and other ecological services (Adam and Tayeb, 2014). About 90% of the world's poor are dependent on forests for at least a portion of their income (World Bank, 2000; Scherl et al., 2004; United States Agency for International Development [USAID], 2006). In Africa alone, it is estimated that about 600 million people depend on woodlands and forests for their livelihoods (Center for International Forestry Research, 2005).

Sustainable management of forest resources is therefore critical in meeting both conservation and utilization goals. For a long time, top-down exclusionary state approaches through protected areas were dominant in the management of forest resources. This approach has however over time proven unsuccessful in curbing deforestation and loss of forest biodiversity which is a major conservation challenge globally today (Geist and Lambin, 2002).

Given these challenges of governance and management of forests and households' dependency on the forest resources, many developing countries have reviewed their conservation policies leading to reforms and in some cases the transfer of management authority to more localized institutions through forest devolution and decentralization (Cavendish, 2000; Bwalya, 2011; Rai et al., 2016). Devolution is the transfer of rights and responsibilities to local user groups while decentralization involves the transfer of decision-making authority to lower levels of government (Meinzen-Dick and Knox, 1999). Over the last few decades, communities' inclusion in the management of all forest resources has increased in many Asian and African countries. In Africa for instance, there has been a gradual evolution from a simple community consultation by the state to a real partnership in the context of devolution (Wily, 2002).

Forests in Kenya can be broadly categorized as natural forests and intensively managed plantation forests (Ototo and Vlosky, 2018). As of the year 2018, the forest cover in Kenya was estimated at 7.4% of the total land area, which is still below the recommended global minimum of 10% by the United Nations. Kenya has an estimated annual forest depletion rate of about 5,000 hectares per annum (Government of Kenya, 2018). Kenyan forests were previously state-managed with the exclusion of local communities from forest decision-making coupled with strict provisions for subsistence extraction and use of forest products. The managing authority, then Forest Department, and currently the Kenyan Forest Service (KFS) had excessive power and authority over forest resources, without accountability to forest communities. This strict protectionist strategy was not effective as there

was continued destruction and degradation of Kenya's forest resources characterized by forest cover decline (Matiru, 2000). The Government of Kenya (GoK, 2015) then recognized the importance of incorporating forest adjacent communities in forest management through Participatory Forest Management (PFM) approach to improve forest cover and reduce deforestation and degradation. In Kenya, the process is still at its early stages with enforcing laws commencing in 2005 after the enactment of the new forest legislation (now the revised Forest Conservation and Management Act of 2016) and many pilot projects now in course. The forest policy of Kenya (2014) is the key policy framework for forestry resources conservation in Kenya as it was instrumental in the enactment of the Forest Conservation and Management Act of 2016. It aims at promoting stakeholder participation in forest management, conservation of water catchments, poverty reduction, creation of employment and general sustainability of the forest sector. However, little effort has been made to generate feedback on communities' perceptions and attitudes towards this new management arrangement. Understanding the attitudes and perceptions of the local community on forest use, management and the factors influencing these perceptions is important in biodiversity conservation, reduction of conflicts and designing of improved forest management policies (Guthiga, 2008; Hariohay et al., 2020; Htay and Røskraft, 2020). This study, therefore, aims at (a) documenting the benefits and forest product use by forest adjacent communities, (b) finding out the attitudes of the forest adjacent community on the existing forest management regime and (c) finding out the perceptions of the community on the status and use of Kapolet Forest Reserve.

