LOCAL COMMUNITIES' INCENTIVES FOR FOREST CONSERVATION: CASE OF KAKAMEGA FOREST IN KENYA

By

Paul Guthiga[1*] and John Mburu[1]

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Survival of the Commons: Mounting Challenges and New Realities

[1]Center for Development Research (ZEF), University of Bonn, Walter-Flex-Str. 3, D53113 Bonn, Germany

[*] Corresponding author: Tel +49-228-731731, Fax +49-228-731869, E-mail: pguthiga@uni-bonn.de

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ABSTRACT

The study is based on a biodiversity-rich remnant of a tropical rainforest located in western Kenya under immense threat of survival. The forest is located in a densely populated area inhabited by poor farming communities. Currently the forest is managed by three management regimes each carrying out its function in a different manner. The study identifies, describes and where possible quantifies the various conservation incentives (both economic and non-economic) offered by the three management regimes. Further, the study analyses local people's perception of management regimes by generating management satisfaction rankings; both overall and for specific management aspects. The findings of the study indicate that extraction of direct forest products is the main incentive offered by two of the regimes. The local people obtain substantial financial benefits in the form of products they extract from the forest. Satisfaction ranking showed that the strictest regime among the three was ranked highest overall for it performance. Coincidentally, the highest ranked regime has the best performance among the three in conserving the forest in its pristine state. An ordered logit regression was used to analyse factors influencing the overall satisfaction ranking. The results indicate that socio-economic factors are not significant in explaining the level of satisfaction ranking but involvement in forest conservation activities appears important in explaining satisfaction ranking. The paper concludes by highlighting some policy implications of the results.

1.0 INTRODUCTION

1.1 Background Information

Forests play a crucial role in the lives of communities and nations. Apart from being reservoirs of other forms of biodiversity, forests are important as water catchments, soil erosion barriers, source of timber and non-timber materials. Forests also provide a very important service in the new and growing leisure industry, which involves the 'non' consumptive use of biological diversity for example eco-tourism. Forests also provide very important ecosystem services that are generally considered to be 'free'. Such essential services include nutrient cycling, soil formation, oxygen production, carbon sequestration and climate regulation. Forest biodiversity also has a 'hidden' value locked up in the genetic stock whose potential value is not yet known. In Kenya, forests occupy a paltry 2.8% of the total land area, but despite the relatively small forest cover, there is a high dependence on forest for provision of wood and non-wood products. As noted by Mogaka *et al,* (2001), it is estimated that about 3 million forest adjacent dwellers in Kenya depend on forests for provision of all households' wood and non-wood products needs.

Forests in Kenya can be classified by regions according to climatic conditions: Costal forest region, dry zone forest region, montane forest region and the western rain forest region (in which Kakamega forest is found). Kenyan forests are managed by different management regimes and have different legal status. Majority of the closed canopy forests are gazetted as forest reserves under the Forestry Act (Cap 385 of the laws of Kenya) and are managed by the Forest Department (FD) under the Ministry of Environment and Natural resources. Some closed canopy forests are gazetted as national parks and national reserves and are managed by the Kenya Wildlife Service (KWS)[1]. FD and KWS have entered into a memorandum of understanding to oversee management of forests whose biodiversity is threatened (Kakamega forest is one such example). An estimated 100,000 ha of forests in Kenya are under Trust land, managed by the Ministry of Local Government through the county councils (local authorities), which hold the land in trust for the local people. Undocumented areas of indigenous forests are under private ownership.

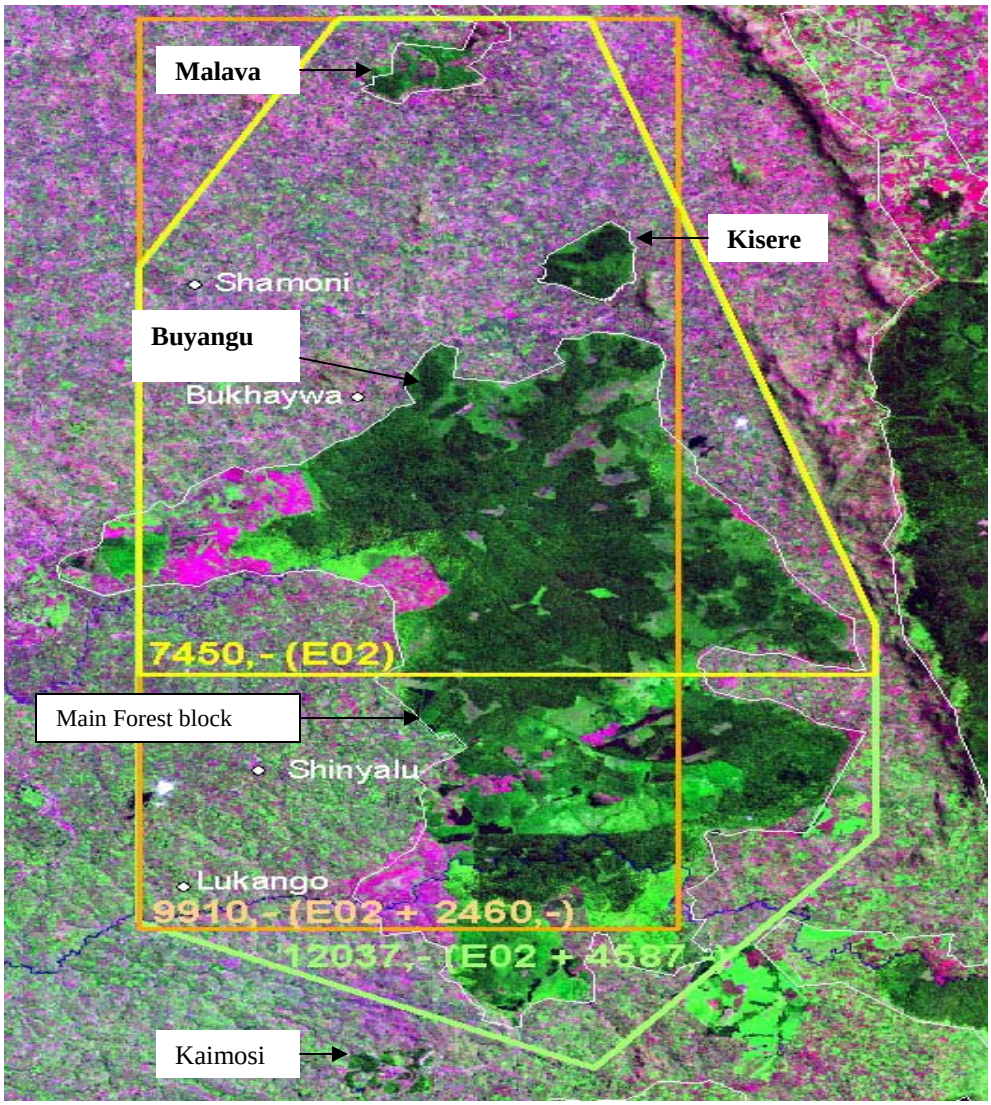
[1] KWS is a quasi-government body formed by an Act of parliament, operating under the Ministry of Environment and Natural resources. It is responsible for management of all national parks and some of the national reserves in the country

