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# An Assessment of Biodiversity Contribution to Rural Livelihood Security and Protected Area Governance in Malawi: A case of Communities along Nkhotakota Wildlife Reserve

**John Ian Kanthungo**

**Supervisors**

**Malin Almstedt**

**Marie Byström**

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UPPSALA UNIVERSITET

# Abstract

This Community study gives insights into the scale of contributions biodiversity makes to surrounding communities of Nkhotakota Wildlife Reserve in Malawi including future economic potential benefits. Problems of unsustainable utilization are discussed and governance issues are explored. The need for well planned people centred mitigative initiatives is emphasised. While general results show substantial dependence on Nkhotakota Wildlife Reserve by border communities for their livelihood, a further analysis, employing logistic regression analysis, has established that derivation of benefits is a function of location, age, education, literacy and capacity to buy fertilizer. Benefits derived include: heating energy, income, food, construction materials and traditional medicine. Educated and literate respondents were less compliant with the access regulations of the reserve than illiterate respondents. Respondents registered concern about the management of the reserve. They felt alienated. This is at variance with guidelines in the National Parks Wildlife Policy which calls for collaborative management with border communities with well determined access and benefit sharing mechanisms. Border communities are worried with the trend of low late or non-existent feedbacks from reserve management when cases of crop damage by marauding animals are reported. They are equally concerned with non-compensation stance by Department of National Parks and Wildlife when their crop fields are damaged by reserve animals.

Only one Community Based Natural Resources Management group is apparent to many people, sharply contrasting the assertions by the Department of National Parks and Wildlife. Capacity limitations of the Department range from logistics, properly trained staff to knowledge and skills in engaging local communities using participatory processes. Successful CBNRMs will have to be trained to acquire capacity and exposed to an in-depth governance and rights issues for them to squarely defend their stakes in the reserve in accordance with existing policies.

***Keywords:*** *Nkhotakota Wildlife Reserve, biodiversity, livelihood, local communities, governance, participatory processes, Malawi, collaborative management*

## Acronyms

| | |
|---|---|
| COMPASS | Community Partnerships for Sustainable Resource Management |
| DNPW | Department of National Parks and Wildlife |
| IUCN | World Conservation Union |
| JOFCA | Japanese Overseas Forestry Consultants Association |
| KKWR | Nkhotakota Wildlife Reserve |
| TANAREMA | Takondwa Natural Resources Management |
| TA | Traditional Authority |
| UNEP | United Nations Environmental Program |
| WHO | World Heath Organisation |
| WWF | World Wide Fund for Nature |

# Contents

# Introduction

Better managed protected areas not only improve the prospects of achieving the objective of biodiversity conservation but may also play a complementary role of uplifting living standards of border communities. This study, apart from giving an insight into the scale of contributions biodiversity makes to surrounding communities of Nkhotakota Wildlife Reserve (KKWR) in Malawi, including future economic potential benefits, discusses problems of unsustainable utilization and emphasises the need for well-planned people-centred mitigative initiatives. To that end local people's perceptions of biodiversity conservation and livelihoods strategies, among others, have been investigated. This report singles out socioeconomic and demographic factors that affect the relative contribution of biodiversity to rural communities in spheres that include; nutrition, income, health, and infrastructural development.

In Malawi, the government has mandated the Department of National Parks and Wildlife (DNPW) to protect wildlife resources and regulate their use. DNPW has to achieve this by promoting sustainable use of wildlife, by ensuring that protected areas produce benefits for Malawians and by minimizing costs born largely by rural communities. There are five national parks (6,982 $km^2$), four wildlife reserves (3,926 $km^2$), and three nature sanctuaries (48 $km^2$) (Malawi Government, 2004) refer Figure I.

It is clearly indicated in the Wildlife Policy (2000) that a key philosophy of DNPW is Collaborative Management with partners that include local communities, NGOs and the private sector. Collaboration with local communities shall take the dimension of determining types of consumptive and non-consumptive use to be permitted in each protected area. Further, the collaboration shall aim at maintaining the ecological and aesthetic qualities of protected areas by preventing illegal access, settlement and cultivation, and by controlling the introduction of exotic plants and animals (Malawi Government 2000).

Guiding principles in the management of protected areas are, *inter alia,* affirmation that participation by the communities living close to protected areas is essential for good management and declaration that adjacent communities will be actively involved in this management. Another guiding principle states that for each protected area, arrangements and mechanisms will be agreed upon for the fair distribution of benefits amongst the surrounding communities, DNPW and Ministry of Finance (Treasury) (Malawi Government 2000).

There is abundant literature which recognises that management of protected areas affects the livelihoods of local people living on their fringes (Lynagh and Urich, 2002; Tisdell and Zhu, 1998; Wild and Mutebi, 1997). Milner - Gullard and Mace 1998 indicated that while protected areas have significantly contributed to biodiversity conservation, social, economic, and ecological conflicts have been observed to the extent that actions of local people can undermine conservation initiatives. Wilkie and Carpenter (1999) and Fa *et al* (2002) asserted that the considerable interest in rural households' utilization of wild foods is partly because the actions of these households can and in many cases do threaten the
sustainability of the resource base. However, equally important is the fact that households

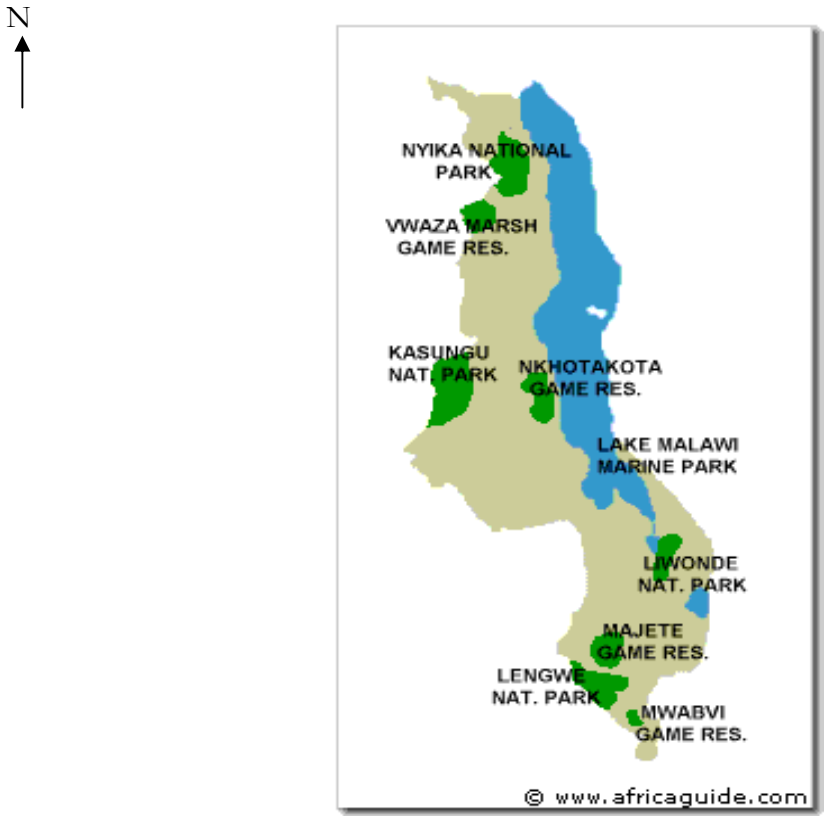


Fig. 1. National Parks and Wildlife (Game) Reserves in Malawi

can have ownership or user rights with a long history that must be acknowledged in any conservation initiative. This, McNeely (1990) contends, requires that the needs, aspirations and attitudes of local people be considered in protected area management. IUCN (1993) called for community participation and equality in decision-making processes. Arising from this sober revelation, approaches to protected area management that integrate

biodiversity management with social and economic development are increasingly advocated and implemented (Western *et al* 1994).

Incompatibilities, defined in terms of differences in goals between local communities and protected area management, or extraction in excess of long term biodiversity productivity, are largely a cause for retrogression observed in protected area management. However, it is small-scale incompatibilities driven by economic necessity and lack of alternatives for local populations within and adjacent to protected areas that occur more frequently than large-scale incompatibilities driven by larger economic interests (Rao *et al* 2002). Maikhuri and Nautiyal (2000) and Larsen (2002) identified permanent settlements, hunting, grazing, medicinal plant extraction, fuelwood and timber and non timber forest products extraction as the main incompatibilities on the small scale.

From their studies, in the Democratic Republic of Congo, de Merode *et al* (2004) found that while wild foods played a small role in household consumption in the areas studied, they contributed significantly to household income. They additionally noted that the value of wild foods increased in the lean season when agricultural production is low. Overall the findings show that small-scale commercialization of wild foods provides a vital source of income for rural households. However, their study unveiled that the poorest households are unable to capitalise on bush meat and fish as a source of food or cash income. Ambrose-Oji (2003), in a study in Cameroun, corroborated these results after finding that it is middle and higher income households who benefit more from non timber forest products when compared with the poor.

The establishment of protected areas often causes tangible economic costs at the household level because of the restrictions on some of the traditional resource uses (Shyamsundar and Kramer 1997). Ghimire and Pimbert (1997) noted that protected areas have stereotypically restricted resource use for local populations and customarily led to extensive resource alienation and economic hardship for many rural groups. Complex histories of resource use and land dispossession, combined with preservationist conservation policies, have come to perpetuate the negative associations local people have with such areas. The challenge now facing protected areas is to redress the imbalance with local people in a range of activities surrounding conservation and protected-area management. Hence, the investigation of local people's perceptions is important as it produces useful information that can be incorporated into the decision-making processes that deal with protected area – people conflicts (Trakolis 2001).

Improved local governance is an element that is being given considerable attention in managing protected areas. Results of a study on global trends in protected area governance (Dearden and Bennett, 2004) depict a shift from

centralized to decentralized management of protected areas and that participatory management is now required by legislation.

Gender is an important factor in many programs thereby deserving special attention. Trapp (2004), in her contribution to rural poverty, food security and biodiversity, highlighted that 80-90 % of food is produced by women in developing countries, depicting the critical role women have on sustainable rural development, nature conservation and promotion of biodiversity.

This study analysed how different socioeconomic and demographic variables affect derivation of various benefits from Nkhotakota Wildlife Reserve by the border communities. The study has also documented losses that are incurred by these communities as well as their general concerns about KKWR management.

The main objective of this study was to establish the relative contribution of biodiversity to the overall household livelihood security in (KKWR). Livelihood security, according to Frankenberger *et al* (2002), is when a household has adequate and sustainable access to income and other resources to enable them to meet basic needs, including adequate access to food, potable water, health facilities, educational opportunities, housing and time for community participation and social integration. Specific objectives were: (1) to find out perceptions of the border communities on biodiversity conservation of the Reserve;
(2) to determine the current and potential contribution of the Reserve to the local rural economy; (3) to assess current livelihood strategies and explore factors that shape them; and (4) to gauge the level of community involvement in the management of the Reserve.

Quantitative analysis of the socioeconomic and demographic factors that affect KKWR resources contribution to livelihood security was beyond the scope of this work as only qualitative data was collected. This work does not cover, due the extensive nature of the data collection, all aspects of livelihood security. Duly cognizant of the fact that wealth is a notoriously difficult index to measure involving lengthy periods of data collection and good funding (de Merode, 2004) as well as the fact that the relationship between wealth and use of wild foods is still contestable (Godoy et al, 1995 and Demmer et al, 2002) it is mentioned here that this study used an ability to purchase fertilizer as a proxy measure of income. Those who failed to buy fertilizer were considered low income households.

### Rationale and Research Hypotheses

Based on the foregoing, it is quite evident that biodiversity is a key to the survival of communities near protected areas. Therefore, integral to the success

of conserving biodiversity in protected areas is, as described by Michener (1998) and Leach *et al,* (1999), the understanding of different people's relationships with their environment, and the need to incorporate this knowledge, experiences and attitudes into the decision-making, planning and implementation processes. However, little work, if any, has been done to assess the relative extent of contribution of biodiversity from KKWR to rural livelihoods. It is hoped that the results generated are of relevance and may influence better management of the Reserve.

Biodiversity-rich ecosystems provide for the rural poor greater options for, and security of, livelihoods both for cash and non-cash, along with livelihood services, such as social safety nets in the contexts of external shocks such as famine, droughts, floods and collapse of market prices (Frankenberger et al, 2003 and Millennium Ecosystem Assessment, 2005). Biodiversity also plays a crucial role in health care with approximately 80% of the population in Africa using traditional medicine (Patterson, 2001 and World Health Organisation, 2004). This percentage could resonate well with secluded and remote marginal areas along KKWR. For communities living close to KKWR, biodiversity also provides nutrition from fish sourced from Bua River which runs across the reserve. In addition, they get construction materials for various structures, more significantly and important their housing. Further still, reserve resources are supporting small but important local enterprises as carpentry, pottery and boat/canoe building (Phiri *et al,* 1995).

