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RESEARCH ARTICLE

THE ROLE OF FORESTRY IN POVERTY ALLEVIATION IN KENYA

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ABSTRACT

The overall objective of this paper is to determine the role played by forestry in alleviating poverty in Kenya. It also seeks to examine and analyse the extent of poverty among people living in Cherangani Hills, West Pokot; assess the benefits of forestry to rural communities; investigate the relationship between forest dependence and poverty and to make policy recommendations on ways of enhancing the contribution of forests in alleviating poverty. Two methods were used to derive data for the study. Secondary data was obtained by review of existing literature related to the subject while primary data was obtained through a survey among 200 households. The survey was based on Multistage sampling procedure. Data was collected through a structured questionnaire, an interview schedule and discussions with key informants and analyzed using descriptive statistics and regression analysis techniques. The findings revealed that 69.5% of the population had incomes falling below the official poverty line. Two categories of forest products had a net effect on rural poverty; timber products were mainly commercialized and traded by people with sufficient capital, while the poor mainly utilized non-timber forest products. The findings further revealed a significant positive relationship between poverty level and household size. There was a significant difference in poverty level among households having forestry as a source of income compared with those without it. On the basis of these findings, it was concluded that forests act to ameliorate the incidence of poverty in the study area. It was recommended that to further enhance this contribution, it was imperative to undertake conservation programmes that were sensitive and responsive to community needs and that aimed to strike a balance between utilization level of forest resources and their renewable rate.

INTRODUCTION

The rising poverty levels are a matter of global concern. Of the world's over 6 billion people, 2.8 billion – almost half - live on less than $ 1 a day (World Bank, 2000a). In Kenya various attempts have been made to understand the nature of poverty in rural areas. Out of these studies, programmes have been implemented aimed at reducing the prevalence of poverty in rural areas where a majority of people live. These programmes devoted a significant attention to alleviation of poverty and satisfaction of basic needs, which are deemed an essential element in the development strategy of the country. The paradox is that in spite of these efforts, poverty levels in rural areas continued to rise and majority of people are increasingly finding it difficult to derive their livelihood and meet basic needs. In 1994, out of the total population of 26.4 million people, eleven and a half million were absolutely poor, of which 10.3 million lived in the rural areas (Kenya, 1998).

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According to Townsend (1979), individuals, families and groups in the population can be said to be in poverty when they lack the resources to obtain the types of diet, participate in the activities and have the living conditions and amenities which are customary, or at least widely encouraged and approved in the society in which they belong. The old adage that poverty, like beauty, lies in the eyes of the beholder (Hobsbawn, 1968) is a commonly used concept in defining poverty. Thus, several approaches exist in the literature for measuring poverty. Chambers (1997) regards poverty as low income or often as low consumption that is easily and readily measured, and these are deemed to vary from place to place and from society to society. Alcock (1993) proposed the use of a combination of budget standards, income proxy measures, and deprivation indicators. This approach involves assessing needs like diet, clothing and other facilities, which are customary and approved in society. The poor are then defined as those who fall below the majority or socially acceptable standards of living. These people will fall below what could be the majority standard given a better redistribution or restructuring of society. Sen (1981), while discussing on

poverty measurement recommends the specification of a set of basic or 'minimum' – needs and poverty is measured by those individuals or households unable to fulfil these needs. The problem of poverty measurement has two aspects. First, the specification of the poverty datum line; the threshold income below which one is considered poor, and which reflects the minimum socially accepted living standards, and second, the intensity of those below the threshold. There is no universal agreement about how the poverty level income is to be determined. In Kenya, the poverty line has been primarily quantified in monetary terms using information generated by the welfare monitoring surveys. Three basic poverty lines have been calculated from the data: food poverty line, which defines the line below which people do not meet their basic food requirement, set at 2250 calories per adult person per day or Kshs. 927 per month per adult in rural areas and Kshs.1254 in urban areas; overall poverty line which includes food expenditure that brings about the required food energy intake, and a non-food expenditure allowance. In monetary terms, this is Kshs.1239 and Kshs.2648 per month per adult person in rural and urban areas respectively and Hardcore Poverty Line is set at the level, where total expenditure is equivalent to food poverty line (UNDP, 2002). Once the poverty line is specified, the next question that arises is how poverty is to be measured. Several indices have been suggested and used in a number of studies. A commonly used measure is the head count ratio which simply gives the proportion of people whose income falls below the poverty line.