1.2 A historical Overview of the Management of Kakamega Forest[2]

Among the few remaining indigenous forests in Kenya, Kakamega Forest occupies a unique place. It is the only remaining patch of Kenya's Guineo-Congolean rain forest, which spanned from west and central Africa, with its easternmost edge in western Kenya. The Forest is famous for its diversity of unique and numerous flora and fauna. Early records indicate that the first forest boundary was physically established around 1908-1910. This boundary was modified in 1912-13 and much later in 1929-1932. The annual government report of 1918 indicates that there was opposition to any sort of control of the forest by government (Mitchell, 2004). At that time, Kakamega Forest was managed by the local people through their village elders who were responsible to the local native council. In 1931, the Forest department (FD) took over the management of the forest against a very strong objection of the local people, who wished to retain control. Despite the local people's opposition, Kakamega Forest was gazetted as a trust land forest on 13th February 1933. This meant that although the forest would remain the property of the local people, the government would manage it on their behalf. The argument for this take over was for the improvement and maximization of its economic benefits. A few customary rights of the people to the forest were reinstated by special rules issued in 1959 and 1964 allowing local residents the right to use the forest for grazing, cultivation and collection of firewood. In 1964 the forest was declared a central government forest which technically meant that the forest no longer belonged to the local people but to the nation as a whole. In 1986 two areas were officially excised from the forest to create the Kakamega National Reserve, encompassing Kisere fragment and the northwestern part of the main forest block also called Buyangu (see fig. 1 below). Both are now strictly managed by Kenya Wildlife Service (KWS) as a national reserve. The idea of the national reserve was to protect and preserve the less disturbed area that is representative of the Kakamega Forest.

[2] Kakamega Forest is not a single forest block. The main forest block is surrounded by several satellite fragments with distinct names. In this study the term 'Kakamega Forest' refers to both the main forest and its satellite fragments.

Fig 1: Map Showing Kakamega Forest and its Fragments



The southern part of the main forest block and several minor forest fragments (such as Malava) are managed by the forest department. There also exists a small fragment of the forest in the Southwestern side of the main block known as Kaimosi. This fragment has been under the management of the Quakers church mission since early 1900s. Part of it has been cleared for construction of a conglomerate of several education institutions. In 1984 a presidential directive banned the conversion of indigenous forest to plantation and another in 1988 banned the cutting of indigenous forest trees. In 1991 a memorandum of understanding was drawn between the FD and KWS, who were supposed to work closely together. However, many of the rules are not

strictly enforced by the FD while, by contrast, the KWS very strictly prohibit forest extraction in the National Reserve.

Over the years the forest has been subjected to disturbances of various kinds. In the pre-colonial days, the local people were actively converting the forest into farmland. In the colonial days, various massive disturbances occurred; gold mining and logging, timber extraction by saw millers and fuel wood collection and charcoal burning by the local people. Even in the post-independence years, disturbance of the forest has continued especially through the non-resident cultivation (NRC) locally known as "*shamba*" system in which people were allowed to cultivate land in the forest without owning it while tending tree seedlings. This was however banned in 1987 in most parts of the forest except in the FD managed part of the forest[3]. Overall, the size of the forest has been shrinking rapidly due to human population growth and increased resource extraction in the last century. In the last three decades, approximately 20% of the forest has been lost (Lung and Schaab, 2004). Despite being protected by the state, local communities are dependent on Kakamega Forest for their basic needs such as fuel-wood, charcoal, building materials, fruits, mushrooms, traditional medicinal plants, game meat, grazing land and timber for making furniture. The area surrounding the forest is densely populated and is used intensively for growing sugar cane, maize and tea. The people around the forest are generally poor and the use of forest resources to supplement their small incomes is tempting because the subsistence crops on which they depend are not enough to meet their needs. The main challenge in forest management is to reconcile extraction needs with conservation interests by offering the local people a proper mix of incentives. This challenge is increasingly becoming ominous in the case of Kakamega forest whose future existence has become a matter of concern.

[3] In the year 2004 the Kenyan government discontinued non-resident cultivation in all indigenous forest in the country including Kakamega forest.

1.3 Problem Statement

Forest management regimes of public forests are important in determining the outcome of forest use (Kant, 2000). A management regime may take the form of centralized management (where state agencies coordinate regulation), decentralized management (where local people are more actively involved) or quasi-private/private. Management regimes are responsible for assigning property rights to the various stakeholders and guiding use and consequently the outcomes (Meinzen-Dick and Di Gregorio, 2004; Oakerson, 1992). Therefore; it becomes necessary to understand the incentive/disincentive structures that govern forest use by local communities so as to determine the optimal management regime that would address the people's need without jeopardizing the conservation efforts. As noted in the earlier section, Kakamega Forest is divided into three different parts each managed by a distinct approaches or system. One part of the forest is strictly managed as a national forest reserve by a quasi-government body on behalf of the central government. Under this management local people are not allowed to harvest any timber or non-timber products from this part of the forest. Another part of the forest is managed less strictly by the central government through the forest department. Local people are allowed to use the forest in a limited way through grazing, collection of dead timber for fuel, mushrooms, fruits and collection of medicinal plants. A small fragment of the forests fall under quasi-private management (by a church mission) and is managed in a flexible manner allowing the local people regulated extraction of forest products. Researchers have pointed out the centrality of the local communities in the process of natural resource management (Wiggins *et al*, 2004; Trakolis, 2001; Rasmussen and Meinzen-Dick, 1995). As noted by Bruce *et al* (2002), public acceptance is of utmost importance to every management decision that public agencies make concerning natural resources. The persistence of resource degradation problems and failure of technical simple technical or economic prescription clearly indicates that there is need to consider the more complex aspects of natural resource management. Well-meaning measures of environmental conservation may negatively impact on the livelihoods of the local inhabitants and this may reduce the effectiveness of the intended policies. The perception of the local people towards management regimes and the factors that condition their perception is important in designing policies for sustainable use of natural resources. Research on local inhabitants' perceptions and satisfaction with natural resource management regimes is limited (Trakolis, 2001). The current study attempts to understand what three management regimes offer to the

local community as incentive for conservation and how the local communities perceive the management regimes in terms of meeting the goal of utilizing and conserving forest biodiversity.

1.4 Objectives

The overall objective of this study was to analyse the incentive structures that characterize different management regimes of Kakamega Forest and assess the local community perception of these management regimes.