Munthali and Mkanda (2002) reported that in Malawi swelling demographic pressure, poverty, and dwindling arable land have resulted in rapid decline of wildlife habitats, over-exploitation of wildlife outside protected areas and intense land degradation. They noted that wildlife inside protected areas has also been reduced. In assessing anthropogenic disturbance to KKWR, Japanese Overseas Forestry Consultants Association (1996) found that the amount of woodland in a 10 km buffer zone surrounding the reserve had alarmingly declined from 50 998 ha in 1984 to 27 998 ha in 1993 representing nearly 46% reduction. The same period has witnessed a growth in grassland. Agricultural activities in the same 10 km buffer zone expanded from 43 796 ha in 1983 to 64 602 ha in 1993 representing an increase of 32%. On my visits to the area, it was quite evident that the decline in the woodland and its corresponding increase of farming activities in the buffer zone is a serious problem and if not checked the core idea of maintaining this area as a wildlife reserve, will be threatened and considerably challenged. Many households have encroached the reserve and strong calls for a review of the reserve boundary were captured. According to these, this boundary review should allow for usufruct ownership of the portions of land they are cultivating. Encroachment rate of the reserve is pegged at 2.1% annually (Malawi Government, 1994). Recommendations are made by this study towards mitigation of the present conflicts and degradation.

Department of National Parks and Wildlife revised its Wildlife Policy in 2000. This revision entailed devolvement of some control to border communities. It was, therefore, hypothesized that border communities of KKWR are involved in the management of the reserve. Secondly, looking at the rate of encroachment on the buffer zone and the land holding sizes, it was hypothesized that land holding size does influence the type of benefits one gets from the reserve. While men and women in Malawi may perform some similar duties or chores, there are many that are distinctively performed by either of them. It was, lastly, hypothesized that gender does not affect derivation of benefits from KKWR.

# Methodology

## Study Area

KKWR, designated in 1938 for animal protection, is the oldest reserve in Malawi. Its boundary was expanded in 1970. KKWR spans an area of 180 200 ha, and it lies in an area with a gradient range of 550 m to 1 638 m. It is situated in the Central Region of Malawi and shares borders with Kasungu and Ntchisi districts (Figure 2). The land is owned by the government (Clarke, 1983).

The reserve is located on the escarpment between the Kasungu plain on the pre-Cambrian Central African Plateau and the plain around Lake Malawi. This fault scarp runs the whole length of the reserve from north to south. The upper part of the reserve consists of a dissected plateau with deep faulted valleys. There are some large hills, including Chipata Mountain (1 638m), an ancient igneous plug. The lower part of the reserve consists of rugged topography with many small valleys and streams. The reserve is bisected by the rocky valley of the Bua River and the northern boundary is marked by the steep gorge of the Dwangwa River. There is a plentiful supply of water by many clear permanent rivers, streams, and springs (Africa Guide, 2005).

According to UNEP (1985) the vegetation is predominantly miombo (*Brachystegia* and *Julbernardia species)* woodland of the escarpment variety, taller and closed in the uplands, shorter and more open in the lowlands. The major valleys contain tall grass savanna with *Terminalia*, *Combretum*, *and Piliostigma* etc with montane forest on the slopes of Chipata. Refer Appendix 1 for a list of tree species in the reserve and Mammals include: elephant (*Loxodonta africana)*, zebra (*Equus burchelli)*, sable antelope (*Hippotragus niger)*, roan antelope (*Hippotragus equines)*, bushbuck (*Tragelaphus scriptus)*, greater kudu (*Tragelaphus strepsiceros)*, eland (*Taurotragus oryx)*, reedbuck (*Redunca arundinum)*, and waterbuck (*Kobus ellipsiprymnus)*. The density of these animals is low. Black rhinoceros (*Diceros bicornis)* [threatened] have not been recorded since the 1960s

and are probably extinct. Refer Appendix 2 for a list of an estimate of animals in 1996 in KKWR through an aerial survey. It should be understood that this survey does not give a complete estimate of all the animal species.

Japanese Overseas Forestry Consultants Association (1996) reported that Nkhotakota Wildlife Reserve, despite being the largest protected area in Malawi, is poorly managed. It is poorly staffed with poor infrastructure and is given little attention by the Department of National Parks and Wildlife. Road infrastructure has improved in the recent years with the construction of M10, a tarmac road passing through the reserve. There is also a tarmac road (M5) which makes access from the capital, Lilongwe to the reserve easy. However, internal reserve road network needs improvement.

It is the only protected area that provides a relatively safe spawning habitat for the lake salmon species, *Osporidium microlepis,* locally called *mpasa* in Bua River (Phiri *et al,* 1995). Sport fishing for the lake salmon has been opened on a trial basis. Bird watching is

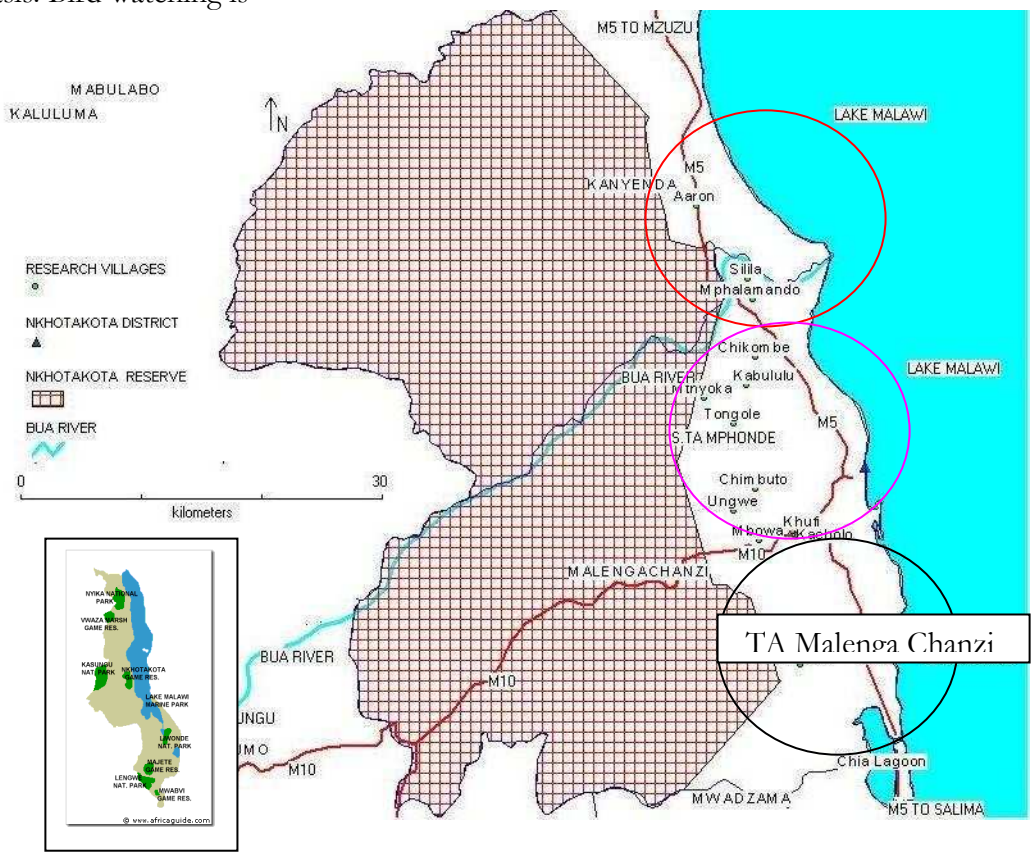


Fig. 2. Study area; TA = Traditional Authority; Kanyenda Mphonde and Malenga Chanzi; Villages were randomly selected from these three TAs.

rewarding with more than 300 species recorded including Pel´s Fishing Owl and Palm nut Vulture (Africa Guide, 2005).

My impressions are that KKWR, which stretches on one side close to Lake Malawi, is a geographically well positioned point for tourists. The duality of tourist attraction features, the lake and the reserve itself, is a strong icon of a great potential for ecotourism which could spur an upward trajectory economic development for the area. However, for this to be realised a number of things will have to be done as advanced in the discussion section.

Largely local people bordering the reserve depend on agriculture. Different crops are grown with the majority growing maize, cassava, groundnuts and rice. Part of their income is derived from the sale of these crops. Income levels tend to increase in villages where cultivated area is large and tobacco is cultivated (Phiri *et al,* 1995). Good markets for tobacco and other crops are not easily accessed leading people to rely on middlemen who normally offer exploitative prices.

In terms of livestock, chickens are popular and so are goats. Cattle are not widely raised due to tsetse fly problem. Often these animals are kept for subsistence and to a lesser degree for raising income.

The communities around the reserve also depend on the reserve resources for various reasons. They collect, legally or illegally, firewood, thatching grass, mushrooms, medicinal plants, honey and poles, among others. The quality of forest resources degrades because the increasing use of firewood exceeds the growth of customary forests leading to a disequilibrium state between demand and supply of fuelwood (Phiri *et al,* 1995).

There are seven scout camps responsible for a multiplicity of duties including assisting tourists. These camps are located within the reserve and each is supposed to be manned by five to six people ideally (refer Figure 3B for Bua camp). However, at the moment they are poorly staffed. The scouts live together with families. Some outstanding problems with the camps are that they are situated far from schools, shops, churches and hospitals. These scouts are not sufficiently provided with means of communication, transportation, equipment and housing. The camps have skeleton facilities for visitors and normally more visitors are recorded at two camps, namely; Bua and Chipata (Japan Overseas Forestry Consultants Association, 1996)

## Data Collection

Nkhotakota district is administratively and traditionally divided into five areas (Malenga Chanzi, Kanyenda, Mphonde, Mwansambo and Mwadzama) each known as a Traditional Authority (TA). Each TA is headed by a chief. A survey

was done in three TAs. Choice of the TAs was made using purposive sampling based on distance to the reserve, distance to the main road and distance to hospital. Comparatively, TAs Mphonde and Malenga Chanzi are closer to the central district administration. This means they are closer to two big hospitals and more economic activities. There is a busy road, M5, passing through the three TAs. There is another big road, M10, cutting across TA Malenga Chanzi. The travellers on these roads improve the economic activities of the areas by different resources from the reserve like firewood. Individual respondents were from different villages falling under each TA. The villages were randomly sampled in each TA and so were the respondents.

The survey was done using a questionnaire with both closed and open-ended questions to collect qualitative data through personal interviews. Refer to Appendix 3 for the questionnaire. These interviews were conducted with local farmers, who are a key and important stakeholder group, living on the fringes of the reserve. They are responsible for direct *de facto* and *de jure* extraction of reserve resources. Some focus group discussions were conducted with key informants to gain more insights. Informal meetings were held with officials from DNPW and some traditional leaders. Transect walks in the villages of respondents were conducted to give actual appreciation of the physical conditions in which they live. The survey was carried out from July to August 2006. Between September 2006 and January 2007 some trips were organized to the study area to take more pictures and finalize informal discussions with traditional leaders.

Enumeration of the questionnaire was done with assistance of four enumerators including the author of this thesis. One guide based at Nkhotakota was used as the team guide because she was very familiar with the terrain. She did not influence any choice of villages or respondents.

At each village the enumeration team introduced itself and briefly explained the purpose of the visit. To avoid potential bias, it was made clear at the outset to the participants that the investigation was for academic research without any affiliation to the management of the Reserve. One adult (≥ 18 years of age) from each household (preference was for household head) was interviewed. To avoid any influence of opinions from other members of the family, every attempt was made to hold a face-to-face interview with the respondents privately. A total of 183 households were interviewed. Key questions included types of livelihoods, perceptions of the respondents to Nkhotakota Wildlife Reserve (KKWR), benefits or losses the respondents get from KKWR, major stresses/shocks faced and how they cope with them, food security, their involvement in management of the reserve and their knowledge of extant regulations of KKWR.

Secondary sources of data were used by digging into archival records related to landscape changes, resource use, management and policy and regulations of Nkhotakota Wildlife Reserve. Largely Nkhotakota Wildlife Master Plan and Wildlife Policy (2000) were studied to analyze the effects of land-use history and patterns on the reserve management and biodiversity use.

### Data Analysis

Data was analyzed using Statistical Package for the Social Sciences (SPSS) 11.5 software at significance level of $p<0.05$. Since the data collected was mainly qualitative, nonparametric tests were done to determine effects and associations between independent variables and dependent variables. In this respect, logistic regression analysis was carried out to assess the relative importance of the various demographic and socioeconomic factors in affecting benefits from KKWR resources in attainment of secure livelihoods in aspects of; food/nutrition, housing, good health, income, and education. For each input variable, a beta value (B), standard error (s.e), Wald statistic, $p$ - value and expected beta value [Exp (B)] were calculated. For the overall model, chi-square ($X^2$), $p$- value and Nagelkerke R Square ($R^2$) were calculated.

Independent variables used in the estimation these statistics included: gender, age, education, literacy, household size, land holding size, livestock, marital status, location (TA), and fertiliser use (fertilizer use was used as a proxy measure for income as ability to buy fertiliser means one is relatively better-off).