The role of forestry and particularly that of NTFP in livelihoods has been widely studied (Palo et al. 2005; El Tahir et al. 2004; FAO. 2001). Forestry is known to play a central role in the nation's development process in many countries (Duerr, 1988; Hamilton, 1984; Rambo, 1982). In rural areas, earnings from forest products are often important as a complement to other income. Large numbers of households generate some of their income from selling forest products especially when farm production is not sufficient to provide enough food all the year round. This income is often used to obtain inputs for other activities that contribute to poverty reduction (Leah and Fairhead, 1994). The rural poor often produce, process and sell forest products (e.g. making mats and baskets and selling fuel wood) in the absence of other employment opportunities often as a part-time activity within farming households. Moreover, forests are a key source of household food security as communities depend on forest plant and animal products to meet part of their nutritional, cooking and/or health needs (Byron and Arnold 1999). During particular seasons of the year these forest products contribute towards meeting dietary shortfalls of communities living near forest resources. Tubers, rhizomes and nuts are especially useful in emergencies such as floods, famines, droughts and war (Warner 2000).

As Chambers (1983) puts it, rural people build a repertoire of different petty enterprises and activities in order to survive. The underlying principle is diversification for survival. Forests provide such an alternative opportunity for improving rural economy, which often results in forest depletion. In a bid to break through the poverty line, the smallholder peasant responds by exploiting forests directly or indirectly. Forests are common property resources in a natural form and exist in the wild and their utilisation cuts across the social strata. They play a critical role in satiating human needs in various ways. As income from regular on-farm sources diminish, communities draw on off-farm forests for input that cannot be produced on-farm or that can be more efficiently supplied from off-farm resources.

More recent studies have examined the impact of non-farm income on income inequality in developing countries (Adams, 1994). The findings reveal that certain types of non-farm activities have an inequality-decreasing effect. Other studies have also focused on revenue generated from forests; amount of forest products harvested and export figures at national level. Other studies have revealed that some of the poorest are disproportionately dependent on forestry income (Reddy and Chakravarty 1999, Jodha 1992). To majority of people in rural arrears, forests are their habitat and satisfy practically all their needs. Forest products enable poor people to secure a living during adverse conditions, and obtain fodder for livestock and fuel for cooking. Forests therefore, provide direct means of survival to poor segment of the rural population. The poor have less land and hence are dependent on forestry for a greater share of their total income (Arnold, 1998). The dependence is measured not only by the products they provide, but also by the non-tangible services they offer. However, the total contribution of forests and trees to poverty reduction is difficult to quantity. Those who collect them, with the amount collected varying according to seasonality, access and options, consume a significant proportion of forest products. Most of the available information is descriptive and often extremely situation specific. While studies on fuel wood or specific forest products have been conducted, censuses and surveys do not usually include information on household-level use or activities for a more complete range of forests products (Byron and Arnold, 1999). It is estimated that one quarter of the world's poor depend directly or indirectly on forests for their livelihood (World Bank, 2000b) although the nature of the dependence vary greatly (Shepherd, Arnold and Bass, 1999). Forest contribution to livelihoods thus encompasses income from agriculture (shifting cultivation), as well as income from forest products. Forest-related income include revenue from sale of crops or livestock for which forest nutrients or fodder were essential (Shepherd, Arnold and Bass, 1999). By this way, forests act as reserve or safety net, providing both subsistence and income in times of crop failure, shortfall, and unemployment or other emergency or hardship, or to meet exceptional needs. The foregoing study, therefore, examined the various ways in which forests help to alleviate rural poverty for people living in a forest environment. This paper is limited to discussing the role played by forests in alleviating rural poverty in Kenya. Several measures of poverty have been suggested.

MATERIALS AND METHODS

The study adopted a descriptive research design and a field survey was conducted in Kapyogen and Kaptabuk locations selected due to their proximity to the community forest resource. Two hundred respondents were chosen to constitute the sample for the survey. The study was based on multistage sampling procedure. This sample was considered adequate for generalisation purposes. The selection of individual units was done through simple random sampling technique. An exploratory survey was conducted to determine the Sub-

locations to be covered in the survey. Multistage sampling was employed to select sub-locations and villages. The list of households in these villages was constructed which constituted the sampling frame. Secondary data was obtained by review of literature at the national, district and divisional headquarters. More data were collected from selected informants in the study area. The data collected included demographic data on the study area, population, population structure, education levels, and socio-economic indicators, number of households, average household size, economic activities, levels and sources of income, land ownership and poverty levels. Data on demographic profiles, economic activities, harvest rates of forest products in the region and information on land use were obtained from the District headquarters. Some data on market prices, volume of forest products traded, medicinal value of forest and cultural values of forests was obtained from the Division and villages. The main survey involved interview-based information on the household demographic features, use of forest products, poverty levels and views of households.