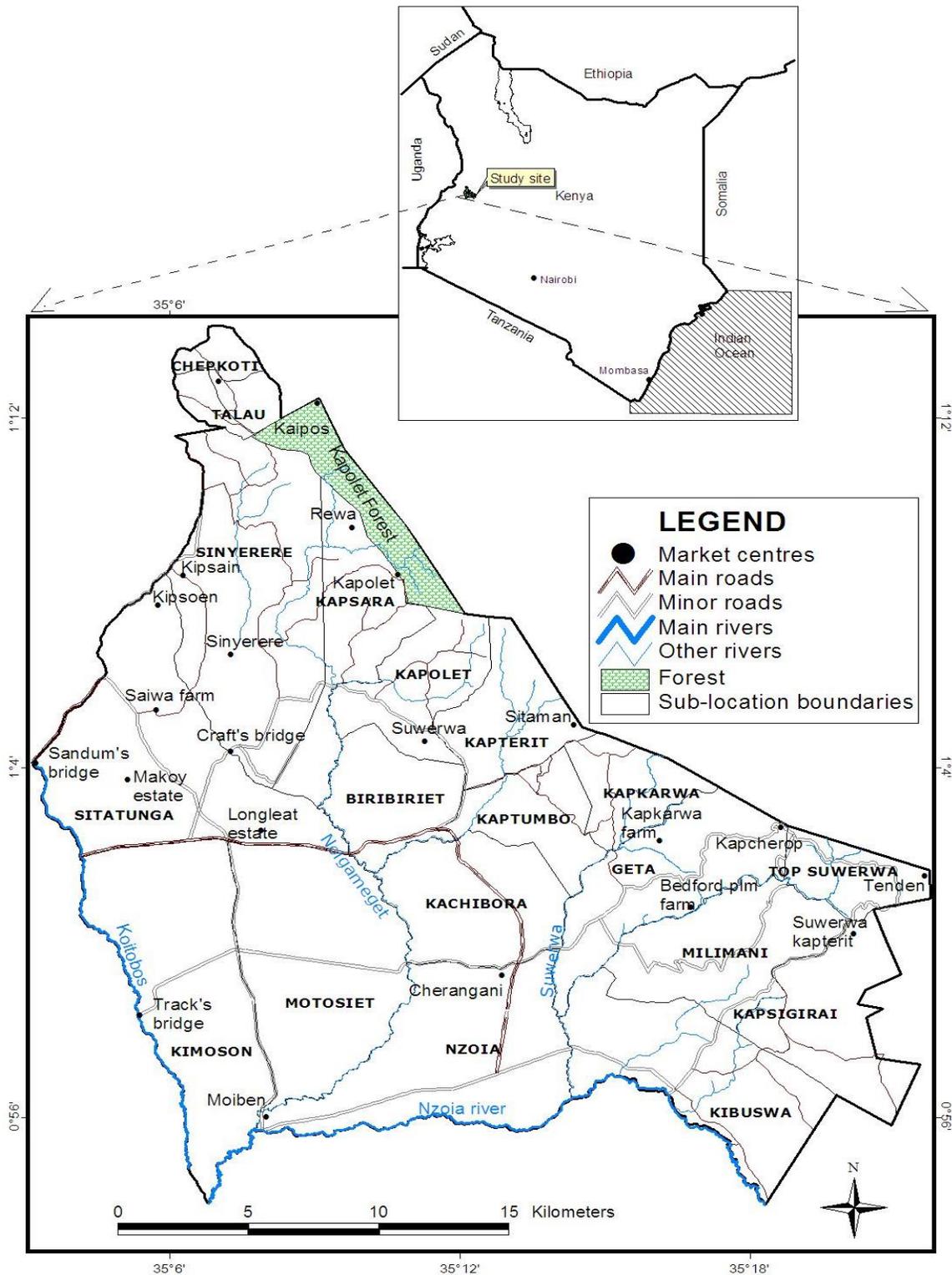
## METHODOLOGY

### Study area

Kapolet is an indigenous forest reserve located in Trans-Nzoia County and constitutes one of the twelve blocks of the Cherangani Hills forest ecosystem, one of the major water towers in Kenya. It was gazetted under legal notice 57/1941 and covers an area of 1,551.6 ha (GoK, 2015).

Geographically, the forest is located between 1.1667° N and 35.1667° E with a mean elevation of about 2300 m above the sea level. It receives about 1219 to 1424 mm of rainfall annually with the main rainy season occurring between April to August and the dry season from December to February. The study area is characterized by moderately deep soils mainly Cambisols of good structure and high organic matter content and variable acidity (GoK, 2015). Kapolet is the source of Rivers Saiwa and Kapolet which are the tributaries of River Nzoia, which eventually drains into Lake Victoria. Similarly, rivers Muruny and Empop, the tributaries of Kerio

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**Figure 1.** Map of the study area.  
Source: Authors.

River that drains its water into Lake Turkana also originate from Kapolet Forest (Figure 1).  
Kapolet Forest is home to large and small wild animals including

black and white Colobus monkeys (*Colobus guereza*), de-brazzas monkeys (*Cercopithecus neglectus*), genet cats (*Genetta genetta*), otters (*Aonyx capensis*), mongooses (*Ichneumia albicauda*),

bushbucks (*Tragelaphus scriptus*), as well as the near-threatened mountain bongo antelope (*Tragelaphus eurycerus*). Common tree species are the common yellowwood (*Podocarpus falcatus*). Tree ferns (*Cyathea manniana*) also occur in stream valleys, with some patches of bamboo (*Arundinaria alpina*). In the clearings, a diversity of flowering plants can be found with the Paperbark acacia (*Acacia abyssinica*) occurring among scrubby grassland (GoK, 2015).

The major inhabitants of the villages adjacent to the forest are the Cherang'any/Sengwer people, a minority hunter-gatherer indigenous people living along the slopes of Cherangani hills whose livelihood, culture and health system are reliant on the forest resources. Their traditional economies were based on bee-keeping, herbal medicine, hunting and gathering. The forest also offers cultural rights and spiritual anchorage to the community (Kiptum and Odhiambo, 2007).

### Study design

The study was conducted through a combination of primary data from social survey and secondary data collection. Three villages (Kapolet, Rewa and Kaipos) were purposefully selected as a representative of the forest dependent communities due to their proximity to the forest. A sample size of 112 households was drawn from a total of 373 households representing about 30% of the entire households in the study area was used.

### Data collection

The survey was conducted in March 2014 after getting ethical approval and informed consent from the relevant authorities. Primary data was collected using semi-structured questionnaires, Key Informant Interviews (KII), Focus Group Discussions (FGD) and participant observation (photographs and transect walk). Different sets of questions were designed for each category of data collection tool. Kiswahili (Kenya's national language) was used in communication but where necessary, the local dialect (Cherang'any) was integrated into the interviews to enhance respondents' understanding. This was achieved with the help of research assistants from the community.

Key Informant Interviews were used for qualitative data collection and results triangulation with government officials from the Kenya Forest Service and Non-Governmental Organizations in conservation forming the key informants. This was done to better understand the management and conservation practices and challenges of forest conservation, as well as the extent and nature of deforestation in the study area. A FGD comprising 10 participants was also held to help understand the community's historical perspective on forest use, conservation practices and perceptions on the contemporary conservation practices by the state authorities. Gender, age and willingness to participate were factors considered in selecting the FGD participants.

Household data were collected using semi-structured questionnaires administered to the respondents via face to face interviews. The questionnaires were administered to the household heads of the third home in a row, systematically selected from a full list of households in each of the three villages provided by the village heads. The questions covered the socio-economic characteristics of the households, forest use and their perceptions on the forest status and government's forest conservation efforts.

Photographs and transect walks were also used as part of participant observation to capture community activities. Secondary data on the forest cover area, population, and climatic data, and study area maps were collected from the Kenya Forest Service (KFS), Kenya National Bureau of Statistics (KNBS) and Ministry of Environment and Natural Resources (MENR).

### Data analysis

The collected data was coded before entry and analysis using Statistical Package for the Social Science (SPSS version 25) and Microsoft Office Excel 2013. Descriptive statistics were run to generate frequency distributions and percentages and results presented in the form of tables and graphs and pie charts. Chi-square tests were conducted at a 95% level of confidence to ascertain the association of socioeconomic characteristics of the respondents and forest products (Dytham, 2011).