## Results

### Socioeconomic and demographic variables

A total of 35 women (19.1%) and 148 men (80.9%) were interviewed. These are female and male-headed households respectively. The respondents' gender segregation is heavily skewed towards men, essentially because household heads that were interviewed were randomly, and not purposively, determined. While it may be argued that this skewness might have influenced the outcome of the study, it should be understood that the random determination of households means, by definition, that the fewer women are representative of female headed households as they are fewer than male headed households in most parts of Malawi. However acknowledgement is made that it would have been interesting to find the results if there was a gender balance. Gender distribution by location of the respondents shows that 24.3% of the men and 20% of the women live in TA Kanyenda whereas a further 38.5% of the men and 54% of the women are in TA Mphonde and 37.2% of the men and the remaining 26% of the women are in TA Malenga Chanzi.

Respondents' ages ranged from 18 to above 50 years with the largest representation by the 40 and above 50 age group. The sample data indicate that about 50% of the respondents have formal education from elementary to MSCE while the other half has had no education. Dichotomizing the respondents in terms of literacy results in more literates (73.2%) and the remainder (26.8%) are illiterate. In terms of household size, the data shows that most households have 5 to 8 people (46.9%). Refer Appendix 4.

Across all the traditional authorities, there is a clear and uneven land distribution among the people ($\chi^2$ =12.996, df = 2, $p$ = < 0.046). A striking land pressure is increasingly apparent in all three TAs with most families having less than 1 ha (54.1 %). TA Kanyenda has the highest (69.8 %) representation of households with less than 1 ha land holding size.

## Off-KKWR livelihoods sources

Respondents were asked about their different sources of livelihoods. All the respondents (100 %) are subsistence farmers growing different crop portfolios as a buffer against risks such as pest or disease. Mostly they grow cassava, maize, rice and groundnuts for own consumption. Cassava is a favourite crop of almost all the respondents. Analysis has revealed that 45.4% of the total respondents managed to produce enough food for one calendar season (2005) while 54.6% had a food deficit ranging from one to eight months. Tobacco and chillies are grown for sale to generate income for the households. When there is a surplus of the food crops they are also sold for household income. Marketing of the crops is predominantly through middlemen who often offer low prices. Nearly 60 % of the cash crop growers sell their produce through middlemen across all the traditional authorities.

Of the respondents who have off-farm income sources, 43% derive the income through *ganyu* (piece works) followed by 19% who get their income through selling of different things other than their own crops. The main form of *ganyu* is working in other peoples fields.

The majority of the respondents own livestock of various classes. An analysis shows that 54.5% of these keep chickens followed by 32.1% who keep a combination of goats and chickens. Livestock is kept mainly for own consumption as only about 2% of the respondents sold part of their livestock in 2005.

## KKWR livelihood benefits

Analysis of the reserve resources utilization unveiled that, in addition to economic benefits, respondents get such other benefits as heating energy (78.1%), medicine (56.3%), general income (55.2%) housing/construction materials (53%), and income for educational support (42.6%) and food (50%).

The food includes fish from the rivers that run in the reserve and this is particularly true for Bua River, which is one of the major inlets of Lake Malawi. Figure 4 shows different benefits which respondents get from KKWR

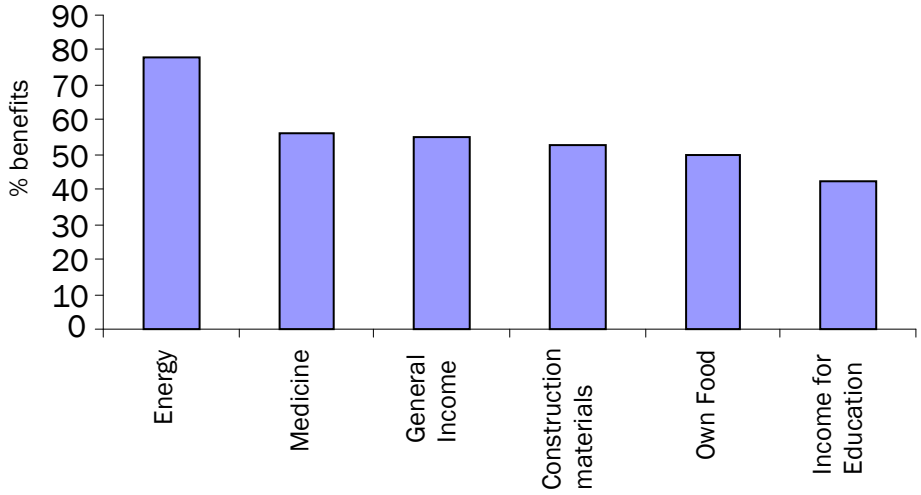


Fig. 3. Percentage of benefits respondents in the three Traditional Authorities get from Nkhotakota Wildlife Reserve

## General Income

When respondents were asked about their income derivation from the reserve resources, it was found that slightly over half (55.2%) get income benefits by way of selling reserve resources across all TAs. While it is clear that appreciable respondents in all three areas get income benefits from KKWR (Figure 4), a further analysis employing logistic regression technique shows that the respondents in TAs Kanyenda and Mphonde get significantly more benefits ($p = 0.000$). The income benefit distribution difference based on location was significantly different ($\chi^2 = 18.131$, df = 2, $p = 0.000$). The results further indicate that the illiterate respondents are more involved in getting income from KKWR across all the TAs ($p = 0.035$). Refer Appendix 5 Table I for logistic regression results.

The people sell different reserve resources. A catalogue of commodities sold includes different species of edible mushrooms, fruits, fish, firewood, insects/caterpillars, thatch grass, construction poles, bamboos, honey and small mammals. Fruits sold include *Uapaca kirkiana, Trumfetta nicotica, Parinari curatelliflora* and *Sclerocary caffra*. Mushrooms sold include *Termitomyces eurhizus, Amanita robusta* and *Russula spp*. Some

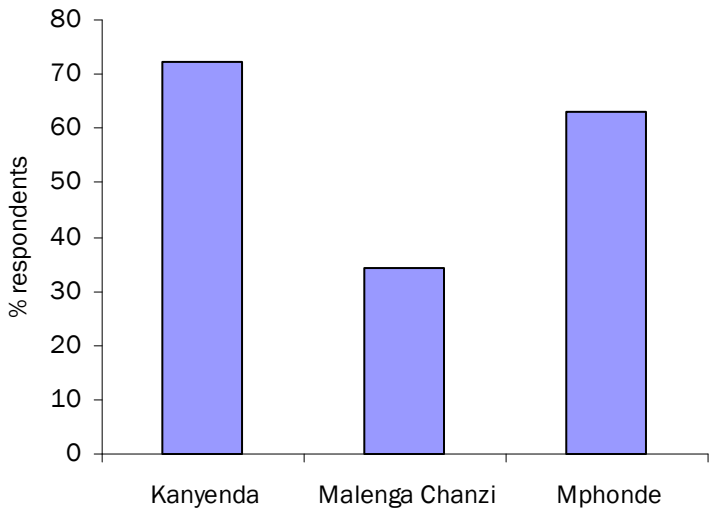


Fig. 4. Percentage of respondents in the three Traditional Authorities getting income benefits from Nkhotakota Wildlife Reserve

merchandisable caterpillars include *Gynanisa maia* and *Gonimbrasi belina.* List of fish sold from Bua River includes, but is not limited to, the following; *Osporidium microlepis Barbus lineomaculatus Astatotilapia calliptera* and *Oreochromis shiranus.* The bulk of the market is found within the area. The customers include fellow local people and travellers on the two main roads (M 5 and M 10) which run through the traditional authorities. Women sell most of the firewood to fishermen along Lake Malawi and this is particularly true for TA Kanyenda which is near to the lake. Open selling of fish from Bua River, where fishing is illegal, is easily conducted due to similarities with fish species from the Lake Malawi, creating challenges for identification and monitoring. In contrast to this, bushmeat is clandestinely sold. Despite the low populations of animals, it was possible that illegal hunting is taking place due, in part, to some of the tools that people use for chasing the animals like spears, guns, clubs and dogs. Some comments from the respondents were: (1) "we want the government to allow us to go into the reserve and hunt only the small mammals." (2) "the government says when the small mammals like wild pigs, bushbuck and duikers are damaging our crops we should just chase them up to the reserve boundary but we want to be allowed to kill them to lessen their populations." Such requests were registered by many respondents and they were definitive on sparing the large mammals if they could be allowed to go hunting. All these comments and opinions are pointing in the direction of asking government for legalisation of hunting.

## Nkhotakota Wildlife Reserve resources for own food consumption

The list of resources used for own consumption is as broad as those offered for sale. It includes different plants (e.g. edible orchids and wild vegetables), fruits, insects/caterpillars, fish and small mammals. Consumption patterns vary, and they are a function of many variables including availability of locally grown food, seasonality of reserve resources.
(e.g. mushrooms) and income regimes. Figure 5 below shows respondents who use KKWR resources for own food consumption. The use of different KKWR resources for own food consumption was significantly different (($\chi^2 = 57.041$, df = 2, $p = 0.000$).

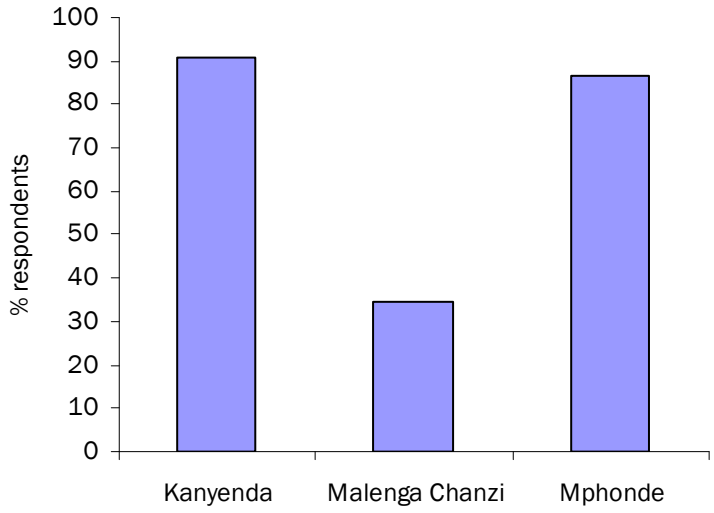


Fig. 5. Percentage of respondents in the three Traditional Authorities getting food resources for own consumption from Nkhotakota Wildlife Reserve

Logistic regression analysis showed that location of an individual has a strong bearing on the respondents' use of resources from the reserve. In particular, the results confirm that less people from TA Malenga Chanzi benefit from KKWR resources as food ($p = 0.000$), compared with people in Kanyenda and Mphonde. Refer Appendix V Table II for the results of logistic regression.

## Energy

Nearly 80% of these communities in the study area source their fuelwood from KKWR. They normally pick dead wood materials and it is a domestic chore for women. They tend to stockpile their homesteads with the firewood during the dry season as it is considered dangerous to make frequent errands into the reserve in the rainy season due to flooding rivers, and the vegetation in the reserve becomes denser compromising visibility. In some villages, just asking the source of their firewood brought terror. Many women started running away

from their houses when asked for a photo standing next to the firewood at their own house. This reaction points to how strong reserve entry restrictions are, as well as how severe non-compliance is treated by reserve authorities. The use of KKWR for fuelwood supply was significantly different among the three areas ($\chi^2 = 31.902$, df= 2, $p = 0.000$). showed the same trend as for general income and KKWR resources use for own food consumption, with fewer respondents from Malenga Chanzi getting fuelwood from the reserve as compared with the other TAs. Figure 6 shows the relative use of fuelwood from KKWR.

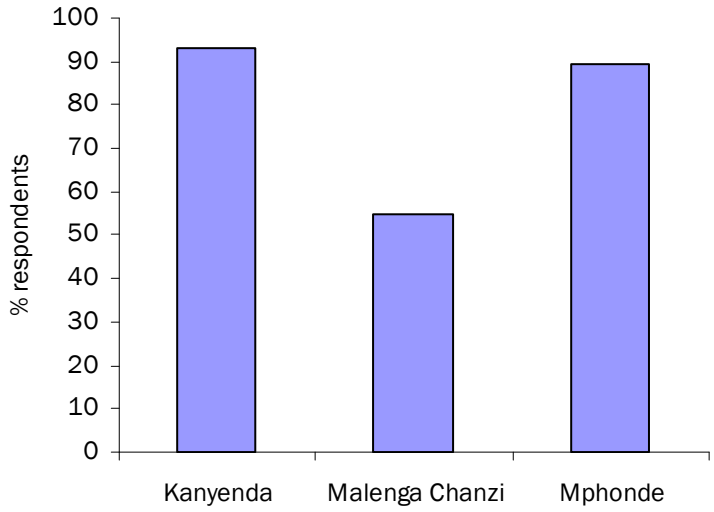


Fig. 6. Percentage of respondents in the three Traditional Authorities getting fuelwood from Nkhotakota Wildlife Reserve

Many respondents said (1) "the reserve is our only source of fuelwood." (2) "I still go into reserve to collect fuelwood despite the wrath one gets from the game rangers." (3) "My wife and her friends walk a long distance to the reserve to get fuelwood as you can see that we don't have any trees in this village which we can use."