The methods of data collection included the use of pilot study, interview schedule, and interviews with key informants. Pre-testing of the questionnaire was done in one of the randomly selected villages outside the sample frame. This was instrumental in highlighting questions whose answers could not readily be revealed by respondents. The interview schedule was therefore adjusted accordingly. Survey method often helps to cover significant areas for investigation that require intensive informal interviewing and observation. Furthermore, random sampling from a given survey furnishes the same information as a census at a much lower cost with greater efficiency and accuracy. One of the mainstays of social survey is the use of key informants as a source of information about the socio - economic dynamics of a given area (Pelto, 1978). Among those interviewed were traditional healers, government officials both at divisional and district headquarters among them forest guards, agriculture officers, foresters, land officers, and administration officials and personnel at Lelan agro forestry self help organisation.

Most data were recorded manually on a questionnaire. Before data analysis, the data went through two stages: data coding and editing. Data coding involved 'screening' to select appropriate data for the study as others were disregarded. Codes were then assigned to relevant variables including non – numeric variables. Missing values were filled in by taking the average of the other respondents. The second stage entailed identification of errors of various kinds. This focused mainly on checks for completeness and consistency. By this way observations, which appeared inconsistent with the rest of the data were adjusted accordingly by use of mean values. This step, according to Chatfied (1980), is vital because errors are unavoidable and steps must be taken to deal with them as far as possible. Qualitative data was analysed using descriptive statistics while quantitative data was analysed by regression analysis techniques. The relationships between various variables under study were analysed using correlation and regression analysis. Incomes from respondents were converted into poverty levels using the FGT index and regressed against the household size. Coefficient of determination (R^2) *Beta,* and T- values as well as significant values were computed. A paired T-test statistics was also employed to compare poverty levels between households with forestry as a source of income and those without it.

The literature review showed that suitable poverty measures should possess two axioms: monotonicity axiom- which states that other things remaining constant, reduction in income of someone below the poverty line must increase the poverty measure, and weak transfer axiom- meaning that a pure transfer of income to a poor person below the poverty line from a richer person without making either cross the poverty line, must reduce the poverty measure (Kakwani and Nanak 1980). An appropriate measure of poverty that fulfils these requirements and one that was adopted in the current study is the FGT index (Foster et. al. 1984). This was selected due to its sensitivity to income reduction among the poorest of the poor. FGT indices were derived using the following formulae:

Head count index (H): suppose that there are *n* households of whom *m* fall below the poverty line. Then the head count ratio index is defined as *H=m/n.*

Poverty gap index (I): suppose the poverty datum line of incomes is Z. There are *m* households with income y_i…ym below that line. Then the sum below: $\sum (Z - y_i)$, where the summation is over i = 1…*m* is an indication of the amount of income needed to lift all the poor to the poverty line from below. The poverty gap index (I) is obtained by:

$I = \sum (Z - yi) / mZ$

Foster, Greer and Thorbecke (1984) Index

FGT (α=2) = H [I^2 + (1 – 1) ^{2} C_m] Where C_m is the coefficient of variation of the income of those who fall below the poverty line, Z and given by

$(C_m)^2 = \Sigma (\mu m - y_i)^2 / (\mu m^2)$ i = 1...m

Where μ_m is the mean value of the income of the poor, and y_i, i = 1… m, is the income of the i^{th} individual among the poor. The shortened form of this formula as used by the Central Bureau of Statistics is:

FGT (α=2) = $1/n \Sigma (y_i-z)^2/z$ where the summation is taken for *m* poor units of the population (Kenya, 1998). Information on income of respondents was sought from respondents and monthly average income calculated. By using the Government poverty line of Kshs. 1239 per person per month, the various indices was computed (Kenya, 1998). These indices were found to be useful only for sample population. Therefore, in order to determine individual poverty level, the FGT index was adjusted using the formula.

$FGT=(y-z)^2/z$

Where y = average monthly income
z = poverty line

RESULTS

Geographical Distribution of Respondents

According to the findings of the study, 38.5% of the respondents were drawn from Chepkono sub-location while Chesubet, Simotwo, and Kapsait sub-locations had 23.5%,

20.5% and 17.5% respectively. It is expected that there will be differences both in poverty incidences and forestry use across the sub-locations depending on their proximity to forest resources.

The Age Factor

The age cohort was developed using 20 years as the base year with age difference of five years. The age factor data showed that the age of respondents followed a normal distribution. The frequency of age increased from 3 respondents for the lowest age group to 60 and 32 respondents for age groups 40-44 and 45-49 respectively. It then started dropping gradually to 11 respondents, for ages 50-54, then to 18 respondents for those between 55-59 years, and 12 for age cohort 60-64 years. From the study, the frequency of those with more than 65 years was 3. Assuming that the productive age range is between 20 to 54 years it could be said that the majority (82%) of the household heads are in their prime working ages.