## RESULTS

### Socio-economic and demographic characteristics

Most of the household heads were males (68.8%), while 31.3% were females. The youth (18-35 years) were the majority of respondents. About 13.4% of the households had no formal education with the majority 53.4% having attained primary education, while some (16.2%) had attained tertiary education. Occupation wise, more than half of the respondents were farmers (59.8%), with 17.9% being casual laborers, 12.5% civil servants and 9.8% were self-employed as smallholder business people. Monthly household income was categorized into three, with the majority (55.4%) having a low income of less than 50 United States Dollar (USD), about 42.8% accumulated between 50 and 300 USD per month while a minority (1.8%) generated a monthly income of more than USD 300 (Table 1).

### Forest benefits, services and associated problems

Of all the interviewed households, 94.6% acknowledged collecting products or receiving products harvested from the forest within the last calendar year. Firewood was the most used forest product (76.4%). Other products included honey (44.3%), herbal medicine (38.7%), poles (21.7%), fodder (12.3%), charcoal (9.4%) and bushmeat (4.7%). The residents also associated the supply of clean water, reliable rainfall and improved social amenities to the existence of the forest (Figure 2).

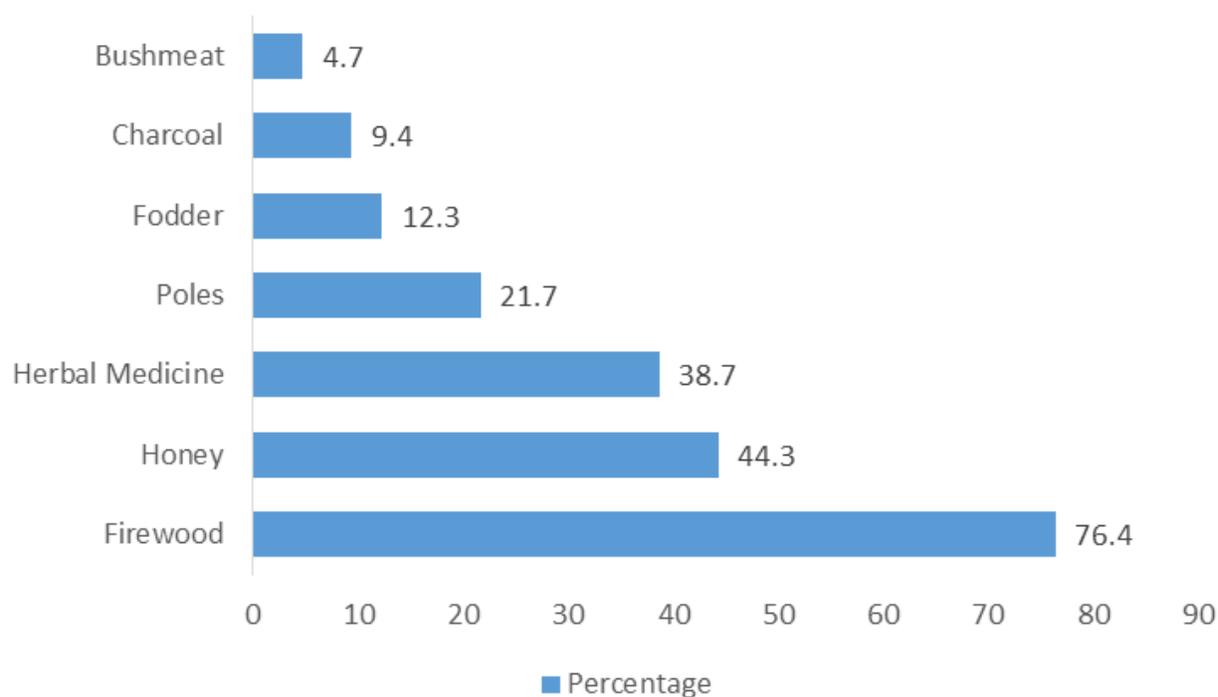
About 89.3% of the respondents also cited some negative impacts of the forest. The majority (91%) noted that the forest provides cover and is frequently used as a hiding ground by criminals most notably cattle rustlers who terrorize community members. About 41% of the respondents indicated the presence of wild animals in the forest which often attacks livestock and damages crops while 9% associated the forest with frequent bush fires.

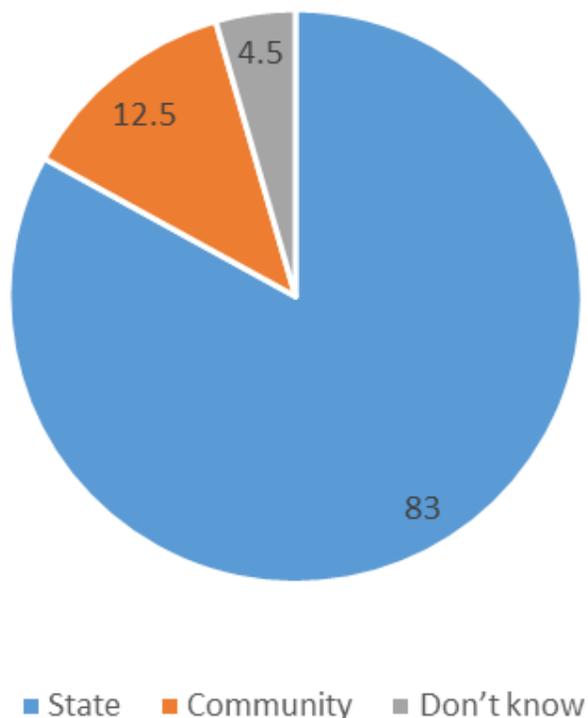
### Knowledge of forest ownership and respondent's involvement in management operations

Concerning the legal status and forest ownership knowledge, a large percentage of those interviewed