## Income for educational support

Failure to support children's needs is a source of shame and displeasure to many parents, literate and illiterate alike, lower income and higher income households alike. This effect could extend to failure to support children's education. Therefore, related to income benefits, 42.6% of the respondents expressed the importance of KKWR resources in relation to educational support. They explicitly indicated that the proceeds from sales go directly to supporting the education of their children or relatives. This support is in form of payment of school fees, purchasing of school supplies (ie school books and

pens) and uniforms. Figure 7 shows respondents who finance their children's education with proceeds from sales of KKWR resources.

Whereas some respondents across the study area acknowledged financing their children's education from proceeds of merchandising KKWR resources, a logistic regression analysis showed that respondents from TA Malenga Chanzi were less linked to financing their school children using this method when compared to respondents from the other two TAs namely; Kanyenda and Mphonde ($p$ = 0.000). The use of KKWR resources for educational support was significantly different among the three TAs ($\chi^2$ = 23.445, df= 2, p = 0.000). The results also demonstrated that respondents who did not buy fertilizer for application in their crop fields and indicated to have supported their children's education by selling KKWR resources benefited more ($p$ = 0.031). Fertilizer use, as indicated in section 2, was used as a proxy measure for income as those who bought fertilizer are in general relatively better off than those who did not buy fertilizer. More respondents aged between 30 and 40 years financed their school education from KKWR resources sales in all three areas
($p$ = 0.003).

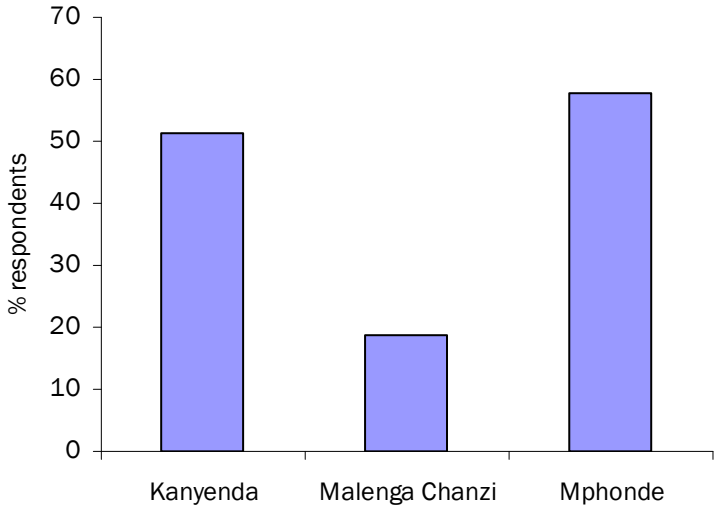


Fig. 7. Percentage of respondents in the three Traditional Authorities getting income foe educational support from Nkhotakota Wildlife Reserve

It was further established, using regression analysis, that it was illiterate respondents who indicated that KKWR resources was a source of their children's educational support
($p$ = 0006). Finally, logistic regression results showed that respondents who kept a combination of sheep, goats and chickens were less associated with use of proceeds from sales of KKWR to fund their children's education when

compared to the respondents who kept other combinations or individual types of livestock across all the TAs ($p$ = 0028). Refer Appendix 5, Table III.

Some responses on using KKWR for financing children education: (1) "I often sell firewood from the reserve to buy school supplies for children." (2) "My children collect mushrooms and sell them along the road and they use part of the proceeds to buy school supplies." (3) "I supplement money from other sources with proceeds realised from sales of different reserve resources to stably finance my children education." (4) A widowed lady herbalist who gets her medicinal products from the reserve said "income I get as practising herbalist goes along way in supporting my family needs including financing my children's education"

## Medicinal benefit

Over half of the respondents (56.3%) declared getting medicinal support from KKWR. The herbal medicine is for both primary health care and income generation. There are several reasons for this dependency and they include long distance to the hospitals, exorbitant hospital charges and strong value placed on herbal medicine. In most cases charges by herbalists can be negotiated or payment may be differed based on mutual agreement until money is sourced by the patient. Some herbalists use post paid methods in their profession.

In this case, one pays after getting healed. Lastly, for herbalists, unlike conventional hospitals, payment may be effected in kind taking the form of live animals or farm produce. Medicinal benefits are defined in terms of treatment for various ailments people get from KKWR. In many cases knowledge of herbs with medicinal potency for common ailments is wide spread and people individually collect them. However, for some ailments medicinal help is sought from a practising herbalist. Some herbs are combined with others or animal parts.

Figure 8 shows respondents who get medicinal benefits from KKWR. The use of KKWR for medicinal benefit was significantly different ($\chi^2$ = 24.061, df =2, $p$ = 0.000).

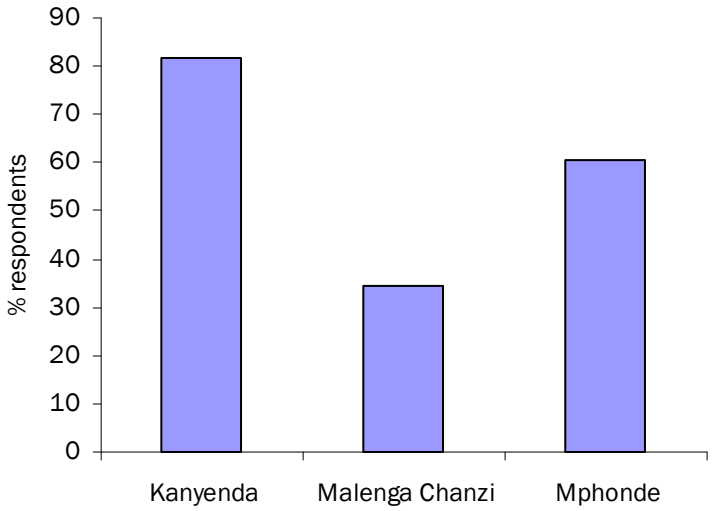


Fig. 8. Percentage of respondents in the three Traditional Authorities getting medicinal benefits from Nkhotakota Wildlife Reserve

While some respondents from all TAs get medicinal benefits the study revealed that respondents from TA Kanyenda are more significantly associated with derivation of this benefit from KKWR ($p = 0.022$). Added to this finding, the logistic regression analysis shows that respondents from TA Malenga Chanzi are least associated with medicinal benefits from KKWR ($p = 0.002$). The logistic regression analysis also shows that, of all the respondents across the TAs, those who had attained primary school leaving education (PSLCE) benefited the least in getting medicinal benefits from KKWR resources ($p = 0.052$). Refer Appendix 5 Table IV.

## Construction materials benefit

Respondents cited use of different tree and grass species to meet various construction demands. These include own housing, housing structures for livestock (73.2% of all the respondents keep livestock), crop harvest drying and storage structures, bee hive nesting, construction of churches and schools, small bridges and make-shift structures such as religious or community meetings shades and shades used for grading different crops.

Figure 9 shows respondents who use KKWR resources for construction from different TAs. The construction benefits were significantly different among the three TAs
($\chi^2 = 12.984$, df =2, $p = 0.002$). Logistic regression results revealed that across all the TAs, respondents from Malenga Chanzi are less likely to have used KKWR resources for construction purposes ($p = 0.005$). The results have also

established that the illiterate respondents are more linked to use of KKWR resources for construction ($p = 0.037$). This was most pronounced in Kanyenda ($p = 0.008$). However, in TA Mphonde more respondents who have attained Junior Certificate of Education (JCE) were likely to have used KKWR resources for construction ($p = 0.035$). Refer Appendix 5 Table V for logistic regression results.

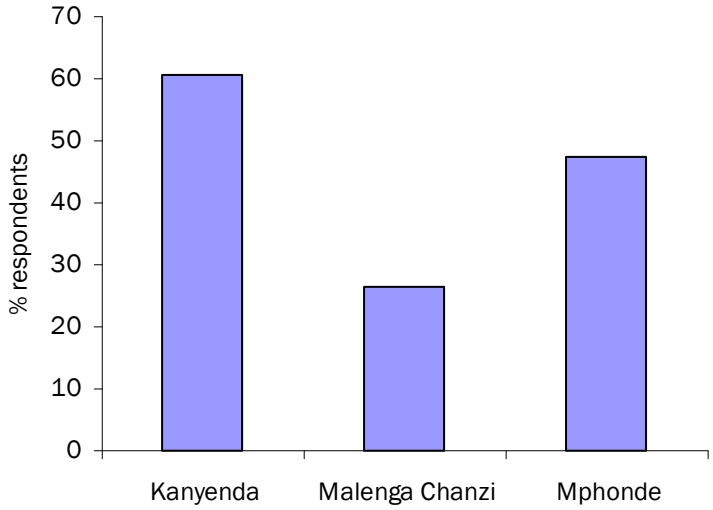


Fig.9. Percentage of respondents in the three Traditional Authorities construction materials from Nkhotakota Wildlife Reserve

## Losses due to Nkhotakota Wildlife Reserve proximity

Living in proximity to KKWR also entails losses. Nearly 37% percent of the respondents registered losses of various forms and magnitude. Most widely cited loss is crop damage due to birds and marauding monkeys, baboons, wild pigs, wild boars, and elephants. Other losses are livestock predation and wildlife-related accidents. Through discussions with key informants it was learnt that some people lost land when the KKWR was being gazetted. One case of death of a person due to attack by an elephant was reported. Cases of attack by lions are mostly turning into legends or historical footnotes since their populations, like that of other mammals, have dwindled significantly or gone to zero.

A logistic regression analysis of the study area, looking at factors affecting losses incurred by respondents, revealed that overall none of the socioeconomic and demographic factors tested were significant. This was also the case for TA Kanyenda when independently analysed. However, for TA Malenga Chanzi it was determined that it is mainly households whose size ranged from 5-8 who suffer ($p = 0{,}001$). Logistic regression analysis for TA

Mphonde established that fewer respondents of age group 18 – 29 incurred the losses
($p$ = 0,028). Refer Appendix 5, Table VI for the logistic regression results.

## Local awareness and attitudes about reserve management

Respondents were asked if they are satisfied with the way KKWR was being managed. A majority (69.9%) of the respondents declared dissatisfaction while 30.1% said they were satisfied. An array of reasons advanced for dissatisfaction ranged from poor feedback or lack of feedback from KKWR staff in cases of crop damage, strict access regulations, beatings and criminalization of their actions.
Some of the responses expressing dissatisfaction with reserve management were: (1)"we are chased when we go into the reserve just to collect firewood, where do they think we should be getting firewood for day to day heating?"; (2) "game rangers beat my wife severely for collecting firewood"; (3) " I was caught and beaten for being found fishing and was sent to police where I spent two weeks in police custody" (4) "the game rangers need to change their behaviour towards us, why should we be harassed for merely collecting mushrooms without permit and it is like we are strangers in our own land" (5) "when we complain about marauding animals, particularly elephants, destroying our fields we don't get timely feedbacks or not even one at all" and (6) a village headman of Aaron village from TA Kanyenda said: " its difficult for people to go into the reserve with permit all the time considering the distance one has to travel to get it." These comments are, indeed, very telling as to the feelings of the communities around the reserve.

Only 28.4% claimed they get permit to access KKWR resources whereas the remainder, 71.6%, does not. Refer Appendix 6 for KKWR Resources Collection Permit. Overall a trend is observed of an inverse relationship between education and use of permits. It appears that the more educated respondents, for MCE ($p$ = 0.007) and JCE ($p$ = 0.038) use permits the least. Respondents who are illiterate are the ones mostly getting permits ($p$ = 0.001) as well as respondents keeping livestock classes of pigs and goats ($p$ = 0.011). Often times, illiterate people tend to be more risk averse than literate people. Besides these observations, reasons such as distant places for permit collection, scouts not patrolling all the time and sheer negligence were cited to explain low use of permits. Refer Appendix 5, Table VII for logistic regression results. A pattern has also been observed that the more education one has the less familiar one is with KKWR regulations, JCE ($p$ = 0.037) and MCE ($p$ = 0.059). Although $p$ value for MCE is not significant, it nonetheless points to a discernible pattern.

Results of an analysis of TA Malenga Chanzi independent of the other TAs, showed that more respondents from the age groups 18 – 29 ($p$ = 0.022) and 30

– 39 ($p = 0.035$) are familiar with KKWR regulations than other the age groups. Refer Appendix 5, Table VIII for logistic regression results output.

An attempt was made to check the respondents' involvement in the management of the reserve by asking them who they think is responsible for the reserve management. On responsibility of running the reserve, 69.9% indicated that it is solely government managing the reserve through the use of game rangers. Only 12% of the respondents said that communities together with their chiefs help government in the management. The latter went further to indicate that they tell their fellow communities to stop poaching and cutting trees indiscriminately. It was not within the ambit of this study to check the degree of effectiveness of this claimed involvement.