Education Level

The analysed data indicated that of the 200 respondents, 23.0% did not have any form of formal education while 44.5% had obtained primary education. Another 22.0% had attained secondary level of education while the remaining 10.5 % had completed post-secondary level. According to the findings, 77% of the total population had some form of formal education and these could be classified as literate.

Major Occupations

According to the findings, the major occupations in the study area were: farming, formal employment, Business/trade and Artisanship. Some respondents were engaged in more than one type of occupation. A majority 69.0% of respondents in the study area were engaged in farming. This included both land cultivation as well as livestock rearing. Respondents engaged in forestry were classified as farmers. Another 5.5% are in formal employment, while only 1.0% are artisans; the same number as those in business enterprises. Multiple occupations with 47 % respondents were a fairly common practice in the area. Such combination of occupations was where one was a farmer as well as a businessman.

Household Average Monthly Income

Information on average monthly income of respondents was gathered and tabulated. Of the total respondents, 37.5% had income ranging between Kshs 0.00-500. The proportion of those whose income ranged between Kshs 500 and Kshs 1,000 declined to 26.5%. The proportion declined further to 9.5% for those people whose monthly income was between Kshs1500 and Kshs 2,000, before rising again to 12.5% for income range Kshs 2,000 and Kshs 2,500 and to 14.0% for those with incomes above Kshs 2,500. This information suggested a community of low-income earners: taking into account the poverty line of Kshs 1,239 per person per month. It was however not clear why there was a rise in percentage for the last two categories of income. In the study, the level of income was synonymous to poverty since it directly impacted on poverty indices.

According to this information, dairy with an average income of Kshs. 783 is the leading source of income in the study region followed by agriculture with average income of Kshs. 455 and other sources contributed the rest of Kshs. 503. Forestry with an average income of Kshs. 200 per person has the least average income. Once again forestry shows a less significant source of income due to difficulties attributed to valuation of many forest products and also due to the fact that most non-timber forest products (NTFPs) are consumed within the household. Therefore, despite being a hilly area, agriculture and dairy are the most important components of the local subsistence economy. Formal employment and business form a large proportion of other sources of income. In order to measure poverty, a set of selected poverty indices were derived from information on household income and analysed. The total sample had a head count ratio of 0.695. This meant that 69.5 % of the total population had incomes falling below the poverty line. Simotwo sub-location with 87.8% had the largest proportion of people falling below the poverty line; Chepkono 79.2%, Kapsait 57.6%, and Chesubet 48.9% sub-locations followed. This showed a marked variation in poverty incidences across the locations.

This variation may be explained, among other factors, by geographical locations of the sub-locations. Simotwo and Chepkono sub-locations for instance are located in the geographical leeward side of Cherangani hills and thus receive unreliable rainfall needed for productive purposes. However, the other two sub-locations of Kapsait and Chesubet are located close to the forest and therefore derive maximum benefits directly and indirectly from forest resources. The sample population had a poverty gap index of 0.591. Since this index shows the extent poor people are from the average poor person, it implies that 59.1% of the poor fell below the mean income of the poor. Once again there were discrepancies in this index across the sub-locations, which is similar to that of head count. Simotwo and Chepkono had their respective indices at 0.712 and 0.600 while Kapsait and Chesubet sub-locations had (I) equal to 0.472 and 0.470 respectively. Information on (I) index reflects the amount of resources required to eliminate absolute poverty. The FGT index for the total population is 0.278 while those for the sub-locations are Simotwo (0.467), Chepkono (0.321), Kapsait (0.154) and Chesubet (0.136) respectively. This information revealed high incidences of poverty in the area which calls for urgent intervention.

Family Structure

The household sizes of the respondents were grouped into five categories. The largest number of respondents (40%) had household sizes of between 6 and 9 persons while only 0.5% of them had household size of more than 18 people. 32% of the respondents had household sizes of between 2 and 5 people; 21.5% of respondents were in the category of between 10 and 13 people and the remaining 6.0% between 14 and 17 people. The average household size in the area was 7.82, which is higher than the district average of 5 people. Information on household sizes was necessary in understanding rural poverty as it was expected to influence average distribution of resources. Household size also determined the demand a particular household exerted on forest products and the overall utilization of these resources at household level. In regard to

marital status 41.5% of the respondents were in polygamous unions, of which 9.5% were married to more than two wives.