Specific objectives include:

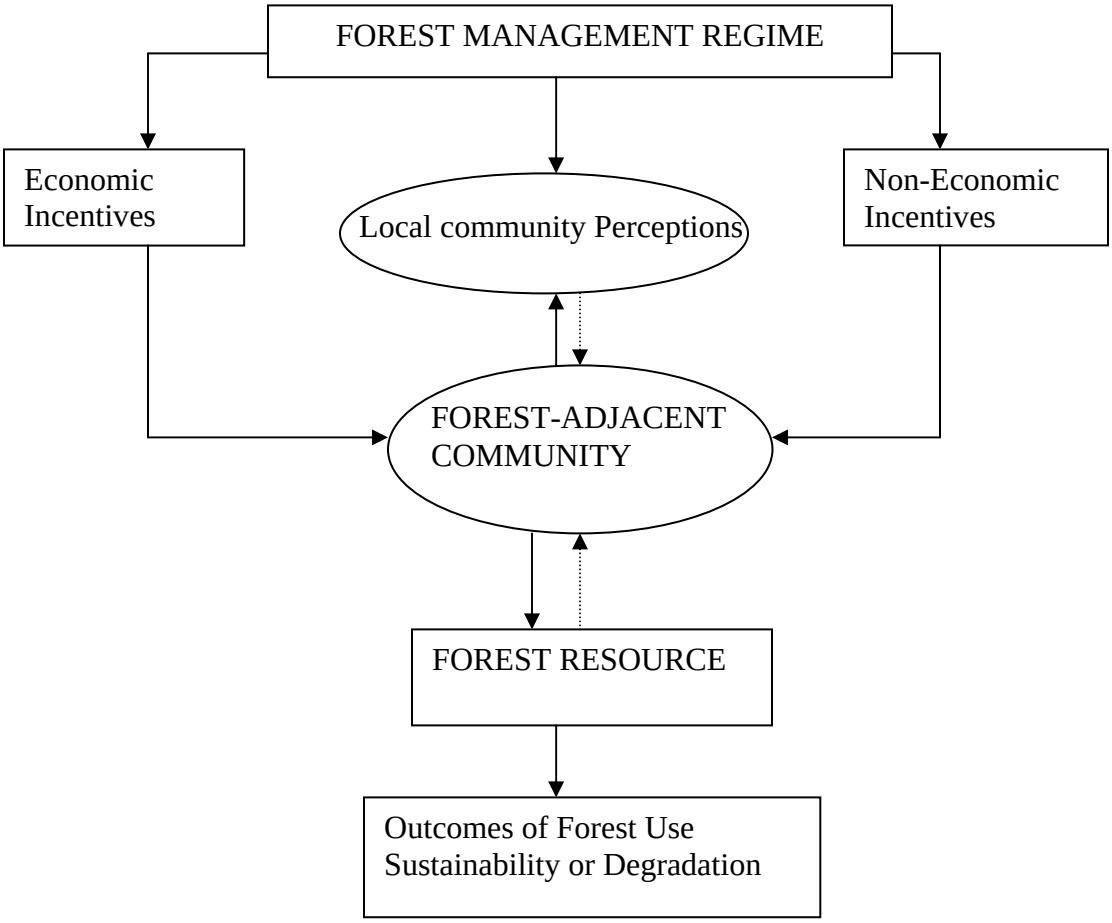
i. Identify, describe and quantify (where possible) the incentives offered by the three management regimes of Kakamega forest
ii. Generate satisfaction ranking of the local community towards the three management regime in the management of the forest
iii. Identify factors that influence the perception of the local people towards forest management regimes

2.0 THEORETICAL BACKGROUND

2.1 Conceptual Framework

For poor people who live adjacent to the forests, the returns from cutting trees for timber or converting the forest to farm land is often financially more attractive, because benefits accrue directly to the individual land holder (Wiggins *et al*, 2004). Existence of the forest denies the forest adjacent people the opportunity to use of the forest for other purposes, farming for example. To motivate the forest adjacent community to conserve the forest, there is need to provide them with incentives. Conservation incentives are mechanisms that encourage or motivate people to participate in conservation activities. They can be economic, for example allowing them to harvest direct forest products or non-financial in nature for example according them an opportunity to participate in making decisions on conservation of the resource (Fig 2-1) below.

Fig 2-1: Conceptual Diagram



Source: Authors conceptualization, 2006

Any economic benefits that they obtain from the forest, somewhat "compensate" them for the "loss" they incur because of the existence of the forest. Participating in decision-making enhances the sense of ownership of the resource. Through the creation of the incentive structure, forest management regimes guide utilization and conservation of forests and ultimately determine the sustainable use or degradation of the forest. The local people on behalf of whom the forest resource is managed are best placed to 'judge' the performance of the management regimes. There perception is important in explaining their cooperation or lack of it with the managing authorities in conservation efforts. If the local people perceive that the forest management regime is insensitive to their needs, they might decide to break the rules regarding extraction.

2.2 The Paradigms of Biodiversity Conservation

Several alternative frameworks or criteria for prioritizing the conservation of biological diversity have been suggested. These frameworks are all based on different perceptions of value. Value can be defined as the contribution of an action or object to user-specified goals, objectives or conditions (Farber *et al*, 2002). Some people argue that there is "value" beyond what humans care about and that society has a responsibility or a moral duty to preserve nature irrespective of their self-interest. In contrast, the economics approach is strictly anthropocentric. Economic approach attempts to help determine how much society should invest in the conservation of biological diversity because conservation is costly and that economic tradeoffs will inevitably arise between conservation of life forms and human activities.

2.2.1 Fortress Conservation

Historically, conservation strategies have been dominated by attempts to fence off or reserve areas for nature and exclude people from the reserved areas (Adams and Hulme, 2001). This model has been called the 'fortress conservation', 'coercive conservation' or 'fence & fine' and for a long time it dominated international thinking about conservation. It involved the creation of protected areas (national parks, game reserves and national forest reserves) and exclusion of people as residents, and prevention of consumptive use and minimization of other forms of human impact. As noted in the introduction section, since early last century, Kakamega Forest has been subjected to state control beginning with its actual gazettement in 1933, followed by its total transfer from the local communities to the central government in 1964. The main argument

behind this approach was that local communities' welfare and development are in direct conflict with objectives and practice of biodiversity conservation (Brown, 2002). Therefore, the government had to take over the management of the forest to ensure that it was properly managed. The approach rarely involved the local people in decision-making thereby ignoring the aspirations and the values of local people. Under the current context the KWS managed part (since 1985) of the forest clearly follows the fortress conservation approach. The local people are strictly excluded from extracting from it. Failure to comply with this requirement leads to legal prosecution and punishment. This part of the forest is least degraded and offers tourist service such as bird watches, nature walks and such other activities. In such an arrangement nearly all the benefits that accrue from forest accrue at the national level with little benefits going to the local communities. However, the regime has done a commendable work in conserving the forest in its pristine form compared to other regimes. The fortress approach has been challenged by another discourse that stresses the need to include local people in the process of conservation.