An open ended question was put forward to the respondents to advance any reflections or opinions about KKWR. This assessment catalogued a quite varied and divided shed of thought. Of the total respondents, 34.4% agreed that the government needs to do a great deal to involve local communities in the management of the reserve. The reflections of these respondents came out very clearly that they feel alienated in the reserve management. Yet their livelihoods are very much connected to it. Some were indicating that: "the only interface I have had with DNPW is when they were chasing me from the reserve"; "DNPW has never come to our village to sit down with us and talk about the reserve"; and "since these game rangers don't come to discuss with us on how we could sustainably use fish from Bua River we just use leaves of *katupe* (*Tephrosia vorgerii)* to quickly kill the fish before they catch us". Use of *Tephrosia vorgerii* as a quick fishing method is highly damaging to aquatic life due to its indiscriminate killing potency. Another group comprising 16.4 % was advocating for the reserve to be demarcated into some areas where local communities could be allowed to collect firewood, mushrooms, fruits, fish and medicinal plants, among others, freely. They had this to say; "since the government restricts our ´free´ entry into the reserve, it should consider demarcating the reserve for free access for us to collect our basic necessities like firewood, mushrooms etc;" and "demarcating the reserve will stop our conflicts with government." A further 15.3%, while agreeing on the need to conserve wildlife, proposed a review of the reserve boundary to accommodate new farming plots and settlement due to land pressure. These respondents said: "we want to ask government to review the boundary so that we should have enough land for farming and settlement;" and "look so many people are encroaching the reserve because they do not have enough land to cultivate their crops, the government should seriously think about reviewing the reserve boundary".

### Local institutional capacity

Respondents were asked if they were aware of available local institutions running programmes of community based natural resources management, CBNRMs. It was found that 59.6% are aware while 37.7% declared ignorance and the remainder had no idea. The CBNRM they referred to is Takondwa Natural Resources Management (TANAREMA). It is found in Mbewa village, TA Malenga Chanzi. It is an outstanding budding CBNRM organization, being a pioneer one, and is on the verge of getting registered by government. Its objectives are linked to income generation through ecotourism. Already they have organised guided tourist tours into the reserve to view wildlife. Its focus is on promotion of community forestry, bee keeping and producing mushrooms and domestication of small wild mammals including cane rats. Since nature is intertwined with culture, TANAREMA organises cultural dances for tourists. The dances are part of the whole package that the tourists enjoy at a fee courtesy of TANAREMA members. DNPW had a hand in the facilitation of its formation. It also helped in sourcing the bee nesting materials. The chairman of TANAREMA said: "we are proud of this initiative and we hope it will go a long way in improving the economic standing of its members" and an ordinary member indicated: "I think TANAREMA is preserving both culture and biodiversity through utilisation". The secretary of the group said "now we want to find better ways of marketing TANAREMA to scale up tourist patronage."

These findings are in sharp contrast with the information from Nkhotakota DNPW office overseeing KKWR. The information from DNPW staff says there are community–based associations available in all the villages along the reserve and they have committees which are responsible for issuing the permits.

While 83% felt convinced that there is local capacity to organise and run CBNRMs, 17%, while applauding the idea, thought there is lack of capacity locally. They indicated they have heard a lot about them through the media but they need training on how to get organised, develop good goals and effectively implement agreed upon activities. Code of conduct to regulate resource use will have to be put in place, should they be fully or partly allowed to manage the reserve, and this was agreed upon by an overwhelming 94% of the respondents.

## Discussion

### Implications of off-KKWR livelihood sources on KKWR

The findings that slightly over half of the respondents registered food deficits are very worrisome. Harvesting of reserve resources is one of the major ways

to bridge the food gap. Probably this explains, to a certain degree, why over half of the respondents acknowledged use of reserve resources for subsistence. The pressure exerted on the resources under food stress periods very likely leads to unsustainable harvesting. While the scenario of food shortage is a household problem it should be noted that government policies on, among others, agricultural input and output marketing could be faulted partly for the food deficits. Unsustainable extraction of resources may be exacerbated by the fact that nearly 70 % of the respondents feel that it is solely a government responsibility to take care of KKWR. Lack of easily accessible proper markets for both crops and livestock allows room for middlemen to negotiate and/or offer exploitative prices to these communities making them realise low incomes which hardly meet their basic needs. Now that the government has introduced a fertilizer input subsidy it would be interesting to check if, after food security has significantly improved, the pattern and quantities of extracted materials would take another configuration.
Although the majority of the respondents raise livestock, the numbers kept would not influence change in their practice of reserve dependence unless scaling up coupled with a good marketing system is done. An option that is available to generate off-farm income is through *ganyu* (doing a casual piece work in exchange for cash or payment in kind). In Malawi, *ganyu* is characteristic of the poor people and it often negatively affects labour supply on their own small farms. An interaction of all these factors creates a very difficult landscape for these communities to live a good life, leading to more biodiversity loss from KKWR.

## Food benefit

Direct food provisioning, among the myriad uses of KKWR resources, supports communities on the fringes of the reserve to supplement different nutrients, including proteins, carbohydrates vitamins and minerals. Reliance on the natural environment is a prevalent livelihood strategy observed throughout rural Africa (Patel, 1998). Mkanda and Munthali (1994) cited 11 different resources that local people use from Kasungu National Park in Malawi, with bee-hive harvesting topping the list. The breadth of resources (13) people get from KKWR is higher than that of Kasungu National Park. Since the intensity of use was not measured, it would be erroneous to compare these two areas beyond the similarities in the resources. Further, this study did not ask the respondents to rank the resources according to importance.

Respondents from TA Malenga Chanzi benefited the least in terms food resources from KKWR. This may be partly due to a small lake, Chikukutu, about 5 km long and between 0,4 km to 1 km wide (Malawi Government, 2001) lying on one side of area in between some of the communities interviewed and KKWR. The lake reduces accessibility to the reserve (legal or

illegal). It could also be that the communities around this lake get more fish for both own consumption and for sale, hence lower reliance on KKWR.

The results indicate that the respondents who are illiterate benefit more from KKWR than the literate. This might be attributed to lower food yields from agricultural production, inadequate cash to supplement food by purchasing or indeed it could be a passion for wild food. It is an area which needs further research.

Quantifying and monetizing the amounts of resources used for own food consumption, which was beyond the scope of this study, would probably yield significant amounts of money

## General income and education support

That a majority of the respondents (55, 2 %) derive commercial benefits from the wildlife resources further validates a substantial utilisation of the reserve resources by the local communities. The inadequate alternative economic activities, the poor road networks and the population growth, among others, strongly determine the landscape gradient of rural economy. The trend of extraction is highest during periods when most community members have registered food deficits. Commercialization of wildlife resources encompasses both plants and animal species. As shown in Chapter four, mostly these resources are sold locally, to travellers on M10 and M5 roads, to people residing at Nkhotakota town. The results are in resonance with what de Merode *et al* (2004) found that, overall, the low income households get substantial income from sales of wild foods.

Fishing, being an increasingly important economic activity along Lake Malawi, has a great impact on the use of wildlife resources. An important example is the use of big trees with a large diameter for making most boats and canoes. The trees used are traced back to the reserve. Fishermen and fish mongers also demand a lot of firewood for both cooking and increasingly for smoking different fish species.

The respondents sell fuelwood and other KKWR resources to meet different emergent household cash obligations and sometimes to defray outstanding bills. The proceeds also go a long way in supporting education for children. Mostly the people who acknowledged getting this benefit are the illiterate and those who failed to buy fertilizer. It could be due to lack of other means to support education of their children. It could be assumed, with much certainty, that these people belong to the bottom income bracket. The people who failed to buy fertilizer were classified as poor in the study. Fertilizer was chosen as the most relevant proxy measure for relative wealth or income.

Those who kept a combination of sheep, goats and chickens did not support education using proceeds from sale of KKWR resources. Probably they could raise higher amounts by selling their livestock in order to get funds for educational support. Loibooki *et al* (2002), in their study of border communities of Serengeti National Park in Tanzania, found that people with higher numbers of sheep and goats per capita were less involved in illegal hunting. Developments projects should target such livestock as sheep and goats if they are to reduce communities´ reliance on the reserve resources. At the same time bigger proceeds from these sales of these animals can elevate the socioeconomic standing of these communities.

## Energy and construction materials contribution

On average nearly 80% of the fuelwood energy in the study area is sourced from the reserve. This is a large amount if a monetary conversion could be made. The money that is not spent on buying this energy goes to other expenditures. For many areas in Malawi, acquisition of fuel wood involves some cash outlays by local communities living far from protected areas. Malawi Government (1984) reported that in Malawi, fuelwood accounts for over 90% of the primary energy supply.

KKWR resources are also supporting different infrastructural development through construction materials. As indicated in section 3, these biodiversity dependent structures include: general housing structures, crop drying and storage facilities and make-shift structures. In general, it appears that the illiterate use the reserve to a larger extent for these materials. It is being suggested that a literacy program should be part of the bigger initiatives as it could help the people understand the importance of biodiversity conservation but its effect is indirect and could take a long time to manifest. It is not a simple question of getting literate then reliance on KKWR gets reduced. Literacy has to be coupled with a general elevation in the socioeconomic status of the local communities. However, the bottom line is to encourage sustainable use of the resources and not to influence non use of KKWR resources. The bigger picture initiative should deal with all aspects that would improve the socioeconomic position of the communities and more importantly the poorer households. The findings indicated that more respondents from TA Malenga Chanzi are less dependent on resources from KKWR for their infrastructural development. In part, it could be explained, in addition to being partly cut-off by the small lake, by the fact that they rely on resources from community forests.

## Health contribution

Administration of traditional medicine is not a haphazard set up. The traditional medicine system includes not only herbal remedies for specific diseases, but also folk knowledge, traditions and values, health behaviour rules

and patterns and identified personnel for delivery and restorative therapies (Hevi, 1989). Some healers use techniques such as divination, rituals and occultism in healing practices. There are some cases when conventional hospitals have referred cases for traditional medicine attention. Traditional doctors are able to cure organic and spiritually based illnesses. Some respondents indicated to have visited traditional healers for snake bites, acute back pains, epileptic conditions, stomach ache problems, and suspected poisoning.

Since charges that are paid for herbal medicine are often comparatively lower than conventional fees paid at private hospitals some money may be saved and used for other things. Similarly time saved from travelling to distant hospitals for conventional medicine is used for other things.

This traditional medicine reliance on the wildlife resources raises a lot of questions which have a strong bearing on the sustainability of the resources. The manner in which the plant species are harvested as well as the rate at which some specific animal species with medicinal efficacy are killed is not well established. Extraction for medicinal purposes is often by digging roots as they are known to contain high concentrations of bioactive compounds, thus tending to be more pharmacologically potent or even toxic than leaves (Johns, 1990).

Some animals which are said to have medicinal potency include hyena (tail), tortoise (head), hedge hog (skin) and some snake species.

Distance to the nearest hospital probably explains why there is highest herbal medicinal usage in TA Kanyenda compared to TAs Mphonde and Malenga Chanzi which are closer to main hospitals in the district.

## Unlocked potential for local economic development

In general, KKWR with its proximity to Lake Malawi, on one side of its stretch, has great potential to attract more tourists who could enjoy the duality of these features. This could enhance the economic development in the area and may thus in fact improve the socioeconomic standing of the local people through job creation and increased sales of various items. However, unlocking this potential demands, among others, an increased political will to promote ecotourism, development of policies that would clearly allow for private sector business investments in the reserve, repopulating the reserve with animal species no longer available like rhinoceros, promotion of Community Based Natural Resources Management along the reserve and improving the management of the reserve. The private investors could considerably and pragmatically improve the facilities and services, thus creating a more conducive environment for local and international tourists. An added

advantage is that accommodation facilities at Nkhotakota town are expanding with an increased touch on standards which would suit travellers wishing to enjoy the lake as well.

## Negative contributions to rural economy

Most frequent incurred loss due to KKWR proximity is crop damage. Whereas elephants cause the most dreaded damage per visitation, the most frequent crop damages are done by monkeys. Elephants are the most difficult to chase. In most cases they cause the damage at night and when people realise this they try to scare the animals by metallic noise produced by mostly hitting hoes against each other. However, the scaring effect is not instant. Some of the tools used for controlling and chasing the animals include; traps, arrows, dogs, guns, clubs, sticks, big panga knives and shouting loudly. When these cases are reported to DNPW normally feedback is low or comes too late, much to the annoyance of the complainants. There is no compensation for any crop damage or any other damage that may be caused by animals from KKWR. To a great extent, the late feedbacks or no feedbacks at all and lack of compensation, in addition to the other reasons already mentioned, are reasons that make these communities dissatisfied with KKWR management. Fuentes-Quezada et al (2000) pointed out that those who benefit from biodiversity conservation do not always bear the costs, whereas those who bear the costs are not always adequately compensated. However, this should not be the norm. Farmers bordering KKWR are the ones bearing most of the conservation costs at the local scale, in greater part, because their traditional rights of resource use are restricted by the regulations of the reserve and correspondingly many opportunities to earn money are lost.