Respondents poverty situation

Sanitation and housing conditions

Poverty is multidimensional and manifests itself in various forms. The definition of rural poverty using one criterion was bound to be inadequate. It was therefore difficult for a single study to capture the many dimensions of poverty. Although the study adopted the money - metric definition in measuring poverty, information on poverty correlated on other selected social indicators. Accordingly, 19% of the respondents had access to safe drinking water. This included piped water and protected springs. Only 2% of the population used modern VIP toilets compared to 74% who used traditional pit latrines. The remaining 24% had no toilets and resorted to bushes. This showed poor sanitary conditions of the people living in the study area. Sanitation was a vital indicator in measuring the living standards of a household. Housing conditions were categorized into two: "permanent" and "non- permanent". A permanent house was defined as one with cement floor, walls made of bricks and roof made of corrugated iron sheets. A non-permanent house on the other hand was one with floor made of sand, walls made of mud or dung, and roof made of grass. In situations where a house met any two criteria in one category, it qualified to belong to that particular category. Housing condition was an important indicator in assessing rural poverty since it reflected on the surface the income level of the household.

Literacy level

Information on literacy levels showed that primary school enrolment rate in the area was 70.0%, while adult literacy level was 38.5%. The population was largely illiterate. This information was important in understanding the relationship between poverty and forestry since high literacy empowered the person with necessary capabilities, which enabled him to interact with the surrounding environment for economic gains. Access to mass media (TV, Radio) was 50%, meaning half of the respondents owned either a television set or radio or both. Access to media showed respondents' capacity to own basic assets which act as household security and also instrumental in advocacy programmes to combat poverty.

Access to means of communication

Distance to nearest access road was assessed and the analysis showed that 56% of respondents had access to communication in less than 2 kilometres. Another 38.5% respondents reside in distances ranging between 2 and 5 kilometres to the nearest access road. Only 5.5% of the population travelled more than 5 kilometres to the nearest access road. This showed that the region along forest area was well served by a road network. Over 94% of respondents travelled less than five kilometres to nearest accessible road while the remaining five percent travelled more than five kilometres.

Respondents' resource status

The resource status of an individual determined the degree to which that person was susceptible to poverty. Land was the major valuable asset in the area, which was expected to influence poverty. Of the surveyed sample, 37.5% had land ranging between 11 and 20 acres. Another 17.5% had land size in the range of 21 and 30 acres. Great differences in size were, however, noticed across the sub-locations with those in more productive areas having less land per capita compared to those in less productive areas. This might be explained by high demand for productive land, which had attracted a high population leading to land fragmentation. Although the community living in the study area was traditionally pastoralist, a shift to mixed farming was the main factor for increased demand of land in the hills. Land was, therefore, regarded as a basic factor of production and access to it implied more income earning opportunities through farming activities.

Domestic energy

The form of domestic energy has a direct bearing on demand on fuel wood. Because firewood and poles were important wood products, the respondents were asked how they acquired and used them. Information on domestic forms of energy was critical in understanding the relationship between poverty and forestry. Excessive use of fuel wood to meet domestic energy resulted in illegal felling of trees, forest encroachment and soil erosion that in turn affect crop production and other related activities. The data indicated that, 84% of the respondents used firewood for cooking, 15% used charcoal and only 1% used paraffin. The data further showed that 45% respondents depended on firewood for lighting while the remaining 55% used paraffin for lighting purpose. Collecting fuel wood was the responsibility of women and children. Most villagers gathered most of their fuel wood from their own farms, although they may have supplemented it with fuel wood from forests. Respondents revealed that dead wood formed a major component of firewood, but for those villagers close to forests, harvesting of green wood was a common practise that contributed to deforestation. Obtaining exact figures on quantity of charcoal used at household level and also the amount of income got from trading of forest fuel was difficult to solicit from respondents due to fear caused by current ban on felling of trees in government forests. However, a visit to these forests showed evidence of ongoing logging of trees and charcoal burning although the latter was to a far lesser extent. The survey established that most households cooked in the 'open air', which was known to consume a large amount of firewood. There was, therefore, need to introduce the energy saving *jiko* so as to save the forests from excessive logging. Majority of the villagers said that it was more difficult to collect fuel wood at the time of the survey than it was five years previously.

DISCUSSION

Demographic information is crucial in studying rural poverty. Poverty is a human phenomenon that entails accumulation of wealth. It is expected that wealth and age determine the extent of utilization of human resource in fighting poverty. One's age also determines the size of the family, which is expected to influence household poverty. The level of education determines a person's capacity to harness existing resources to improve household economy, which is vital in alleviating poverty.