2.2.2 Incentive-Induced Conservation

The new approach is the incentive-induced conservation. This approach has two distinct elements: first, it allows people in the vicinity of the protected area or others with property rights to participate in the conservation process and second, to link the objectives of conservation with the local development needs of the people (Hutton and Leader-Williams, 2003). This approach recognizes the moral implications of imposing costs on local people and the pragmatic problem of hostility of displaced or disadvantaged local people to conservation organizations practicing fortress conservation strategy (Adams and Hulme, 2001). The approach adopts sustainable development concept and combines both biocentric arguments and anthropocentric arguments in conservation. Forests can be exploited through harvesting of high value timber, collection of non-timber forest products or biodiversity prospecting. Incentive-induced conservation approach is applied in somewhat limited way in the southern part of the main block of Kakamega Forest and in the Kaimosi fragment. The local communities are allowed limited use of the forest such as grazing and collection of dead wood for fuel. There have been attempts by the FD to give incentives to the local people and enhance their participation in the management of the forest for example; by allowing a income generating community based organization to operate within its grounds. However, the level of community participation is still low and illegal forest activities

are still high. More importantly, despite the incentives, the degradation of the forest still goes on at a much more pronounced pace under FD compared to KWS.

2. 3 Local Community Perception of Forest Management Regimes

Local people are central to the success of sustainable management of natural resources. The past failure of techno-ecological and economic approach, which did not pay enough attention to the role of social actors, has led to an increasing recognition of the role of social actors in natural resource management problems (Wiggins *et al*, 2004; Brown, 2002; Meinzen-Dick *et al*, 2002; Trakolis, 2001; Rasmussen and Meizen-Dick, 1995). In essence, the local people can be viewed as the *de facto* owners or custodians of the natural resource. Therefore, the local people can be looked at as the "clients" on whose behalf the resource is being managed. Any external management intervention can be correctly evaluated from the perspective of the local people. Since the declaration of "Forest Principles" at the Rio Conference in 1992, there has been growing interest in development of criteria and indicators for sustainable forest management (Prahbu *et al*, 1998). The interest has led to definition of indicators that can be used to assess the social, economic and ecological sustainability of forest management. Some of these criteria and indicators have focused more at national level while others have emphasized information needs at the forest management unit level. This study focused on the forest management unit level and applied broad indicators such as community involvement in decision-making process, conflict resolution, outreach programs, promotion of alternative income sources, clarity of rules and provision of conservation incentives.

Local community perceptions of management regimes were evaluated by eliciting their satisfaction ranking of forest management performance. From literature, esearchers do not have a consensus on the definition of satisfaction (Giese and Cote, 2002). Lack of consensus is associated with three main problems; first, problem of selecting an appropriate definition for a given context. Second, the validity of measures of satisfaction and lastly the challenge of comparing and interpreting results. There are three common elements of consumer satisfaction; it's a response (emotional/cognitive), response pertains to a particular focus and it occurs at a particular time. Dissatisfaction is portrayed as the bipolar opposite of satisfaction. The favored notion of consumer satisfaction (which was adopted in this study) is a response to an evaluation process. Studies of people's satisfaction in the context of natural resource management are not

widespread but there are several studies in other areas for example health (Margolis, 2003; Fredrik and Jostein, 2000; Kolodinsky, 1999). Akama and Kieti, (2003) applied the concept of consumer satisfaction to the Kenya´s wildlife *safari* (recreational tourism). Andersson (2004) generated a score for user satisfaction with the municipal provision of forestry services in Bolivia. The user ratings were converted into a dichotomous variable, indicating whether the quality of forestry services were "responding well" or "responding poorly" to the rural population needs in the forestry sector. The current study applies a similar approach to generate a management score first by eliciting an overall ranking of the management system by the local community and secondly constructing a management score based on ranking of individual forest management indicators. The ranking is at five levels; 1=very good, 2=good, 3=fair, 4=poor and 5=very poor. The interviewee was presented with five water drums (containers) with varying levels of water from which he/she choose the one that best reflected their level of satisfaction. (See appendix 1). Farmers perception of a given forest management regimes is likely to be influenced by an array of factors that relate to their socio-economic characteristics, interactions with forest management and such like factors. Understanding the influence of such factors on farmer's perception toward management is important in guiding intervention that would make management more responsive to the needs of the local people. The influence of such factor on farmer's perception will be assessed through regression analysis to obtain magnitude and direction of these factors on the farmers' satisfaction ranking of management regime. In the case where the satisfaction score is an ordered variable, ordered probit or logit regression is the appropriate analytical model (Greene, 2003).

3.0 METHODOLOGY

3.1 Methods of Data Collection

3.1.1 The Study area

Kakamega Forest is located mainly in Kakamega district in western Kenya but it utilized by people in two other neighbouring Vihiga and North Nandi districts. Kakamega district lies between longitudes 34^0 32´ and 34^0 57´30´´ East and latitudes 0^0 07´ 30´´ and 0^0 07´´ 30´´ N and 0^0 15´´ S of the equator. The total area of the district is approximately 3020 sq. km. The district has a varying topography with altitudes ranging from 1250 m to 2000m above the sea level (Republic of Kenya, 2002). There are two main rain seasons in the district: the long rains, which start in March and end in June; and the short rains that begin in July and end in September with a peak in August. The total annual rainfall averages between 1500- 2000mm/annum. The district has high temperatures all the year round with slight variations in mean maximum and minimum ranges of 28^0c to 32^0 c and 11^0 c to 13 ^{0} c respectively. The rainfall and temperature makes the area conducive for growing the main food crops like maize, beans, tea, sugarcane and also horticultural crops. The 1994 welfare monitoring survey carried out in Kenya showed that 52% of the population in the district lie below the poverty line meaning that they can hardly afford basic necessities like food, shelter, clothing, education and such like amenities (Republic of Kenya, 2002). Kakamega Forest is located within the Lake Victoria catchment area. It is an important water catchment area with Isikhu and Yala rivers flowing through it. The soils are well-drained, deep, heavily leached clay loams and clays of general low fertility.

The forest covers an area of about 154.8 sq. km out of which 15.92 sq. km is plantation forest while the rest is under natural forest. Kakamega Forest holds unique biological resources (flora, fauna and avifauna) which have been seen to share similar characteristics with those of the western African equatorial rainforests (Kokwaro, 1988). The area surrounding the forest is densely populated and intensively used for farming with almost no permanent grassland or forest. There is widespread dependence on the forest by the local people who obtain firewood, thatch grass, medicinal plants and also graze in the forest. There are incidences of illegal logging, charcoal burning and hunting of small animals in the forest.