A recommendation is that DNPW should improve the way it relates with the communities by ensuring that timely feedbacks are given when complaints are lodged. It would be good for government to start compensating crop loss due to damage by reserve animals because in some cases people are driven into destitution when they experience total loss from the same.

## Awareness and attitudes linked to low management involvement

The disapproval of reserve management as shown by low satisfaction by the majority of respondents (69, 9 %) is indicative of conflict between communities and reserve management. The low satisfaction is not localised to KKWR only but is evident in all other parks and wildlife reserves in Malawi and it is equally apparent in many countries (Rao *et al*, 2003 and Jim *et al* 2002). The disapproval is further ascertained by the fact that across the study area, 70 % of the respondents do not use permits when accessing KKWR resources. These findings deserve great and credible attention by the DNPW management in order to achieve the mandate they were given by government.

Neumann (2004) recounted that villagers commonly act to circumvent regulations out of necessity or in response to perceived injustice, and park managers often respond with increased enforcement efforts against local people whose activities they see as undermining conservation objectives. These results are corroborated by, among others, Bonner (1993), and Wells and Brandon (1992) when they indicated that criminalisation of border communities practices on grounds of safeguarding the ecological integrity foments hatred and local resentment toward conservation policies.

The results that disproportionately more respondents (70%) feel that government alone is responsible for the reserve management show significantly that there is lack of ownership of the resources. This is at variance with what is stipulated in the Malawi Wildlife Policy (2000) that ownership is in the hands of the local communities. While a point could be raised in defence of DNPW that government processes take long, the results by Japanese Overseas Forestry Consultants Association (1996) that in a space of ten years (between 1984 and 1993), due to anthropogenic interests, woodland in a 10 km buffer zone of KKWR was reduced by an alarming 46% should act as wake up call and a strong cause for concern to seriously start addressing the problem. The little awareness of communities of the government efforts to involve communities depicts glaringly that there is little community training and education on the wildlife issues by DNPW. This low awareness flawed the assertions by the DNPW that they are closely collaborating with communities along the reserve. Probably the collection of people that the DNPW calls committee in different villages is DNPW appointed and their positions are not elective leading to the people not to embrace and own the initiative. In other words, the committees are put in place in a non-participatory manner. It may be strongly assumed that there is little capacity in DNPW to involve communities in participative processes. It was observed in the study area that a member of staff from DNPW Nkhotakota office and staff manning the camps with a game ranger training orientation were the ones having scanty interfaces with some communities. Obviously this arrangement confounds the intended results of community mobilisation in participatory natural resources management.

The situation of minimal or lack of involvement in management by the border communities, as it stands now, facilitates and promotes abuse of resources contrary to what is in the Wildlife policy (2000) indicating that border communities shall be involved in the management of the reserve in a collaborative fashion. Maikhuri *et al* (2001) asserted that should local people's interests get marginalized for a lengthy period, they might adopt actions detrimental to the goal of conservation. In fact, on general opinions about KKWR, many people expressed their wish of getting involved in the reserve management as communities. WWF, one of the leading international organisations in biodiversity conservation, has declared that it would not endorse or support any activities that are proposed in protected areas without

prior, free, and informed consent of indigenous and local communities. These activities may include economic or other development projects, natural resources exploitation, commercially oriented or academic research, resettlement of indigenous communities, creation of protected areas or imposition of restrictions on subsistence resource use, and colonization within indigenous territories (WWF 1996).

The willingness of the communities to be consulted and become partners should motivate DNPW to make initiatives to get the communities involved. However, for this to succeed there is need for a transparently worked out clear benefit sharing mechanism for all the stakeholders to appreciate their stakes. Proceeding in this manner would bring hope, promise and confidence to all and more importantly and significantly to the local communities.

That respondents with some form of education or literacy, tended to be elusive with KKWR regulations sounds unusual. This could be because they don't feel justified and obliged to follow the regulations in the absence of some convincing reasons to do so. It is, therefore, not a surprise that this group of people is not very familiar with regulations (or they may have chosen to feign ignorance). This explanation strengthens further findings that the outreach program by DNPW is almost at stand still and constrained due to poor staffing, inadequate logistics and training. The respondents who are illiterate tend to be risk averse so they would try to follow the regulations better to avoid criminalisation. The literacy level of the study area at 73, 2% is higher than the national average which is pegged at 65 % (Malawi Government, 2002). Probably there could be issues at stake with the way the permit was designed and is enforced. There is a great need to seek the communities' view on the issue of permits. A consultative review of the permit including its administration would likely bring out many factors with complex relationships which probably get overlooked by DNPW but have far reaching "chilling effect" on the KKWR – communities' relationship. It should be appreciated that local communities are not accustomed to filling forms for purposes of merely trucking information on behalf of government because, hitherto, the feeling is that they do not own the reserve. Compounding the problem is an issue of seven days permit validity period. The documentation requirements appear too heavy to be properly followed by people who frequent the reserve. Overall, the problem is evidently lack of local structures that are constituted in a participatory manner, and therefore locally owned, that can work properly with DNPW.

These patterns of behaviour, where regulations are deliberately ignored, in addition to the reasons mentioned for non compliance such as long distances to permit collection points, lack of feedback, and general fatigue with management of exclusion should be taken into consideration when drawing up outreach programs. The best way would be for DNPW to seriously dialogue

with the communities, using better methodologies in development ie rights-based approach and review the whole system.

In TA Malenga Chanzi, age groups 18 – 29 and 30 - 39 are more familiar with regulations partly because their age group moves and interacts with other people more. Being familiar with regulations is just part of the equation. This group is also the part the respondents who declared strongest dissatisfaction with KKWR management.

In short, the management approach has to be improved or better still changed altogether to realise the goals of biodiversity conservation for both the government and the surrounding communities. This should start by involving these communities with real equality and definitive mutual benefits clearly agreed, *de jure,* as outlined in the Wildlife (2000) policy (Malawi Government, 2000). Of importance to carefully work out should also be questions of access mechanism and responsibilities of each stakeholder. Other issues, as identified by Dearden *et al* (1996), that need to be addressed include training and awareness, economic incentives such as community based ecotourism, training of park staff on local livelihoods and indigenous knowledge systems, and the identification, formulation, and implementation of suitable management strategies.

## Institutional capacity and governance

In general, there is lack of structures related to natural resources management on the ground for DNPW to start working with communities for the purpose of doing collaborative management. The TANAREMA initiative could be a good learning ground for DNPW and other stakeholders including other communities. It has a functional committee but it needs more capacity building to strengthen it as well as training for the general membership on their obligations and responsibilities. It is, in part, getting capacity building support from Community Partnerships for Sustainable Resource Management (COMPASS), a non governmental organisation (NGO) which gets financial assistance from United States Aid for International Development (US AID). This initiative is a good pilot project which should be multiplied all along the reserve neighbourhood. A significant majority (83%) of the respondents was convinced that there is local capacity to run their own community institutions to collaboratively manage the wildlife resources, and DNPW should feel energized to proceed in this direction. Most of these communities have had experience in running farmers' clubs which were the only avenues to access fertilizer on loan from the 1970s to early 1990s. The results further show that a majority of the respondents perceive that the community has the ability to manage the reserve resources. Probably this means that with technical assistance from the DNPW and other forms of training, communities could

start managing the KKWR which could eventually lead to sustainable use of the reserve.

TANAREMA has an orientation and focus on promotion of community forestry which may eventually lessen the extraction pressure from the reserve. According to its draft constitution, 65% of total earnings from income generating activities shall be shared among the members at the end of its calendar year while 35% will be used to meet over head costs. Such kinds of initiatives have great potential for improving the economic situation of the poorer households thereby decreasing dependence on income from unsustainable use of biodiversity. While applauding this initiative by TANAREMA, the revenue potential of their income generating activities should be carefully looked at with a background of free membership. Free membership means any one who is interested and participates in the activities is automatically a member without any entrance or membership fees. This question should also be central to other similar initiatives to come. Balint (2006) warns that, according to literature, if the economic value of income generating opportunities linked to the nearby protected area that the community or its members can effectively capture is low relative to the number of households these initiatives are unlikely to be successful.

Balint (2006) defined capacity as the levels of competence, ability, and skills necessary to set and achieve relevant goals. He added that for joint community based conservation and protected area initiative essential capacity clearly includes relevant technical, managerial, and political skills. Capacity stretches to cover intangibles, such as motivation, perseverance, resilience, confidence, optimism, openness to change, among others. Assessing capacity of the respondents to run a joint community based conservation and PA initiative was beyond this study. However, most respondents felt a great a need to produce a code of conduct to guide the sustainable use of the reserve resources. A code of conduct would stipulate control measures to avoid over extraction. Question of harvesting scale that could be deemed sustainable is a research area that would be challenging but important to address.

Related to capacity are issues of governance and rights. Governance refers to the effectiveness of decision making processes and institutions (Kaufmann *et al* 2005; Knack 2001). The importance of these variables in co-management in protected areas is emphasized by Roe *et al* (2000) when they indicated that co-management projects are affected by the quality of governance and rights at the community, provincial, and national levels. In the area of study most respondents complained about the conduct of traditional leaders, particularly in respect of the uneven distribution criteria of subsidized fertilizer coupons. These people had never complained to any authority. This is a clear manifestation of weak governance and ignorance of rights and as asserted by Balint (2006) this landscape might limit community participation and facilitate

expropriation of community benefits by traditional leaders or private firms Lastly, Balint (2006) observed that improved capacity appears to facilitate more effective governance, and strengthened governance, in turn, tends to promote and expand citizens rights. It is, therefore, important to consider these three aspects; capacity, governance and rights, when designing projects or programs that will effectively lead a less constrained KKWR management-local community relationship.

# Conclusion

This research work has managed to unearth many issues which would be very important, if taken into account, in ensuring that DNPW achieves its objectives. Biodiversity is critical to the livelihood security of the communities living on the fringes of KKWR in areas of nutrition, health, energy, educational support, income and infrastructural development. Of great concern is how the resources are being unsustainably utilised, as shown by the reduction of almost half of the woodland in the 10 km buffer zone in a time scale of ten years. The use of KKWR resources for different purposes is a function of location, household size, education, and literacy level among others. These variables have to be taken into account when designing programmes to help change the situation in this area. The willingness of the communities to be consulted and become partners in the management of KKWR is a window of opportunity that has to be utilised by DNPW. DNPW should engage the communities in a participatory manner with the goal of getting their needs, aspirations and attitudes in protected area management. This could form the basis for co-management whose success will depend on a transparently worked out clear benefit sharing mechanism for all the stakeholders to appreciate their stakes. Proceeding in this manner would bring hope, promise and confidence to all and more importantly and significantly to the local communities.

Initiatives should be pursued to support the border communities in a participatory fashion to solve their socioeconomic problems including the lack of livelihood alternatives. Improving existing livelihoods should introduce programs, among others, that improve marketing channels of crops and livestock coupled with objectives of increased production levels. To engage the local communities in participatory processes will demand capacity building on the side of DNPW staff. The capacity building should also include training and awareness of the importance of biodiversity, economic incentives such as community based ecotourism, training of park staff on local livelihoods and indigenous knowledge systems, and the identification, formulation, and implementation of suitable management strategies. The participatory processes will ensure ownership of ideas and eventual projects to develop from the same.

The initiatives aimed at improving the socioeconomic standing of border communities should be implemented along lines of community based natural resource management (CBNRM) whose formation should be properly facilitated. Apparently groups that DNPW refers to as community based organisations are non existent. Their formation should arise out of realised needs and stakes, and consequently backed by proper training emphasizing areas of capacity, governance, rights and responsibilities. Improved capacity appears to facilitate more effective governance, and strengthened governance in turn tends to strengthen citizen's rights. Revenue potential expressed in terms of economic value of income generating activities by CBNRM should be critically analysed.

DNPW should treat the CBNRMs on equal footing; otherwise all efforts will be mere rhetoric. In the absence of this, there will be hardly any effective biodiversity conservation and successful reserve management.

A recommendation is that DNPW should improve the way it relates with the communities by ensuring that timely feedbacks are given when complaints are lodged. This will improve the trust the local communities have on DNPW. It is further recommended that government should look into ways of compensating crop loss due to damage by reserve animals because in some cases people are driven into destitution when they experience total loss.
The close proximity of KKWR and Lake Malawi brings great economic development potential for the local area by way of ecotourism. However unlocking this potential needs increased political will to promote ecotourism, developing policies that would clearly allow private sector investments in the reserve, repopulating the reserve with animal species no longer available or with low populations, promotion of Community Based Natural Resources Management along the reserve and improving the management of the reserve.