**Table 1.** Socio-economic characteristics of the respondents.

| Socio-economic characteristics       | Frequency (n= 112) | Percentage |
|--------------------------------------|--------------------|------------|
| <b>Gender</b>                        |                    |            |
| Male                                 | 77                 | 68.8       |
| Female                               | 35                 | 31.3       |
| <b>Age</b>                           |                    |            |
| 18-25                                | 16                 | 14.3       |
| 26-35                                | 35                 | 31.2       |
| 36-60                                | 46                 | 41.1       |
| >60                                  | 15                 | 13.4       |
| <b>Education level</b>               |                    |            |
| No formal education                  | 15                 | 13.4       |
| Primary                              | 60                 | 53.4       |
| Secondary                            | 19                 | 17         |
| Tertiary                             | 18                 | 16.2       |
| <b>Occupation of the respondents</b> |                    |            |
| Farmer                               | 67                 | 59.8       |
| Casual labourer                      | 20                 | 17.9       |
| Smallholder business                 | 11                 | 9.8        |
| Civil servants                       | 14                 | 12.5       |
| <b>Income level</b>                  |                    |            |
| Low                                  | 62                 | 55.4       |
| Medium                               | 48                 | 42.8       |
| High                                 | 2                  | 1.8        |

**Figure 2.** The proportion of households (%) collecting various forest products from Kapolet forest.



**Figure 3.** Pie chart showing respondents knowledge of forest ownership.

**Table 2.** Level of satisfaction with current forest management regime.

| Level of satisfaction | Frequency | Percentage |
|-----------------------|-----------|------------|
| Very satisfied        | 2         | 1.8        |
| Satisfied             | 11        | 9.8        |
| Somehow satisfied     | 38        | 33.9       |
| Dissatisfied          | 57        | 50.9       |
| Very dissatisfied     | 4         | 3.6        |
| Total                 | 112       | 100        |

(83%) had a working knowledge that the forest was state-owned, 12.5% thought the community-owned the forest while 4.5% had no idea about the ownership of Kapolet Forest. About 21.4% of the respondents reported participating in forest management operations mainly through monitoring and afforestation (Figure 3).

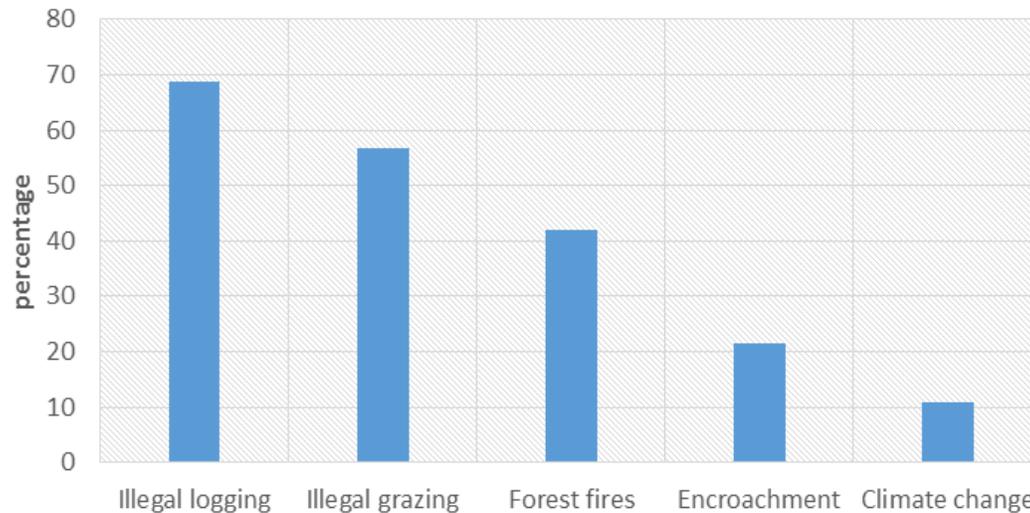
#### Respondents' attitudes towards forest management

More than half of the respondents (54.5%) expressed dissatisfaction with forest management while about 45.5% of the respondents expressed satisfaction in the way forest resources were being managed. The key reasons cited for dissatisfaction include an insecure land tenure system (58.9%) lack of community integration in

forest management (51.8%) and corruption (24.1%). The level of satisfaction with forest management is shown in Table 2.

#### Perceived forest status and causes of forest degradation

When questioned about the forest status, most of the respondents (66.1%) acknowledged that the forest had degraded over the last decade while 33.9% felt that forest status was good with no significant changes in the past decade. The perceived causes of forest degradation as per the majority of respondents were illegal logging (68.9%), illegal grazing (56.8%), forest fires (41.9%), encroachment (21.6%) and climate change (10.8%)



**Figure 4.** Graph showing the perceived causes of forest degradation.

(Figure 4).

## DISCUSSION

### Socio-economic and demographic characteristics

Male headed households were common in the study locations as per the dominant Kalenjin community customs where men are expected to be the head of the household. Females can only assume this role upon bereavement or when males are away attending to other duties. This finding is consistent with that of Langat et al. (2016) conducted in the eastern Mau forest ecosystem of Kenya. There was a significant association between honey collection and the age of the respondents ( $\chi^2 = 7.944$ ,  $df = 3$ ,  $p < 0.05$ ). Honey collection is a labor-intensive process and requires physical strength for tree climbing and stamina for the long distances traveled in the forest in search of honey. The energetic nature of the youth enables them to engage in forest extraction activities. These findings are supported by similar studies elsewhere (Fonta and Ayuk, 2013).

Households in the study area were engaged in diverse livelihood activities for subsistence and income generation. The most common livelihood activity was mixed farming which involves a combination of growing crops and rearing of livestock. According to Njenga et al. (2011), about 65% of the rural Kenyan populations depend on agriculture as the prime source of income generation, employment and food security. There was an association between education level and charcoal use ( $\chi^2 = 23.025$ ,  $df = 5$ ,  $p < 0.001$ ). Low levels of tertiary education among the respondents with several illiterate members could influence the forest use patterns and conservation. According to Jumbe and Angelsen (2007),

educated people have higher levels of understanding on the importance of forest conservation and are therefore more willing to participate in forest conservation activities.