3.1.2 Sampling and Data Collection Procedures

The study was undertaken within approximately 10 Km radius all around the Kakamega forest. Reconnaissance survey in the study area indicated that there are progressively fewer people that extracting from the forest beyond 5 km radius of the forest. The study covered three main districts within which Kakamega forest and its fragments occur, that is Kakamega, Vihiga and North Nandi. There were approximately 350 villages occurring with the study area. The sampling frame (i.e. the list of households) was generated in conjunction with the administrative heads of the villages, locally known as "*Likuru*" and the local chiefs and sub-chiefs. A sampling frame of over 34,000 households was generated from 350 villages. A random sample of 378 households was randomly selected by use of a computer (using SPSS program). The sampled households we randomly interspersed in the study area and across the three management regimes. Structured questionnaires were administered to the sampled farmers by trained enumerators. The questionnaires elicited information on household socio-economic characteristics, farming information, type of products and quantities they extract from the forest and costs they incur in the process and their perception of the forest management approaches. Out of the interviewed households only 335 households were included in the final analysis, 43 households were dropped in the process of data cleaning.

Detailed information about the functioning of the three forest management systems was collected through interviews with the forest managers and further cross-checked with expert opinions. Additional data for example prices of forest products were obtained collected from local markets. Secondary sources were also used to supplement information on forest management systems.

4.0 RESULTS AND DISCUSSION

4.1 Household's Socio-Economic Characteristics

The main socio-economic variables of the sampled households are summarized in table 3-1 and figure 3-1 below. The farm sizes in the study area small in scale given the average size of 2.4 acres per household. It should also be noted that the main method of acquisition of land in the study area is through inheritance from the parents (fig 3-1). Over 85% of the household heads indicated that they inherited their land from their parents. Therefore, land sizes are bound to continue declining in the foreseen future, and given that most of the people (over 70%) are involved in farming as their main occupation (fig. 3-1) then it can be argued that there will be increased pressure on land to meet food needs of the people. The increasing pressure on land does not augur well with the conservation efforts of the forest because forest will definitely be one of the immediate alternatives for the people.

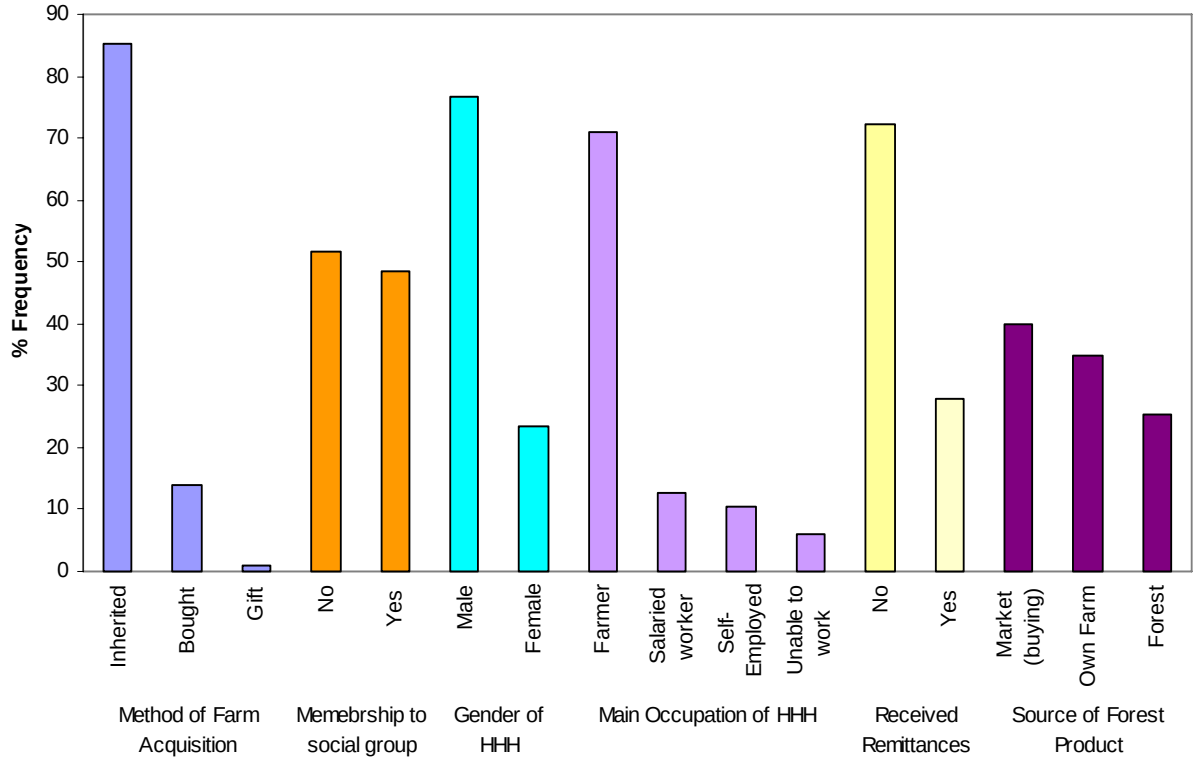
Table 3-1: Socio-Economic Characteristics of the households

Variable	Min.	Max	Mean	STD Deviation
Total Land Size (in acres)	0.1	12	2.35	1.96
Age of the Household Head (years)	20	98	51.02	15.01
Total years of formal education	0.00	18	7.79	3.83
Total years of Farming experience	1.00	60.00	20.67	13.54
Average Resident Family size	1	12	5.77	2.20
Shortest distance to the forest edge (Km)	0.5	8.5	2.18	2.10
Distance to the Nearest Input Market (KM)	0.5	15	1.97	2.13
Distance to the Nearest Output Market	0.1	15	2.00	2.04

Source: Authors' Computation, 2006

The average number of years of education for the household heads in the area is relatively low. An average of 8 years of formal education means that most farmers do not have any education beyond the elementary level while some do not have any formal education at all. Therefore they have limited opportunities to get employed in the non-farm sector or to successfully run commercial enterprises. This is clearly supported by the observation that over 70% of the respondents are involved in farming as their main occupation.

Fig 3-1: Frequency Table of Some Selected Households' Socio-Economic Characteristics



Source: Authors' Computation, 2006

On average, the sampled farmers reside within 2 km radius of the forest (table 3-1) which is a walking distance to the forest. The closer to the forest people are to the forest more the likelihood that they extract the forest. This has significant implication on the ease with which the local people can access the forest and consequently extract or over-extract from it.