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## Appendix 1: List of Trees Species Identified KKWR

| FAMILY | BOTANICAL NAME | LOCAL NAME |
|---|---|---|
| Moraceae | *Ficus natalensis* | Kachere |
| | *Treculia africana* | Njayi |
| | *Trilepsium madaganscariensis* | Kanungununungu |
| Moraceae, Apocynaceae | *Bosqueia phoberos,* | Kanungununungu |
| | *Strophanthus nicholsonii* | Mkombe |
| Proteaceae | *Protea sp., Faurea sp.* | Chiere |
| Annonaceae | *Annona senegalensis* | Mpoza |
| Amaranthaceae | *Amaranthus spinosus* | Kalindi, Bonongwe |
| Ochnaceae | *Ochna pulchra* | Mpatwe |
| | *Ochna schweinfurthiana* | Mgundanguluwe |
| Dipterocarpaceae, Caesapinioideae | *Monotes africanus* | Mkalakate |
| | *Swartzia madagascariensis* | |
| Guttiferae | *Garcinia huillensis* | Mtundira, Musongwa |
| | *Harungana madagascariensis* | Mbuluni |
| Rosaceae | *Parinari curatellifolia* | Muula |
| Fabaceae | *Acacia nilotica* | Chiwiriri |
| | *Afzelia quanzensis* | Msamabamfumu, Mngongomwa |
| | *Albizia adianthifolia* | Mtangatanga |
| | *Bauhinia petersiana* | Mpapa, Mpandula |
| | *Brachystegia boehmii* | Mombo |
| | *Brachystegia bussei* | Mseza, Mchenga |
| | *Brachystegia floribunda* | Mvukwe, Faija |
| | *Brachystegia longifolia* | Mombo |
| | *Brachystegia speciformis* | Mpapa |
| | *Brachystegia stipulata* | Mombo, Bobvu |
| | *Brachystegia utilis* | Msenga, Chitowe |
| | *Burkea africana* | Kawizi, Kawidzu, Mkalati |
| | *Craibia brevicaudata* | Mpindawago |
| | *Dalbegia nitidula* | Mkalasinga |
| | *Dalbergiella nyasae* | Mlundo |
| | *Dichrostachys cinerea* | Mpangala |
| | *Entada abyssinica* | Chisese |
| | *Jubernadia globiflora* | Kamponi |
| | *Jubernadia paniculata* | Mtondo |
| | *Lonchocarpus capssa* | Nyamakani, |

| | | |
|---|---|---|
| Mpakasa | | |
| | *Newtonia buchananii* | |
| | Sendele?(msenjere), Mkwenyani | |
| | *Pericopsis angolensis* | Mwanga |
| | *Piliostigma thonningii* | Msekese, |
| Chitimbe | | |
| | *Pterocarpus angolensis* | Mlombwa |
| | *Senna didymobotrya* | Njere, Mjere |
| | *Senna petersiana* | Mtanthanyerere |
| | *Trephrosia vogelii* | Mthuthu |
| Erythroxylaceae | *Erythroxylum emarginatum* | |
| | Chikango,Kafupa,Mlungamo | |
| Euphorbiaceae | *Bridelia micrantha* | Mpasa, Kapasa |
| | *Croton macrostachys* | Mbwani, |
| Mthutu, Chiwalika | | |
| | *Pseudolachnostylis maprouneifolia* | Msolo |
| | *Uapaka kirkiana* | Msuku |
| | *Uapaka nitida* | Kasokolowe |
| Rutaceae | *Teclea nobilis* | Mkulukuku |
| Meliaceae | *Ekebergia benguelensis* | Mlyasefu, |
| Musefu | | |
| | *Trichilia emetica* | Msikidzi, |
| Msikitsi, Mwavi | | |
| | *Turraea floribunda* | Chikwisimbi |
| Anacardiaceae | *Lannea discolor* | Kaumbu, |
| Chiumbu | | |
| | *Lannea schimperi* | Kaumbu |
| | *Ozoroa reticulata* | Mbewe |
| Melianthaceae | *Bersama abyssinica* | Chiwindu, |
| Mkanga, Nkanga | | |
| Celastraceae | *Maytenus senegalensis* | Mchema, |
| Mpabula | | |
| Icacinaceae | *Apodytes dimidiata* | Katole, |
| Lifefe,Mtibulo,Msusumba | | |
| Sterculiaceae | *Dombeya rotundifolia* | Naduwa, Nchiu, |
| Mchiu | | |
| Flacourtiaceae | *Flacourtia indica* | Nthudza |
| Myrtaceae | *Syzygium cordatun* | Nyowe |
| | *Syzygium guineense* | Mbunguzi, |
| Mpeuma | | |
| | *Syzygium sp* | Katope |
| Rhixophoraceae | *Anisophyllea pomifera* | Mfungo |
| Combretaceae | *Combretum fragraus* | Kalama wa |
| ukazi | | |
| | *Combretum molle* | Kadale |
| | *Combretum zeyheri* | Kalama |
| | *Terminalia stenostachya* | Mkulu |
| Sapotaceae | *Bequaertodendron* | |
| | *magalismontanum* | Chiyira |
| Ebenaceae | *Euclea schimperi* | Mpukuso |
| Ebenaceae, Guttiferae | *Diospyros sp.* | |
| | *Psorospermiun febrifugum* | Mdima |

| | | |
|---|---|---|
| | *Rhus longipes* | |
| Oleaceae | *Chionanthus battiscambei* | Kapanda |
| Loganiaceae | *Strychnos spinosa* | Maye, Dzaye, |
| Mteme, Mateme | | |
| Apocynaceae | *Diplorhynchus condylocarpon* | Thombozi |
| | *Rauvolfia caffra* | Mvumbamvula, |
| Mwimbi | | |
| Rubiaceae | *Breonadia microcephala* | M´ngona |
| | *Oxyanthus speciosus* | Chikanga, |
| Msongwe | | |
| | *Polysphaeria lanceolata* | Mpeko, |
| Msepauta, Mtola | | |
| | *Psychotria mahoni* | Chipeta |
| | *Randia sp. Xeromphis obovata* | Chipembere |
| | *Vangueria infausta* | Mvilu, Mzilu |
| | *Vangueria sp* | Mfulukutu |
| Boraginaceae | *Cordia abyssinica* | Mbwabwa |
| Verbenaceae | *Vitex doniana* | Msipsya |
| Schrophulariaceae | *Halleria elliptica* | Mpulupulu |
| Bignoniaceae | *Kigelia africana* | Mvunguti, |
| Muutungwa | | |
| | *Markhamia obtusifolia* | Msewa, |
| Mwanambewe | | |
| | *Stereospermum kunthinum* | Kavunguti |
| Pedaliaceae | *Sesamiun angolense* | Mkuyu, Mkuya |
| Liliaceae | *Dracaena laxissima* | Mchemani |
| ? | *Chamaete cristata* | ? |
| ? | *Stenoleps lanceolata* | ? |
| ? | ? | Chosimbwe |
| ? | ? | |
| | Chiwowo,Chiwowa | |
| ? | ? | Kamilalumba |
| ? | ? | Kanamzuro |
| ? | ? | Kapilapila |
| ? | ? | Katele |
| ? | ? | Kigele |
| ? | ? | Mlima |

Source: Japan Overseas Forestry Consultants Association, 1997

## Appendix 2: Estimated Existing Animals in Nkhotakota Wildlife Reserve

| Animal Type | Estimated Animal Count |
|---|---|
| Buffalo | 601 |
| Bushbuck | 285 |
| Bush pig | 71 |
| Duiker | 1770 |
| Eland | 23 |
| African Elephant | 1037 |
| Grysbok | 32 |
| Hartebeest | - |
| Hippopotamus | - |
| Klipspringer | - |
| Kudu | 87 |
| Reedbuck | 351 |
| Roan | 424 |
| Sable | 181 |
| Warthog | 771 |
| Waterbuck | 244 |
| Zebra | 246 |
| Total | 6123 |

Source: Japanese Forestry Consultants Association, 1997

# Appendix 3: Survey Questionnaire

AN ASSESSMENT OF BIODIVERSITY CONTRIBUTION TO RURAL LIVELIHOOD SECURITY IN MALAWI: A CASE OF COMMUNITIES ALONG NKHOTAKOTA WILDLIFE RESERVE. QUESTIONNAIRE JIK©

**Enumerator:……District:..……**
**….……**

Village: ……T/A:
……..……

Date……../07/2006 Number:
……

PART I: HOUSEHOLD CHARACTERISTICS

1. Gender of household head
   □ Female □ Male
2. Marital status
   □ Married □ Divorced □ Widow/Widower □ Single □ Separated
3. Age
   □ 18-29 □ 30-39 □ 40-50 □ >50
4. Household size _____ persons
5. Literacy level
   □ Can read □ Can write □ Can not read & write

6. Education
   □PSLCE □JCE □MSCE □Other

**PART II: GEOGRAPHICAL INFORMATION**

7. Distance to main road: _____ km
8. Distance to primary school: _____ km
9. Distance to hospital: _____ km
10. Distance to water source: _____ km
11. Distance to the main trading centre (town) _____ km

**PART III: INCOME & ASSETS**

12. Land size owned: _____ hectare
13. Does this household own any livestock? □ Yes □ No
14a. How many of the following types of animals are owned by this household:

| **Livestock class** | **Number** | **Value (MK)** | **Other Value** |
|---|---|---|---|
| □ Cattle | | | |
| □ Pigs | | | |
| □ Sheep | | | |
| □ Goats | | | |
| □ Chicken | | | |
| others (specify) | | | |

14b. Livestock sales or barter

| Livestock class | sales 04/05 | barter 04/05 | sales 05/06 | barter 05/06 |
|---|---|---|---|---|
| □ Cattle | | | | |
| □ Pigs | | | | |
| □ Sheep | | | | |
| □ Goats | | | | |
| □ Chicken | | | | |
| Others specify | | | | |

15. Other assets

| Asset | Number | Value (MK) | Other value |
|---|---|---|---|
| Bicycle | | | |
| Oxcart | | | |
| others (specify) | | | |
| | | | |
| | | | |

16. List off-farm household income sources in 2005

| Male | Female | Amount(MK) |
|---|---|---|
| | | |
| | | |

17a. Are there absent household members[1] (relatives) who contribute income to this household?

□ Yes □ No

17b. If yes, how many? _____

17c. How much did they contribute (remittances)?

| Year | Amount (MK) | Other forms of contribution (in kind) |
|---|---|---|
| 2004/05 | | |
| 2005/06 | | |

18a. Does the family have any credit?

□ Yes □ No (if no proceed to question 13)

18b. If yes, mention

| Source of credit | Amount (MK) | Use of credit |
|---|---|---|
| | | |
| | | |

19a. Crops grown during season 04/05

| Crops grown | Yield (kg) | Crop sold (units)[2] | Amount (MK) | Market[3] | Seed Source* |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |

* 1 = Local (bought) 2 = Gift 3 = Formal market 4 = Own (farm-saved) 5 = Government/NGO program

[1] Household members being referred to are those living elsewhere

[2] Use local units eg 50 kg bags, standard pail (50 kg), ngolo etc, conversion will be done in the capital - LL

[3] Market refers to where the produce was sold

19b. Did you use any inorganic fertilizer during the season 04/05?

 Yes  No

19c. If yes, what kind of inorganic fertilizer, in what quantity and amount?

| **Fertilizer type** | **Quantity** | **Amount (MK)** |
|---|---|---|
| | | |
| | | |
| | | |

20a. Crops grown during season 05/06

| **Crops grown** | **Yield (kg)** | **Crop sold (units)[4]** | **Amount (MK)** | **Market[5]** | **Seed Source*** |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |

* 1 = Local (bought) 2 = Gift 3 = Formal market 4 = Own (farm-saved) 5 = Government/NGO programs

20b. Did you use any inorganic fertilizer during the season 05/06?

 Yes  No

20c. If yes, what kind of inorganic fertilizer, in what quantity and amount?

| **Fertilizer type** | **Quantity** | **Amount (MK)** |
|---|---|---|
| | | |
| | | |

21a. Did you face any stresses/shocks last year?

 Yes  No

21b. What kind of stresses/shocks have you faced and how have you coped with it?

| **Stresses /shocks** | **Coping/adapting strategy[6]** |
|---|---|
|  Drought | |
|  Livestock pest/disease outbreak | |
|  disaster | |
| poor governance | |
|  seasonal price changes | |
| others (specify) | |

22a. Are social relations (networks) important to this family

 Yes  No

22b. If yes, in what ways?

_____

_____

_____

**PART IV: FOOD SECURITY**

23a. How many days in a month do you eat the following foods?