In addition income from only one source was inadequate to meet subsistence needs and as such most people tend to diversify for supplementary income. Information on type of occupation of household head was vital in determining income base of the household. It was also expected that for people with low income to meet minimum daily needs they would utilize forest resources more compared with those with higher incomes. Furthermore, family structure, among other factors, explained why there was a large household size in the region. There seemed to be a rising trend in immigration of people from the neighbouring ASAL divisions to the hills in search of farming land. This was chiefly responsible for the increasing population in the area, a situation that encouraged conversion of forestland to farmlands. Accessibility to road network was vital in understanding rural poverty and forest utilization. Access roads open up remote parts and enhance flow of goods and services to alleviate poverty. Also with accessible roads, mobility of forest products especially timber was improved and as a result increased forests potential to alleviate rural poverty. It was also expected that the size of land one owned would have a bearing on household income. However, this requires a combination of other factors like capital and technology in order to undertake income generating activities. The demand and infrastructure are other vital factors that determine the nature of land use in a particular area.

Effects of forestry on poverty indices

Decomposition of income in the region shows that forestry had the least contribution to average income per person. However, this scenario was due to non-monetization of non-timber forest products (NTFPs), most of which were consumed locally. The effect of forest income on poverty indices is critical in understanding the contribution of forests in alleviating poverty in the area. The findings showed a marked difference in poverty indices between those respondents with forestry income and those without. 62.2% of those households dependent on forestry income fall below the poverty line compared to 86.2% in those households not relying on it as reflected by the head count indices. Similarly, the poverty gap indices for the two categories of households were 0.571 and 0.701 respectively. There was also marked differences in FGT indices, which were 0.292 and 0.453 for respondents with forestry income and those without it. This fact demonstrated that forests accorded poor people an extra opportunity to generate income. The analysis tended to suggest that income from forestry has a positive effect on selected poverty indices, and therefore was a useful resource in alleviating poverty. When household incomes were disaggregated, it was observed that most of the respondents with high income from regular sources (dairy, agriculture) were the same ones earning some income from forestry. This scenario implied that in order to generate income from forestry, it required one to have adequate capital to be able to invest in this sub-sector. This may be explained by the fact that timber, which was the product traded in the area, needed sufficient starting capital which was supplied from other regular sources. There, therefore, existed some relationship between the various sources of income and forestry. Forest income was only useful in supplementing household income. This may be justified further by the fact that among the surveyed respondents, none was solely relying on forestry income for livelihood. It is however important to note that the above indices might have been misleading because of varying proportions between people having forestry as a source of income and those without it. Large families tended to have incomes below the poverty line. This may be explained by the fact that, when family size is large, the per capita income, which is used to measure poverty, reduces and affect the poverty index. Also, holding other factors constant, large family size exerts excessive pressure on existing resources pushing the household below the poverty datum. In order to alleviate poverty in the area, controlling population growth rate would be necessary. This would also control the overuse of forest resources in the area through reduction in demand of forest products especially fuel wood and timber, while at the same time reducing the rate of conversion of forestland to farmlands.

In addition, the mean FGT values was lower (0.302) for households depending on forestry as a source of income compared with those not depending on it (0.480). Moreover, the two household categories were found to be statistically different with a R^2 value (-0.094). This suggested that income from forestry had an impact on household poverty level and therefore boosts people's income, and secondly, Income from forestry supplemented that for respondents whose income was already above the poverty line. Timber was the main forest product commercialised in the study area. This was an enterprise that required high capital to undertake. It was likely therefore that income from trade of this product benefited the non-poor more than it did for the poor. Given the fact that trade in timber is discouraged in the area and that the poor infrastructure is a hindrance to trading in it, it implied that the poor were unable to participate effectively in commercial activities of forest products and as such their incomes were low compared to the non-poor. It may be concluded that in order to address the poverty problem in the region, improving income from forestry will definitely be a necessary, though not sufficient, strategy. The decomposition of income sources showed that forestry had the least household income in the area. Again about 40% of the population derived some form of income from forestry. Commercialising forestry will supplement diminishing income from regular sources. However, such strategy will most likely benefit the non-poor more than the poor and in fact, may serve to widen income inequality in the region. However, if the strategy is properly designed, then by the trickle-down effect, such strategy may be useful in reducing poverty.

Use of forestry in rural economy

The importance of forests in rural economy was recognized. Forest resources play a multiple role in rural economy. Five main uses were identified in this study.

Medicinal uses

The study confirmed that 78% of the population entirely or partly depended on traditional medicine for primary health-care. From the findings, 184 respondents had a traditional healer in less than 4 kilometres compared to 37 who had access to a health facility within same distance. Another 42 respondents travelled more than 8 kilometres to the nearest health facility while none travelled such distance to the traditional healer. This information depicted a big difference in

accessibility to the two types of health service outlets. It further showed a high concentration of medicine-men in the area compared to modern health facilities. Traditional medical practice was carried out in all the villages but the respondents declined to give information on user fee charged for the services. This was difficult because of lack of records, overlaps in medical dispensation and the differences in motives among the practitioners; with some on either humanitarian while others on commercial basis. The fee charged by traditional healers was however 75% lower than that charged in modern health facilities. This, among other reasons, explained why most people preferred traditional practitioners as procuring treatment from them saves a substantial amount of money, which could be used to meet other household needs and so reduce poverty.