4.2 Conservation Incentives offered by Forest Management Regimes

4.2.1 Extraction of Direct Forest Products

As noted in an earlier section, two forest management regimes; namely FD and Quakers church mission allow a regulated extraction from the forest. KWS does not allow any direct extraction but limited illegal extraction still goes on. A total of 91 households (27.16%) indicated that they extracted at least product one from the forest during last one year preceding the interview (fig 3-1). Firewood was the main product obtained from the forest with 91 households indicating that they collected some firewood from the forest. There were progressively lesser households who

indicated harvesting other forest products; 30 HH's grazed in the forest, only 7 HH's said they harvested medicinal plants from the forest. However, it is important to note that a few households might have hidden some information about their involvement in extraction for fear of prosecution despite all assurances from enumerators. Firewood is harvested as head lots and the average price of a head lot in the study are is Kshs 50 (US $ 0.68). Results of the study indicate that the average value of firewood harvested by the extracting households (N= 91) was Kshs 6,274.18 (US $ 84.78) per year per household. When this figure is extrapolated to all households that extract from the forest (approximately 27.16 % of all 34,000 households in the study area) it translates to over US $ 782,800 worth of firewood. There are marked differences on the value of firewood harvested by households across the management approaches as summarized in table 3-2 below:

Table 3-2: Value of Firewood harvested by Extracting Households under Different Management Approaches

Management Approach	N	Mean Value of Firewood Extracted /Yr/HH	
		Kshs	US $
Quaker Church Mission	19	9817.50	132.68
Forest Department (FD)	66	8228.53	111.19
Kenya Wildlife Service (KWS)	6	5166.67	68.91

Source: Authors' Computation, 2006

The mean differences are all significant at 1% level between all the three samples. Only six households indicated that they illegally extract under. Both the forest department (FD) and Quaker church mission generously allowing the local community to extract fireood from the forest. Given that the people around the forest are poor with limited sources of livelihoods, allowing the local community to collect dead wood from the forest, if well regulated can act as a strong incentive for people to conserve the forest. Otherwise, people would be pushed to illegally extract from the forest in unregulated manner thereby causing forest destruction. The proponents of no-extraction at all (especially KWS), argue that the dead decaying wood from an important component of natural cycles of biodiversity by providing food for the fungi, habitat and breeding ground for some organisms and also enhances nutrient cycling with the forest. They further argue that allowing people into the forest would lead to uncontrolled extraction leading to forest

degradation. These are definitely valid arguments which cannot be ignored. Ultimately, the decision of whether or not to allow extraction, where to allow it and the manner of extraction lies with the policy makers and implementers. Suffice is to say that a balance ought to be struck between these competing needs.

The FD and the Quakers church mission allow the local people to graze their animals in the forest at a fee. Grazing is done in the open forest glades within which grass grows in abundance. Enquires made about the grazing in the study are indicate that people hire out their land for grazing at a cost of about Kshs 1050 per month per animal which is equivalent to Kshs 35/day/animal. Using this figure to estimate the value of grazing, the total value of grazing per year per household is Kshs 42,108 (US $ 569.03). If this figure is extrapolated for all the households in the study area who grazes in the forest (8.05% of the total) the figure translates to about US $ 1,557,435. Findings of the study show that 23 out of 27 households in the sample who indicated that they grazed in the forest were found in the area managed by FD. The bulk of the forest glades, where grazing is done is found in the FD managed part. It would be surprising for many people that the forest generates such high values for the grazing service. But as land sizes continue to decline in the study area, and more and more agricultural intensification is carried out, grazing land is going to become progressively scarce and the value of forest as grazing land will continue to rise.

Thatching grass is the other direct product that farmers extract from the forest. The grass is used as a roofing material for the grass thatched houses. It offers a cheaper roofing alternative to the more expensive corrugated iron sheets. The market value of one bundle of thatching grass is about Kshs 60 (US $ 0.8). There were only 4 households who indicated that they harvested an average of 47 bundles of thatched grass from the forest in a year. Therefore, it can be inferred that the value of thatched grass harvested per household per year was Kshs 2820 (US $ 37.6). Thatch grass forms an important source of roofing material in the study area. A sizeable 18 % the sample size had their houses roofed with thatch grass. As poverty persists, thatch grass will continue to play an important role as a building material. Wild fruits are also occasionally collected from the forest. However, only a negligible number of households indicated that they collected any such fruits from the forest. Some illegal activities such as burning of charcoal and

lumbering take place in the forest despite policing by the authorities. A gunny bag of charcoal has a market value of about Kshs 300 (US $ 4) in the study area. About 7 households indicated that they got some burned charcoal in the forest each obtaining an average of 4 bags in a month. This translates to about Kshs 14,400 (US $ 192) per year per household. Medicinal plants are also illegally extracted from the forest. Very few households indicated that they harvested any medicinal plants from the forest. Overall extraction of direct forest products generates huge financial benefits to the local community. But whether or not the realization of this benefit enhances the stewardship of the people toward the forest resource is in question given the substantial level of forest destruction that is still going on.

4.2.2. Other Conservation Incentives Offered by Forest Management Regimes

Apart from the direct forest products that forest management regimes allow local communities to extract from the forest, they offer a few other incentives. FD and KWS co-host and support a fast growing community-based organization known as Kakamega Environmental Education Program (KEEP). The CBO is involved in several income generating activities as well as environmental education initiatives in local schools and other public fora. KEEP has two branches one operating in KWS managed part and another in FD part and has approximately 40 staff engaged in its day-to-day activities. The branch at KWS provides tour guiding services (at a fee) to tourists who take nature walks in the forest. Recently, it also established a tree nursery for growing tree seedlings for sale to the local community. The KEEP branch in FD runs a tree nursery, butterfly farm, tour guide services as well as lodging services in traditional huts for tourists visiting the forest. KEEP not only offers employment opportunity for the people it employs but also increases conservation awareness of the locals and provides them with opportunity to earn income through promotion of butterfly farming and providing a marketing channel for the butterfly pupae.

Prior to the year 2004, forest department had been allowing the local community to cultivate crops in designated parts of the forest land while tending tree seedlings for afforesting parts of the forests that were degraded. The people would provide labour for tending tree seedlings while they grew their crops in the forest. However, this was stopped by the government in the year 2004 because of its associated problem of forest encroachment and subsequent degradation. This system of non-resident cultivation (or *shamba* system as its known locally), allowed the local

people to supplement crop production from their small farms. Its discontinuation has been an issue of great discontent among the local people. In the preparation for the new proposed forest law in Kenya (Forest Bill, 2000), expected to take effect soon, the forest department has began facilitating the formation of village conservation committees. The new forest law envisages active participation of the local people in management of the forest through elected representatives at village level. The enactment of the law would herald a new era of co-management of all forest under the management of FD in the country. The main concern here is how the local community will deal with the challenges of collective action so that they effectively participate in jointly managing forest resources with state agencies.

Quakers church mission has since its arrival in the early 1900's established a complex of training institutions within its grounds consisting of two high schools, a theological college, technical college and a teachers training institute. Although this complex does exclusively benefit the local people, a sizeable number of the local people attend schools here and many more are employed by the church. Further, the church is actively involved in community service initiatives such as promotion of new agriculture technologies, health education and HIV and AIDS awareness campaigns. It has also set apart a small part of its forest for the performance of traditional ritual of the *Tiriki* people (a sub-tribe in the area). By and large it can be argued that, the impacts of these incentive initiatives are rather small to have community-wide impact. Members of the community who do not experience direct benefit of such initiative are likely to attach little importance to them.