There was also a significant association between the collection of poles and the income of the respondents ( $\chi^2 = 8.200$ ,  $df = 2$ ,  $p < 0.05$ ). Most of the respondents were poor with low income levels and this might affect their forest use patterns and dependency. Mamo et al. (2007), infer that both the wealthy and poor households rely on forests. The difference between the two wealth classes being the wealthier tends to extract greater aggregated quantities while the poorer households are more dependent on forest products for survival.

### Forest benefits and associated problems

The study findings show that the households are dependent on the forest for various products and benefits, mostly Non-Timber Forest Products (NTFPs) for subsistence purposes. Garekae et al. (2019) note that forest resources form a fundamental part of local livelihoods since they contribute greatly towards household economies and serve as a source of livelihood, predominantly in poor households. Firewood is the most harvested forest product as it is a cheap and readily available source of energy for cooking and heating. These findings compare with that of Rotich (2019) in Embobut forest Kenya and Garekae et al. (2019) in Chobe enclave Botswana which both report firewood as the most collected forest product. Honey was the second most harvested product from the forest as the Cherang'any people are renowned for honey harvesting which is part of their traditional gathering practice. Most respondents sell the collected honey to generate household income while some used it for

subsistence and medicinal purposes. Poles were primarily used for fencing off farms, kraals and construction of houses and other household structures.

Herbal medicine formed an integral part of the community healthcare as it was used for the treatment of most human and livestock diseases and ailments. The community also has renowned medicine men/women specialized in the diagnosis and treatment of complications. Reliance on herbal medicine is because the nearest modern healthcare facility is in Kitale town, a distance of about 26 kilometers hence traditional healthcare serves as a viable alternative. Bushmeat and charcoal burning was the least mentioned forest products as it is forbidden and punishable by law hence respondents were hesitant to disclose their involvement. Informal discussion with some residents and observations during transect walks revealed a much higher level of hunting and charcoal burning than reported since charcoal was a significant source of energy for cooking while hunting is a traditional long practice of the Sengwer/Cherang'any community.

Community projects including a primary school and water project were also initiated in the study area. This was after the government of Kenya through Lake Victoria North Water Services Company with funding from Kreditanstalt für Wiederaufbau (KfW) Development Bank of Germany set up a water intake at Kapolet River which originates from the forest to supply Kitale township with fresh water. This was done in recognition of contribution of the forest to the spiritual and cultural values of the Cherang'any/Sengwer indigenous people like circumcision of boys and provision of spiritual anchorage by acting as a site for offering sacrifices to the gods by the community elders during times of calamities or thanksgiving. Participants in FGD acknowledged ecological functions of the forest including water purification, air purification and provision of wildlife habitat.

Despite the numerous benefits of the forest, there were some negative activities associated with the forest which include among others being a source of insecurity and human wildlife conflicts. The forest has for long time been used as a hideout for bandits most notably cattle rustlers who have continuously terrorized community members. Hundreds of livestock have been raided and lives lost too from such raids making the community members live in constant fear of imminent attacks. This has also discouraged community members from keeping livestock as it makes one a target of such raids.

Farmers also complained of crop damages due to invasions by wild animals from the forest. Maize, potatoes, sorghum, millet and cabbages are the common crops grown and they are destroyed by monkeys, wild pigs, porcupines and birds. This has effectively reduced the crop yields and by extension the income generated from the sale of farm produce. These findings corroborate with a study done by Mbuba (2019) in the eastern slopes

of Mount Kenya forest. Frequent attacks by leopards on livestock (cows, goats and sheep) and mongoose on poultry were also reported in the area.

### **Forest management and community attitudes towards management**

Kapolet Forest is a state-owned indigenous forest managed by the Kenya Forest Service (a semi-autonomous body) under Kapolet Forest Station which serves as the administrative center. KFS, is a state corporation which was established under the Forest Act of 2005 and was operational from February 2007. Its key mandate is to enhance conservation, development and management of the country's public forest resources and to assist County Governments in the development and management of forest resources (KFS, 2020). The station is administered by an Ecosystem Conservator based at Kitale town, Trans-Nzoia County who in turn is answerable to the Head of the North Rift Conservancy based in Eldoret Town (GoK, 2015). KFS is tasked with ensuring sustainable management and utilization of forest resources in Kenya in collaboration with forest communities through Community Forest Associations (CFAs). Most community members were aware of the state forest ownership but few members were unaware of the forest ownership. The respondents who claimed forest ownership were adamant that forest ownership and the community were inseparable since they have been dwelling in the forest since the pre-colonial period. Less than a quarter of the respondents were involved in forest management operations. Their involvement was mainly through forest monitoring as forest guards and provision of labor during afforestation exercises.

Majority of the respondents were dissatisfied with the management regime and style citing insecure land tenure as the leading cause of dissatisfaction. Traditionally, the Cherang'any/Sengwer is a hunter-gatherer community, roaming between Cherang'any hills forest and the adjacent plains. The plains were converted into agricultural fields and settlement areas during the Colonial period, pushing the Sengwer to retreat to the forests of Cherang'any hills (Larsen, 2015). The previous government regime allocated Kapolet Forest land which comprises a trust land and gazetted government forest to the community with Phase I of the Kapolet settlement scheme involving the Trust Land areas commencing in 1998 (Lynch, 2006). By the year 2000, allocation of phase II began, but very little progress was made in processing land division and the area was never degazetted. In the year 2003, a government notice was issued declaring living in a gazetted forest area illegal, meaning community members had no rights to the forests (Lynch, 2006). An invasion of phase II in the year 2004 to protest delays in allocation of land from locals and neighboring communities led to arrests and evictions by