The study gathered supplementary information from traditional healers on the nature of treatment provided. Accordingly, wild plants are the main sources of traditional medicine although wild animals are used but to a far lesser extent. All plant parts save for flowers and fruits were utilized for this purpose. It was not clear why different parts were used for different tree species. It was, however, known that differences existed in drug or mineral components of plants, parts of plants utilized, time of day the plant was collected and the season. Apart from human medicine, plants provided medicine for treatment of East Coast Fever (ECF) in livestock. Leaves and buds of *toporewo* Species were specifically used for this purpose. It was also used to remove retained placenta in livestock. These helped to bridge the gap occasioned by privatisation of the veterinary sector. The only known wild animal used for traditional medicine was a rodent; big rat (*murkuyo)*. The whole animal was burnt into ashes, and a solution was made out of it that was used to treat complications associated with pregnancy such as miscarriage and menstrual disorders. The medicine obtained from forests was not exclusively used for treatment. A number of tree species were used to fulfil cultural needs as well as for despoil.

The cultural activities that required the use of trees included peace meetings, giving blessings, initiation and burial ceremonies. Peace meetings were especially common considering the fact tribal clashes between the community living in this area and its neighbours was a common phenomenon due to cattle raids. Bamboo species was used for this purpose. Cedar (*Yemit)* species was used to impart blessings. This was common during installation of chiefs, priests and other rulers and also whenever elders were preparing warriors for war. *Dobera glabra* on the other hand was useful during initiation while *boscia salicifolia* species was used during burial ceremonies. These species were placed on the grave in order to determine whether the deceased was a witch. Herbs were also used to acquire fame and to promote business ventures. Regarding despoil, 75% of respondents reported that herbs were used for despoil in the region although the species used and the reasons for their use were not readily revealed. Traditional practitioners indicated that the use of despoil in traditional medicine mainly helped to check immoral behaviour among married people, and generally to instil discipline in the community. Jealousy among community members was also given as a reason for despoils. Forests were the major source of raw materials for manufacture of domestic tools. These included walking sticks, handles for axes and hoes and the Pokot stool, which were popular among men and had multiple uses. The stool was used as a seat, a billow and a weapon in case of emergency. Construction needs of the community were met by forest products. Timber and poles were two main forest products used for this purpose. Timber was needed to construct houses for new settlement and furniture while poles, apart from their use in building houses, were needed for erecting fences. 65% percent of the population obtained these materials from government or community forests while the remaining 30% obtained these products from own farms. The remaining 5% did obtain them from both sources.

Forest food

Food is a key product obtained from forest. This is according to the frequency of respondents and the type of food obtained from forests in the study area. 39.5% of the population did not receive any form of food from forests as compared to 60.5% who obtained some form of forest food. Honey with 34.5% response was the most common type of forest food in the region followed by wild fruits 9.0%, and meat 5.0% in that order. 17.0% received more than one form of forest food. Besides these types of forest food, several tree species were widely used as vegetable in the area. These were occasionally sold in Makutano and Lodwar towns and the proceeds used to supplement regular household income. Although the supply of forest food does not continue throughout the year, they are in greatest supply in the months of September-December when there is shortage of regular food. This information showed that forest food provides for those who did not produce sufficient food from fields and gardens and who cannot afford to buy food from the market. This form of food thus cushioned the community during periods of food scarcity and contributed to alleviating poverty in the area.

Livestock fodder

Dairy farming was the main source of income in the region. Cattle, sheep and goats were the common livestock types reared in the area. Data from the survey showed a high population of livestock in the region. Of the sample population, 76.5% indicated that livestock population was in the increase. This factor resulted in increased demand for fodder, which was met by forest fodder to supplement farm sources. Farmers with small landholdings collected the larger proportion of fodder from forests. 30% of sample population obtained fodder for their livestock from forests. The figures however vary greatly across the sub locations. For instance, in Simotwo sub-location all fodder requirements were met by farm sources, while in Kapsait sub-location 46% of the population depended on both farm and forest sources of fodder. The great discrepancy was due to the distances of the two locations to the nearest community/government forests. In this respect forests played an indirect role in poverty reduction by supplying required nutrients to livestock, which was the leading source of income in the area. Cattle were kept to provide milk, meat and skins and to meet a variety of cultural needs. Livestock was more reliable than cash as a source of wealth accumulation. The bride-price was still paid in cattle; status in the village was associated with the size of household herd kept. Thus people were eager to increase their herd size.

Sheep and goats were mainly kept to provide meat although high breed sheep was more frequently sold for cash than cattle.