4.3 Results of Management Satisfaction Analysis

The results of forest management satisfaction ranking are summarized in table 4-1 below. In response to the question: **What is your overall satisfaction with the way the forest in your area is managed? 1 [Very good] 2 [Good] 3 [Fair] 4 [Poor] 5 [V. Poor]**

KWS was rated as a good management regime while the other two were rated as fair. Testing for significance of differences between means indicate that the mean ranking for KWS is higher than the other two management regimes. This pattern is repeated in the average management score that is calculated over all the management indicators. These results are somewhat surprising in the sense that the strictest management system is ranked most highly in the management of the

forest. It can be said that contrary to common belief, people are very much interested in forest conservation despite the pressing need to extract from the forest.

Table: 4-1: Results of Ranking of Management Regimes

Management Indicator	Mean Rank 1 [V. Good] 2 [Good] 3 [Fair] 4 [Poor] 5 [V. Poor]			
	Overall (N=319)	FD (N=191)	KWS N=50	Quakers Church (N=78)
Overall Satisfaction	**2.55**	**2.68**	**2.04**	**2.56**
Community involvement in decision-making process				
Designing extraction rules	3.33	3.48	2.73	3.40
Enforcement rules	3.25	3.52	2.15	3.32
Setting aside pristine parts of the forest for conservation	2.62	2.86	1.96	2.45
Resolution of conflicts				
Mechanisms for conflict resolution	3.81	3.84	3.73	3.78
Wildlife-human conflicts	4.05	4.09	4.19	3.87
Outreach programs				
School Outreach programs	3.45	3.53	2.77	3.70
Environmental conservation activities	3.52	3.53	3.37	3.58
Promotion of Alternatives to Forest Extraction				
Energy saving technologies e.g. improved stoves	4.16	4.23	3.85	4.13
Tree seedlings	3.79	3.82	3.83	3.70
Alternative income sources e.g. tree nurseries	4.30	4.37	4.19	4.12
Clarity of rules				
Extraction rules	3.44	3.62	2.33	3.65
Enforcement rules	3.34	3.56	2.33	3.43
Provision of Conservation Incentives				
Employment of the locals	4.37	4.39	4.63	4.13
Prevention of livestock damage	4.54	4.51	4.77	4.48
Compensation for crop or livestock damage	4.60	4.58	4.88	4.46
Level of extraction allowed	3.51	3.60	3.06	3.59
AVERAGE MANAGEMENT SCORE	**3.75**	**3.85**	**3.43**	**3.75**

Source: Authors Construction, 2006

Since taking over the management of its part of the forest 20 years ago, KWS has transformed a rather degraded forest into a regenerated forest flourishing with biodiversity. When a question

was posed to the interviews on whether or not they thought conservation of the forest was important to them; a whooping 94% percent responded in the affirmative. This observation is further strengthened by the finding that it is only about 27% of the local people who extract any product directly from the forest. There is a huge portion of the population who judge the management not in terms of what they obtain from the forest but on its conservation performance. Resolution of human-wildlife conflict, provision of alternative income sources and employment of the local people by the forest regimes cut-across the regimes as issues that local people are unsatisfied with. It can therefore be said that the local people would like to see the forest conserved but would also like to share in the benefit of its conservation and also cushioned from the costs of conservation especially wildlife damage.

4.4 Regression Results

The overall management score was regressed against an array of selected factors that were postulated to affect the average value of management score. The MLE estimates are summarized in Table 4-1 below:

Table 4-1: Table MLE Estimates of Ordered Probability Model of Overall Management Score

	Coefficient	Standard Error	T-Value
CONSTANT***	2.0792	0.1215	17.120
DISTFRST	0.0282	0.0323	0.3470
AGEHH	-0.0007	0.0005	-1.4970
EDUCHH	-0.0005	0.0002	-0.2320
DIRECTFRSTEX	-0.0267	0.1452	-0.1840
CONSRACTV**	0.0006	0.0003	1.8620
POVINDEX	0.0007	0.06198	0.0120

The regression results reveal that only one factor (whether or not a household was involved in a forest conservation activity in the last year) among those included in the model was significant. Socioeconomic factors seem not to influence the satisfaction ranking, this finding concur with those of Mehta and Kellert (1998) in which household demographic characteristics did not explain perception of community of community-based conservation in Nepal. Involvement in a forest conservation activity (tree-planting for example) seems to positively influence the overall

management ranking. It can be argued that people who are involved in forest conservation activities appreciate the efforts of forest management regimes more than those who are not involved. This observation favors the argument for education of the local community on the need to actively participate in conservation efforts.

5.0 SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

The study highlighted the various incentives that are offered by the different management regimes. The main incentive for conservation offered by two of the regimes (FD & Church mission) is extraction of direct forest products. The results clearly indicate that the local communities enjoy substantial economic benefits from Kakamega forest. Therefore, for continued realization of these benefits, there is need to balance the current levels of extraction with future conservation interests. There is a big challenge for the management regimes to ensure that extraction does not lead to overexploitation. It would therefore, be important to carry out further studies to understand in depth the actual level of current forest exploitation *vis a vis* the corresponding regeneration so that a good balance is maintained between the two processes. Since allowing the local people to extract from the forest does not rule out illegal practices, more vigorous policing is required to ensure compliance. Analysis of satisfaction ranking for management revealed that the strictest management regime is ranked highest. It is important to note here that the local people were judging the management in performing its duty of conservation. From a conservation policy point of view, it could be concluded that in the area of study, the local community judge a conservation regime not on whether it is state, community or private based *per se* but on its ability to fulfill desired needs of conservation. The management regimes still have more work to do in meeting the needs and aspirations of the local communities. There are key areas that obviously need attention especially creating mechanisms of protecting and compensating people from crop destruction and loss in case of wildlife attacks and more vigorous promotion of alternative sources of forest products.

REFRENCES

Adams W. and Hulme D., 2001. Conservation and Community In Hulme D. and Murphree M. (Eds) *African Wildlife and Livelihoods*. James Currey Limited Oxford

Akama J.S. and Kieti D.M., 2003. Measuring Tourist Satisfaction with Kenya's Wildlife Safari: A case Study of Tsavo West National Park. *Tourism Management*, Vol 24 pp 73-81

Andersson K.P., 2004. Who Talks with Whom? The Role of Repeated Interactions in Decentralized Forest Governance. *World Development*. Vol 32, No. 2 pp 233-249

Brown K., 2002. Innovations for Conservation and Development. *The Geographical Journal*, Vol. 168, No. 1 March, 2002, pp 6-17

Bruce S.A., Mark B., George S.H., 2002. Social Acceptability of Forest Conditions and Management Practices: A Problem Analysis. *General Technical Report* (PNW-GTR-537), U.S. Department of Agriculture, Forest Service pp 68

Farber S.C., Costanza R and Wilson M.A., 2002. Economic and Ecological Concepts for Valuing Ecosystem Services. *Ecological Economics*, Vol. 41, pp 375-392

Fredrik C. and Jostein G., 2000. Consumer Satisfaction and Supplier Induced Demand. *Journal of Health Economics* Vol. 19, Issue 5 pp 731-753

Giese J.L. and Cote J.A., 2002. Defining Consumer Satisfaction. *Academy of Marketing Science Review*, Vol. 2000, No. 1

Greene W.H., 2003. *Econometrics Analysis* (5th Ed). Pearson Education International, USA

Hutton J.M. and Leader-Williams N., 2003. Sustainable Use and Incentive-Driven Conservation: Realigning Human and Conservation Interests. *Oryx* Vol. 37, No. 2 April 2003

Kant S., 2000. A Dynamic Approach to Forest Regimes in Developing Economies. *Ecological Economics* Vol. 32 pp 287-300

Kokwaro J.O., 1988. Conservation Status of the Kakamega Forest in Kenya-the Easternmost Relic of the equatorial rainforests of Africa. *Monographs Systematic Botany*. Missouri Botanical garden 25, 471-489.