the government officers triggering a series of court battles that are still ongoing as of the year 2020. The community members, therefore, view this move by the government as a denial of their rights to the ancestral land which dates back to the precolonial period. A report by Pusaka and Pokker (2014), laments that in spite of the progress made at the international level with regards to the recognition of access rights to ancestral forest land and efforts to improve human rights enforcement, indigenous communities still face expulsion from their traditional territories. There is evidence that the provision of land tenure security or temporary land use rights to forest communities could motivate them to participate in conservation activities (Soe and Yeo-Chang, 2019). Lawry et al. (2017), reiterate the importance of clearly defined and enforceable rights to land and natural resources and its significant in conservation as it reduces the uncertainties associated with making investments and improves the likelihood of rights holders' perception that they will benefit from conservation improvements. Efforts have since been made from the time this study was carried out to resolve conflicts including a three-day colloquium facilitated by the World Bank was held in March 2015 to bring together representatives of forest-dependent communities, civil society and government to collectively address the complex issues facing the Kenyan forestry sector. A government task force on indigenous people also visited the study area in mid-2019 to carry out the consultation with Kapolet Forest residents and propose appropriate actions for resolution of the land issue and other community concerns related to forest conservation.

Community integration in forest management is realized through the Community Forest Association (CFAs). Kapolet CFA was the sole association in the study area with low membership as most community members thought that by joining the CFA they were relinquishing their rights to the forest which they believe is theirs. They also complained of a lack of recognition of their *de facto* traditional forest conservation practices by the government. From the FGD, concerns on exclusion or non-involvement in decision making on matters of forest management and conservation and harassment by the authorities were raised. These findings are in line with that of Makindi (2010), who reported respondents' negative attitudes towards the management of select protected areas in Kenya due to restricted access to and use of resources, lack of community involvement in the management of the protected areas and regular harassment by the conservation enforcing agents. Htay and Røskaft (2020), further reiterate that understanding community' perceptions and use of protected areas increase conservation effectiveness through reducing human pressure on the resources and improving relationship between the people and conservation agencies. Conservation education can be adopted by the management authority as a tool for changing people's

attitudes and perceptions. Jacobson et al. (2006) emphasize that appropriate education and outreach programs can be instrumental in fostering sustainable behavior, reducing poaching activities in protected areas, improving community support for conservation, increasing recreation carrying capacities, improving general compliance with stipulated environmental regulations and influencing policies and decisions on matters environment and natural resources.

Corruption and bribery allegations were also leveled against the management mostly the enforcement officers who allow illegal activities like logging, charcoal production and commercial exploitation of poles in exchange for money. *"Some government officers and forest guards usually take bribes in form of money to allow for illegal logging, charcoal production, extraction of poles in the forest and transportation at night"* (Philip, Personal Communication, March 21, 2014). This threatens the forest cover and biodiversity. The governance of most tropical forests remains weak with corruption being one of the main problems facing the forestry sector. Corruption has been documented in the forest sector of most developing nations and is believed to be a leading contributor to deforestation and forest degradation (Smith et al., 2006; Urrunaga et al., 2012).

Some residents however expressed satisfaction with the management regime. One of their reasons for content was the formation of a CFA which was at least a step towards a more community-inclusive approach as opposed to the earlier state-centered approach. KFS had also in the past partnered with international organizations in carrying out forest conservation with community members also benefiting from such initiatives. The Natural Resources Management Project (NRMP) funded and approved by the World Bank in the year 2007 for example provided livelihood support to community members in recognition of their efforts in conservation and help reduce overreliance on the forest for survival. Selected households received cattle, poultry, beehives, coffee and tea seedlings to boost their household incomes.

### **Perceived forest status and causes of degradation**

More than half of the respondents perceived the forest had been degraded in the last decade due to one or a combination of factors. Most of the reported threats fall under the direct threat class of the International Union for Conservation of Nature (IUCN) since they are as a result of adjacent human activities or processes that have caused, are causing, or may cause biodiversity impairment, destruction and degradation (Salafsky et al., 2008). Logging and charcoal production for commercial purposes were common practices in the forest despite their illegality. The most exploited tree species for timber were the common yellowwood (*P. falcatus*) and East

African rosewood (*Hagenia abyssinica*) while the Falcon's claw acacia (*Acacia polyacantha*) was the most targeted species for charcoal and poles. Illegal logging and charcoal production are a threat to Kenyan forests and a common occurrence as established by Lambrechts et al. (2003) in the Abadare range forest and Vuyiya et al. (2014) in Kakamega forest.

Illegal grazing was also reported in the forest especially during the dry season. Herders mostly from the dryer lowlands drove their livestock in numbers deep into the forest for grazing especially during the dry seasons. The issue of illegal livestock-grazing and fodder-cutting is not unique to protected areas of Kenya as similar findings have been reported in the Royal Chitwan National Park, Nepal and Hyrcanian forest, Iran (Sharma and Shaw, 1993; Soofi et al., 2018).

Encroachment into the forest for farming was perceived as another cause of degradation. This was driven by the steady increase in population in the area consequently leading to increased demand for food production. The Kenya Water Towers Agency (2018) reports Kapolet as having the highest population of 43,227 people amongst the Cherangani hills ecosystem forest blocks. This is further exacerbated by unclear demarcation of the forest boundary in some forest sections making it hard to separate croplands from forestland. Indeed, a study by Kinyanjui (2009), in the western blocks of the Mau forest complex established that human encroachment negatively affects forest cover, structure and composition.

Climate change in the form of droughts and erratic rainfall patterns in the recent past has also been seen as a threat to the forest. Forest fires are also common during the dry seasons. This is occasioned by the use of fire in honey harvesting, charcoal burning, farmers using fire to clear debris from the farms in preparation for cultivation and in some instance arsonists.

Conversely, the authorities note that there has been an improvement in the coordination and management of forest resources since the devolution of the forestry sector as per the new constitution of Kenya 2010. Political goodwill is also evident with the ongoing nationwide tree planting campaign launched by the president of Kenya in the year 2018 to improve the country's forest cover. There have also been reshuffles in the officers in charge of forest management at the national, regional and local levels in a bid to improve forest management. They however acknowledge some existing and sometimes recurring management and conservation challenges among them: political interference, limited financial resources, inadequate infrastructure, understaffing and low level of conservation awareness by community members.