Seasonal Utilisation of NTFPs

Information on non-timber forest products (NTFPs) showed that their demand varied according to season. Information gathered showed that 43.5% of respondents utilized forest products during the first quarter of the year, 38% during last quarter, 23% the third quarter and 11.5% on the second quarter. This showed a progressive rise in demand for NTFPs in the area from the second quarter through the first quarter. The combined demand for the fourth and first quarters was 81.5%. Therefore maximum benefit from the forest was received during this period. Information on food security revealed that food shortage was normally experienced in the third and fourth quarters. Of the sampled population, 20.0% reported that the supply was least in the third quarter, while 71.0% reported such shortage in the fourth quarter. From this information it was evident that food deficit encouraged utilisation of forestry products. People, especially the poor, resorted to forestry as an alternative to income and also to meet subsistence household needs. Further, it was during this period that the weather was dry and conducive for honey production, the main forest food in the area.

Conclusion

Following the discussions on the findings of the foregoing study, the following are the main conclusions about the incidences of poverty and the role of forestry in poverty reduction in Lelan division. About 70% of the population in Cherangani hills have incomes below the official poverty line. The average income in the area is Kshs 890 far below the national poverty line of Kshs 1239 for rural areas. This proportion will continue to rise steadily in future if no mitigation measures are put in place. There are not many alternatives to income in the study areas and farm activities play a leading role in subsistence economy. Other social indicators were similarly low among most of the population. In the sampled villages, the importance of forests in rural livelihood was evident. The contribution of forests in alleviating poverty takes two forms: direct and indirect. The direct role entails those forest products, which are consumed at household level. From the study, people obtained a number of products from forests, such as fuel, timber, wild fruits, herbs, and honey. Most of these products were for household consumption, although some were occasionally traded for cash. In this way, forestry was found to contribute in alleviating poverty in the region. Indirect forest benefits also accrue as a result of activities that were supported by forest resources. These include conversion of forestland to other land uses; provision of livestock fodder and cultural values. Forest products were not exclusively obtained from forests. People with access to adequate land were becoming increasingly reliant on on-farm cultivation of trees. This was however not true in all cases as farm trees only provided part of the required products. Moreover, on-farm tree growing was not an option for landless households and the poorest. Relatively poor people tended to depend more on forest products. In this regard forests play a complementary role to agriculture, livestock and other sources of income in the area. Forests provide a supplementary role in food security in the area by providing forest food during shortfall of regular food. Forests therefore act as a buffer in times of hardship. It is the poor who benefit most from forest products since they realise inadequate production on their farms.

Households having forestry as a source of income had lower poverty level compared with those without it. Thus forestry income boosts people's income and supplements income for those households whose income was already above the poverty line. Timber was the main forest product commercialised in the study area. This was an enterprise that required high capital to undertake. It was likely therefore that income from trade of this product benefited the non-poor more than it did the poor. In order to address the poverty problem in the region, improving income from forestry will definitely be a necessary, though not sufficient, strategy. The decomposition of income sources showed that forestry had the least household income in the area. Again about 40% of the population derived some form of income from forestry. Commercialising forestry will supplement diminishing income from regular sources. However, such strategy will most likely benefit the non-poor more than the poor and in fact, may lead to income inequality in the region. However, if the strategy is properly designed, then the by trickle-down effect, such strategy may be useful in reducing poverty.

POLICY RECOMMENDATIONS

There are key policy measures that need to be taken with a view to enhancing the role forestry plays in poverty reduction in Kenya. The high and rising population is a key factor in incidences of poverty in the area. Besides that, it motivates people to encroach into forestland for both direct and indirect benefits. Controlling population growth will ease pressure on existing resources and improve living standards. The A primary health care programme linking to sustainable forest management should be piloted in the area. Given that forestry income has a significant effect on poverty level in the area. The need to pursue a market- based conservation strategy in the region is imperative. The government should strive to value NTFPs derived from forests and then create markets for these products so as to provide incentives to local people towards forest conserve. However, there is a caveat to this strategy as high returns from forests may lead to their depletion. Pursuing policies that aim at enhancing farm income may not be in themselves sufficient make-up for the loss to the poor resulting from restrictions on access to forest products. What needs to be done is emphasise on Participatory Forest Management as provided for in the new Forest Act, 2005. Perhaps most importantly, people living in forest environment need to be supported and encouraged to take the necessary action to protect this valuable resource.

However, conserving forests on its own without commensurate efforts to combat poverty may be an effort in futility. It is important that community-based conservation programmes that are sensitive and responsive to community needs are undertaken. People-centred approach to development should be central in rural development programmes. Such approaches should aim at striking a balance between utilisation level of forest resources and their renewable rate.

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