Kolodinsky J., 1999. Consumer Satisfaction with a Managed Health Plan. *The Journal of Consumer Affairs* Vol. 33, No. 2 pp 223-236

Lung T. and Schaab G., 2004. Change-Detection in Western Kenya- The Documentation of Fragmentation and Disturbance for Kakamega Forest and Associated Forest Areas by

Means of Remotely-Sensed Imagery. In: ISPRS *Archives, Vol. XXXV, Part B (CD-ROM)*, Proceedings of the ISPRS XXth Congress, 12.-23. Juli 2004, Istanbul

Margolis S.A., Al-Marzouqi S., Revel T. and Reed R.L., 2003. Patient Satisfaction with Primary Health Care Services in the United Arab Emirates. *International Journal for Quality in Health Care* Vol. 15, No. 15 pp 241-249

Meinzen-Dick R., Raju K.V. and Gulati A., 2002. What Affects Organization and Collection Action for Managing Resources? Evidence from Canal Irrigation Systems in India. *World Development*, Vol 30, No. 4 pp 649-666

Meinzen-Dick R. and Di Gregorio M., 2004. Collective Action and Property Rights for Sustainable Development: Overview. *IFPRI Brief* 1 of 16, February 2004

Mehta J. N. and Kellert S.R., 1998. Local attitudes Toward Community-based Conservation and Programmes in Nepal: A Case Study in the Makalu-Barum Conservation Area. *Environmental Conservation* Vol 25, No. 4 pp 320-333

Mitchell, N., 2004. The exploitation and disturbance history of Kakamega Forest, Western Kenya. In: Bleher, B. & H. Dalitz (eds.): *BIOTA East Report No. 1*. - Bielefelder Ökologische Beiträge 20: 1-77.

Mogaka H., Simons G., Turpie J., Emerton L. and Karanja F., 2001. Economic Aspects of Community Involvement in Sustainable Forest Management in Eastern and Southern Afica. *IUCN Policy Brief*, 2001

Oakerson R.J., 1992. Analyzing the Commons: A Framework. In Bromely D.W. (Ed) *Making Commons Work: Theory, Practice and Policy*. ICS Press, San Francisco, pp 41-59

Prabhu R., Colfer C. And Shepherd G., 1998. Criteria and Indicators for Sustainable Forest Management: New Findings from CIFOR´s Forest Management Unit Level Research. Rural Development Forestry Network. *Network Paper 23a*. ODi, London

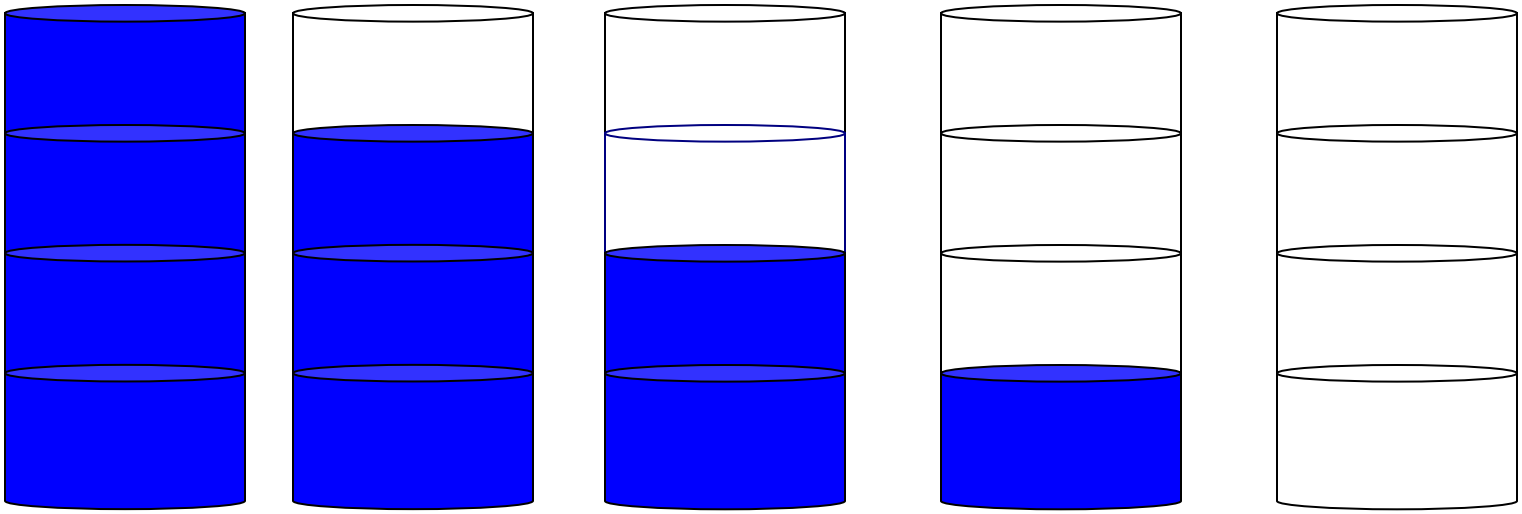
Rasmussen L. N. and Meizen-Dick R., 1995. Local Organizations for Natural Resource Management: Lessons from Theoretical and Empirical Literature. *EPTD Discussion Paper No. 11*. IFPRI

Takolis D., 2001. Perceptions, Preferences, and Reactions of Local Inhabitants in Vikos-Aoos National Park, Greece. *Environmental Management* Vol. 28, No. 5, pp 665-676

Wiggins S., Marfo K. and Anchirinah V., 2004. protecting the Forest or the People? Environmental Policies and Livelihoods in the Forest magins of Southern Ghana. *World Development* Vol. 32, No. 11 pp 1939-1955

Wollenberg E., 1998. Methods for Assessing the Conservation and Development of Forest Products: What We Know and What We Have Yet to Learn. In Wollenberg E and Ingles A. (Eds) *Incomes from the Forest: Methods for the Development and Conservation of Forest products for Local Communities*. CIFOR

Appendix 1: Management satisfaction ranking using water drums



1. (Very good) 2. (Good) 3. (Fair) 4 (Poor) 5 (Very poor)