Proposed strategic actions against deforestation and forest degradation by community members from the FGD and KII include agroforestry to reduce pressure on the forest for fuelwood and fodder, diversification of livelihoods, adoption of improved and modern farming methods for optimum production, enhanced forest

monitoring through recruitment of forest scouts and clear demarcation of the forest boundary to reduce encroachment into the forest. In order to improve the well-being, experience and potential Pro-Environmental Behaviors (PEB) of new generations of humanity, there is also a need to use most plant and animal species in the study area as Experiential Key Species (EKS) to avoid an irreversible disconnect from an engagement with nature (Battisti, 2016).

## Conclusion

From the study it is evident that the forest plays a key role in the peoples' livelihoods both for subsistence and commercial purposes. Access to forest resources is therefore crucial in sustaining community livelihoods. Community support is vital in achieving forest management goals. There were mixed views on the existing management regime with the majority expressing dissatisfaction due to insecure land tenure and lack of access to some forest resources. This can deter community members from fully participating in forest management and conservation activities. Securing permanent or temporary land tenure for genuine community members might act as an incentive for their participation in forest conservation in addition to reducing their negative attitudes towards the enforcing agencies. Conservation education and outreach actions coupled with the integration of the local community forest conservation knowledge and practices to the existing state laws can be instrumental in achieving sustainable forest management. There is also a need for increased resource allocation by the government to the forestry sector in the annual budget for effective operations and achievement of the minimum 10% forest cover in the country. The recommendations from the findings of the taskforce on Forest Resources Management and Logging Activities in Kenya (2018) should be implemented for better outcomes in forest management and conservation. Finally, speedy investigation, prosecution and conviction of corrupt KFS officers should be done to eliminate future malpractices by officers and restore public confidence in the institution.

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## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

## REFERENCES

- Adam YO, El Tayeb AM (2014). Forest dependency and its effect on conservation in Sudan: A case of Sarf-Saaid Reserved Forest in Gadarif state. *Poljoprivreda i Sumarstvo* 60(3):107.
- Battisti C (2016). Experiential key species for the nature-disconnected generation. *Nature* 34:203-226.
- Bwalya SM (2011). Household Dependence on Forest Income in Rural Zambia. *Zambia Social Journal* 2(1):67-86.
- Cavendish W (2000). Empirical Regularities in the Poverty Environment Relationship of Rural Households: Evidence from Zimbabwe. *World Development* 28(11):1979-2003.
- Center for International Forestry Research (2005). Contributing to Africa's development through forests strategy for engagement in sub-Saharan Africa. CIFOR, 41.
- Dytham C (2011). Choosing and using statistics: a biologist's guide. John Wiley & Sons.
- Fonta WM, Ayuk ET (2013). Measuring the role of forest income in mitigating poverty and inequality: evidence from south-eastern Nigeria. *Forests, Trees and Livelihoods* 22(2):86-105.
- Garekai H, Lepetu J, Thakadu OT (2020). Forest resource utilization and rural livelihoods: insights from Chobe enclave, Botswana. *South African Geographical Journal* 102(1):22-40.
- Geist HJ, Lambin EF (2002). Proximate Causes and Underlying Driving Forces of Tropical Deforestation. *BioScience* 52(2):143-150.
- Government of Kenya (2015). Cherangani Hills Forest Strategic Ecosystem Management Plan 2015 - 2040. Kenya Forest Service, Nairobi, Kenya.
- Government of Kenya (2018). Taskforce report on Forest Resources Management and Logging Activities in Kenya. Available at: <http://www.environment.go.ke/wp-content/uploads/2018/05/Task-Force-Report.pdf>
- Guthiga PM (2008). Understanding local communities' perceptions of existing forest management regimes of a Kenyan rainforest. *International Journal of Social Forestry* 1(2):145-166.
- Hariohay KM, Gambay JG, Røskaft E (2020). Attitudes of local leaders towards wildlife conservation in village areas in southern Ngorongoro Conservation Area, Karatu District, Tanzania. *International Journal of Biodiversity and Conservation* 12(3):227-239.
- Htay T, Røskaft E (2020). Community dependency and perceptions of a protected area in a threatened ecoregion of Myanmar. *International Journal of Biodiversity and Conservation* 12(4):240-252.
- Jacobson SK, McDuff M, Monroe M (2006). Conservation education and outreach techniques. Oxford, UK: Oxford University Press.
- Jumbe CB, Angelsen A (2007). Forest dependence and participation in CPR management: Empirical evidence from forest co-management in Malawi. *Ecological Economics* 62(3-4):661-672.
- Kenya Forest Service (KFS) (2020). About KFS. Available at: <http://www.kenyaforestservice.org/>
- Kenya Water Towers Agency (2018). Kenya Water Towers Status Report for Cherangany and Mt. Elgon. Available at: [https://watertowers.go.ke/wp-content/uploads/2019/03/Water-towers-status-report\\_-\\_Cherangany-and-Mt.-Elgon.pdf](https://watertowers.go.ke/wp-content/uploads/2019/03/Water-towers-status-report_-_Cherangany-and-Mt.-Elgon.pdf)
- Kinyanjui MJ (2009). The effect of human encroachment on forest cover, composition and structure in the western blocks of the Mau forest complex. Department of Natural Resources (Forestry) of Egerton University, Egerton University. Doctor of Philosophy Degree.
- Kiptum D, Odhiambo C (2007). Safeguarding Sengwer Territory, Land, Culture and Natural Resources. Available at: [http://www.iapad.org/wp-content/uploads/2016/01/p3dm\\_sengwer\\_people.pdf](http://www.iapad.org/wp-content/uploads/2016/01/p3dm_sengwer_people.pdf)
- Lambrechts C, Woodley B, Church C, Gachanja M (2003). Aerial survey of the destruction of the Aberdare Range forests. UNEP. Division of Early Warning and Assessment. P 35. Available at: [http://rhinoark.org/wp-content/uploads/2016/05/Aberdare\\_aerial\\_survey\\_ENGLISH.pdf](http://rhinoark.org/wp-content/uploads/2016/05/Aberdare_aerial_survey_ENGLISH.pdf)
- Langat DK, Maranga EK, Aboud AA, Cheboiwo JK (2016). Role of forest resources to local livelihoods: The case of East Mau forest ecosystem, Kenya. *International Journal of Forestry Research* 2016:1-10.
- Larsen S (2015). Threatened forest, threatened culture: a case study of subjectivities, nature and resistance in Embobut Forest. Master Thesis Series in Environmental Studies and Sustainability Science. Available at: <https://lup.lub.lu.se/student-papers/search/publication/8234294>
- Lawry S, Samii C, Hall R, Leopold A, Hornby D, Mtero F (2017). The impact of land property rights interventions on investment and agricultural productivity in developing countries: a systematic review. *Journal of Development Effectiveness* 9(1):61-81.
- Lynch G (2006). Negotiating ethnicity: Identity politics in contemporary Kenya. *Review of African Political Economy* 33(107):49-65.
- Makindi SM (2010). Communities' perceptions and assessment of biodiversity conservation strategies: the case of protected areas in Kenya. PhD. thesis. University of Kwazulu-Natal, Durban: School of Environmental Sciences.
- Mamo G, Sjaastad E, Vedeld P (2007). Economic dependence on forest resources: A case from Dendi District, Ethiopia. *Forest Policy and Economics* 9(8):916-927.
- Maturu V (2000). Forest Cover and Forest Reserves in Kenya: Policy and Practice. IUCN Eastern Africa Programme, Forest and Social Perspectives in Conservation (No. 5). Working Paper.
- Mbuba MD (2019). Fencing and Forest Conservation: Attitudes of Local People Living Adjacent to Eastern Slopes of Mount Kenya. *International Journal of Natural Resource Ecology and Management* 4(1):1-6.
- Meinzen-Dick R, Knox A (1999). Collective action, property rights, and devolution of natural resource management: A conceptual framework. In Draft paper for workshop (Vol. 15).
- Njenga PK, Mugo F, Opiyo R (2011). Youth and women empowerment through agriculture in Kenya. VSO Jitolee.
- Ototo G, Vlosky RP (2018). Overview of the Forest Sector in Kenya. *Forest Products Journal* 68(1):6-14.
- Pusaka FPP, Pokker SHK (2014). Securing forests securing rights: Report of the International Workshop on Deforestation and the Rights of Forest Peoples. Palangka Raya, Indonesia, March 2014. Available at: <http://www.forestpeoples.org/sites/fpp/files/private/publication/2014/09/prereport.pdf>
- Rai RK, Neupane P, Dhakal A (2016). Is the Contribution of Community Forest Users Financially Efficient? A Household Level Benefit-Cost Analysis of Community Forest Management in Nepal. *International Journal of the Commons* 10(1):142-157.
- Rotich B (2019). Forest Conservation and Utilization in Embobut, Cherangani Hills, Kenya. *International Journal of Natural Resource Ecology and Management* 1:7-13.
- Salafsky N, Salzer D, Stattersfield AJ, Hilton-Taylor C, Neugarten R, Butchart SHM, Collen B, Cox N, Master LL, O'Connor S, Wilkie D (2008). A standard lexicon for biodiversity conservation: unified classifications of threats and actions. *Conservation Biology* 22:897-911.
- Scherl LM, Wild R, Wilson A (2004). Can protected areas contribute to poverty reduction?: opportunities and limitations. IUCN.
- Sharma UR, Shaw WW (1993). Role of Nepal's Royal Chitwan National Park in meeting the grazing and fodder needs of local people. *Environmental Conservation* 20(2):139-142.
- Smith J, Colan V, Sabogal C, Snook L (2006). Why policy reforms fail to improve logging practices: The role of governance and norms in Peru. *Forest Policy and Economics* 8(4):458-469.
- Soe KT, Yeo-Chang Y (2019). Perceptions of forest-dependent communities toward participation in forest conservation: A case study in Bago Yoma, South-Central Myanmar. *Forest Policy and Economics* 100:129-141.
- Soofi M, Ghoddousi A, Zeppenfeld T, Shokri S, Soufi M, Jafari A, Chahartaghi NR (2018). Livestock grazing in protected areas and its effects on large mammals in the Hyrcanian forest, Iran. *Biological Conservation* 217:377-382.
- Urrunaga JM, Johnson A, Orbegoza ID, Mulligan F (2012). The laundering machine: How fraud and corruption in Peru's concession system are destroying the future of its forests. Washington, DC: Environmental Investigation Agency.
- USAID (2006). Issues in Poverty Reduction and Natural Resource Management. United States Agency for International Development, Washington, DC. Available at:

<https://www.usaid.gov/sites/default/files/documents/1862/issues-in-poverty-reduction-and-natural-resource-management.pdf>

Vuyiya E, Konje M, Tsingalia H, Obiet L, Kigen C, Wamalwa S, Nyongesa H (2014). The impacts of human activities on tree species richness and diversity in Kakamega Forest, Western Kenya. *International Journal of Biodiversity Conservation* 6:428-435.

Wily LA (2002). Participatory forest management in Africa: an overview of progress and issues. In second international workshop on participatory forestry in Africa. Defining the way forward: sustainable livelihoods and sustainable forest management through participatory forestry, Arusha, United Republic of Tanzania, pp. 18-22.

World Bank (2000). *World Development Report 2000/2001 : Attacking Poverty*. World Bank, Washington DC. Available at: <https://openknowledge.worldbank.org/handle/10986/11856>