[4] Use local units eg 50 kg bags, standard pail (50 kg), ngolo etc, conversion will be done in the capital - LL

[5] Market refers to where the produce was sold

[6] How they deal with stresses/shocks in short and long term basis

| **Food type** | **Number of meals per week** |
|---|---|
| □ Cereals | |
| □ Pulses | |
| □ Vegetables | |
| □ Fish | |
| □ Fruits | |
| □ Milk | |
| □ Meat | |

23b. How many meals do you eat per day? _____ meals per day.
23c. How many meals would you like to eat per day? _____ meals per day.
23d. What is in your opinion an adequate meal?
_____
_____
_____

24a. Does your food from own agricultural production last the whole year?
□ Yes □ No
24b. If no, how long does it last? (in months)
_____
_____
24c. How do you deal cope/(adapt) with/(to) this shortfall
_____
_____
_____
24d. How large is the difference in how many meals you eat per day depending on season?
_____
_____
24e. What are the main differences in the composition of meals you eat depending on season?
_____
_____
_____

**PART V: GOVERNMENT AND NON GOVERNMENTAL ACTIVITIES/SERVICES**

25. What activities and/or services carried out by Government ministries/departments are you aware of in this area?

| **Ministry/Department** | **Activity and/or service** |
|---|---|
| Health | |
| Agriculture | |
| Forestry | |
| Wildlife | |

26. What activities and/or services carried out by NGO's are you aware of in this area?

| **NGO** | **Activity and/or service** |
|---|---|
| Health | |
| Agriculture | |
| Forestry | |
| Wildlife | |

**PART VI: USE OF NATURAL RESOURCES**

27a. Are you aware of the existence of the Nkhotakota Wildlife Reserve?

□ Yes □ No

27b. If yes, are you aware of the purpose and functions of Nkhotakota Wildlife Reserve?

□ Yes □ No

27c. If yes, describe them.

_____
_____
_____

28a Do you know who is responsible for the management Nkhotakota wildlife Reserve?

□ Yes, _____ □ No

28b. Are you in some way involved in the management of Nkhotakota Wildlife Reserve?

□ Yes □ No (if no, proceed to 29)

28c. If yes, in what way?

_____
_____
_____

29. Are you aware of government ´s efforts to involve communities in forest and wildlife management and tangibly benefit from them?

_____
_____
_____

30a. Does Nkhotakota Wildlife Reserve, in your opinion, bring any benefits for you?

□ Yes □ No

30b. If yes, what are the benefits from the Nkhotakota Wildlife Reserve for you?

| **Benefits/products** | **Level of benefit** |
|---|---|
| | □ High □ Medium □ Low |
| | □ High □ Medium □ Low |
| | □ High □ Medium □ Low |
| | □ High □ Medium □ Low |

30c. During which months of the year is extraction/harvesting/hunting the highest?

_____
_____

30d. What are the reasons for this trend?

_____
_____
_____

30e. Which of these products are sold?

_____
_____
_____

30f. Where is the market for the products?

_____
_____
_____

30g. How do you use the proceeds from sales

_____
_____
_____

30h. Have you encountered any problems with the management of the Nkhotakota Wildlife Reserve?

□ Yes □ No

30i. If yes, in what way?

_____
_____
_____
_____

31a. What species are you using and for what purpose?

| **Species**[7] | **Purpose*** | **Effort**[8] **level** (for past 10 years) |
|---|---|---|
| | | □ increased □decreased □ stable |
| | | □ increased □decreased □ stable |
| | | □ increased □decreased □ stable |
| | | □ increased □decreased □ stable |
| | | □ increased □decreased □ stable |

*medicine, firewood, construction, food,…

31b. How accessible are these species and can you tell us if the accessibility (effort) has increased, decreased or been stable over time? [***answered by ticking Effort level column above***]

32a. Does Nkhotakota Wildlife Reserve, in your opinion, mean any losses for you?

□ Yes □ No

32b. If yes, what are the losses from the Nkhotakota Wildlife Reserve for you?

| **Losses** | **Level of loss** |
|---|---|
| | □ High □ Medium □ Low |
| | □ High □ Medium □ Low |
| | □ High □ Medium □ Low |
| | □ High □ Medium □ Low |

33a. In your opinion, does the Nkhotakota Wildlife Reserve contribute to improvement of your lives?

□ Yes □ No

33b. If yes, describe in what ways

i. food

_____
_____
_____

ii. clean water

_____
_____
_____

iii. medicine

_____

[7] Species refers to both plants and animals. Indicate local names as mentioned by respondents.

[8] Effort means the time spent to collect/harvest/hunt bush meat and non timber forest products.

_____
_____
_____

iv. economic opportunities
_____
_____
_____

v. education support
_____
_____
_____

vi. infrastructural development (construction materials)
_____
_____
_____

vii. energy (fuel wood)
_____
_____
_____

34a. Are you satisfied with how the Nkhotakota Wildlife Reserve is managed?
□ Yes □ No

34b. If yes, in what ways?
_____
_____
_____

34c. If no, what could/should in your opinion be done to improve the management of the Nkhotakota Wildlife Reserve?
_____
_____
_____

**PART VII: REGULATIONS AWARENESS**

35a. Are you familiar with KKWR regulations?[9]
□ Yes □ No

35b. Were you consulted during the formulation of the regulations?
□ Yes □ No

36a. Do you abide by the regulations when you utilize wildlife?
□ Yes □ No

36b. If yes, how?
_____
_____
_____

36c. If no, why not?
_____
_____
_____

[9] Make reference to question 29

36d. Do you think the Wildlife legislation confers adequate resource user rights to communities?
□ Yes □ No
36e. If no, how?
_____
_____
_____

36f. What issues concerning the reserve would you want to have autonomy and rights to handle by yourselves?
_____
_____
_____
37. Do you think the government is fully committed to devolving rights for natural resource ownership and use to local communities?

**VIII: LOCAL COMMUNITY INSTITUTIONS AND CAPACITY TO MANAGE NATURAL RESOURCES**

38a. Are you aware of any community base natural resources management programmes?

□ Yes □ No

38b. If yes, which ones?
_____
_____
_____
39. Are there any local community institutions that would guide Community Based NRM programmes in this area?
_____
_____
_____

40. Do you think communities have capacity to implement CBNRM programmes?
_____
_____
_____
41. Do communities need a code of conduct to regulate use of wildlife?
_____
_____
_____

42. What is your general opinion of Nkhotakota Wildlife Reserve?
_____
_____
_____

**Thanks for Sparing Your Precious Time to Answer these Questions**

# Appendix 4: Socioeconomic and Demographic Data of Respondents

| Characteristics | Group | Traditional Authority | | | Total (%) |
|---|---|---|---|---|---|
| | | Kanyenda* | Malenga Chanzi* | Mphonde* | |
| *Gender* | Females | 7 (16, 3%) | 9 (14,1%) | 19(25,0%) | 35 (19.1%) |
| | Males | 36 (83,7%) | 55(85,9%) | 57(75,0%) | 148 (80.9%) |
| | | | | | |
| *Age* | 18 – 29 years | 11 (25,6%) | 21(32,8%) | 21(27,6%) | 53 (29.0%) |
| | 30 – 39 years | 11 (25,6%) | 10(15,6%) | 15(19,7%) | 36 (19.7%) |
| | 40 – 50 years | 13 (30,2%) | 23(35,9%) | 21(27,6%) | 57 (31.1%) |
| | > 50 years | 8 (18,6%) | 10(15,5%) | 19(25,0) | 37 (20.2%) |
| | | | | | |
| *Education* | No education | 28 (60,5%) | 26(40,6%) | 42(55,3%) | 94 (51.4) |
| | < PSLCE | 8 (18,6%) | 4(6,3%) | 0(0,0%) | 12 (6.6%) |
| | PSLCE | 3 (7,0%) | 21(32,8%) | 26(34,2%) | 50 (27.3%) |
| | JCE | 5 (11,6%) | 9(14,1%) | 8(10,5%) | 22 (12.0%) |
| | MSCE | 1 (2,3%) | 4(6,3%) | 0(0,0%) | 5 (2.7%) |
| | | | | | |
| *Household size* | 1- 4 people | 14 (32,6%) | 20(31,3%) | 18(23,7%) | 52 (28.4%) |
| | 5 – 8 people | 22 (51,2%) | 26(40,6%) | 38(50,0%) | 86 (46.9%) |
| | 9 – 12 people | 5 (11,6%) | 18(28,1%) | 20(26,3%) | 43 (23.5%) |
| | > 12 people | 2 (4,7%) | 0(0,0%) | 0(0,0%) | 2 (1.1%) |
| | | | | | |
| *Land holding size* | < 1 ha | 30 (69,8%) | 31(48,4%) | 38(50,0%) | 99 (54.1%) |
| | 1 – 2 ha | 9 (20,9%) | 28(43,8%) | 32(42,1%) | 69 (37.7%) |
| | 3 – 4 ha | 4 (9,3) | 1(1,6%) | 3(3,9%) | 8 (4.4%) |
| | > 4 ha | 0 (0,0%) | 4(6,3%) | 3(3,9%) | 7 (3.8%) |
| | | | | | |
| *Literacy* | Illiterate | 10 (23,3%) | 13(20,3%) | 26(34,2%) | 49(26,8%) |
| | Literate | 33 (76,7%) | 51(79,7%) | 50(65,8%) | 134(73,2%) |
| | | | | | |
| *Livestock ownership* | No | 12 (27,9) | 11(17,2%) | 26(34,2%) | 49(26,8%) |
| | Yes | 31 (72,1%) | 53(82,8) | 50(65,8%) | 134(73,2%) |

Note:

* Distribution percentage (%) within Traditional Authority

PSLCE (Primary School Leaving Certificate of Education) refers to a certificate obtained after successfully finishing primary school

JCE (Junior Certificate of Education) refers to a certificate obtained midway secondary school

MSCE (Malawi School Certificate of Education) an equivalent of British General School Certificate of Education O level

# Appendix 5: Logistic Regression Results Tables

TA= Traditional Authority; M-CH= Malenga Chanzi; KANY = Kanyenda; LVSTK = Livestock;
SGC = sheep, goats and chickens; LITLEVEL= literacy; lit= literate; EDU = Educational level; PSLCE = Primary School Certificate of Education; JCE = Junior Certificate of Education; MCE = Malawi Certificate of Education; AGE 18-29 = Age group of 18 – 29 years; AGE 30-39 = Age group of 30 – 39 years; the underlined are independent variable categories; B = logistic regression estimated coefficient; S.E = Standard Error; p value = significance; Exp (B) = logistic regression expected coefficient; $\chi^{2}$ = Chi-square value; and Nagelkerke's R-Square ($R^2$) = measures strength of association/indicates the relative contribution of each independent variable to the model in explaining the variance of the dependent model.

Table I Logistic regression analysis showing factors affecting KKWR income accruals

| **Area** | **Variables in the equation** | | | | | **Final logistic model** | | | |
|---|---|---|---|---|---|---|---|---|---|
| Whole study Area | Independent variable | B | S.E | Wald | *p* value | Exp(B) | $\chi^2$ | *p* value | $R^2$ |
| | TA M-CH | -1,370 | 0,371 | 13,634 | 0,000 | 0,254 | 23,926 | 0,000 | 0,165 |
| | LITLEVEL lit | -0,768 | 0,363 | 4,468 | 0,035 | 0,464 | | | |

Table II Logistic regression analysis showing factors affecting KKWR resources as food for own consumption

| **Area** | **Variables in the equation** | | | | | **Final logistic model** | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Independent variable | B | s.e | Wald | *p* value | Exp(B) | $X^2$ | *p* value | $R^2$ |
| Whole area | TA -M-Ch | -2,580 | 0,432 | 35,682 | 0,000 | 0,076 | 97.648 | 0,000 | 0,586 |

Table III Logistic regression analysis showing factors affecting KKWR resources derivation of education support benefits

| **Area** | | | **Variables in the equation** | | | **Final logistic model** | | | |
|---|---|---|---|---|---|---|---|---|---|
| Whole area | Independent variable | B | S.E | Wald | *P* value | Exp(B) | $\chi^2$ | *p* value | $R^2$ |
| | TA –M-CH | -3,151 | 0,677 | 21,662 | 0,000 | 0,043 | 111,165 | 0,000 | 0,614 |
| | LITLEVEL | -1,471 | 0,534 | 7,590 | 0,006 | 0,230 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | lit | | | | | | | | |
| | LVSTK SGC | -1,367 | 0,622 | 4,824 | 0,028 | 0,255 | | | |
| | AGE 30-40 | 2,326 | 0,787 | 8,734 | 0,003 | 10,240 | | | |
| | FERTUS YES | -1,072 | 0,497 | 4,652 | 0,031 | 0,342 | | | |

Table IV Logistic regression analysis showing factors affecting medicinal benefits

| **Area** | **Variables in the equation** | | | | | **Final logistic model** | | | |
|---|---|---|---|---|---|---|---|---|---|
| Whole area | Independent variable | B | s.e | Wald | *p* value | Exp(B) | $\chi^2$ | *p* value | $R^2$ |
| | TA - KANY | 1,048 | 0,457 | 5,269 | 0,022 | 2,853 | 52,097 | 0,000 | 0,334 |
| | TA -M-CH | -1,121 | 0,356 | 9,927 | 0,002 | 0,326 | | | |
| | EDU PSLCE | -1,808 | 0,932 | 3,760 | 0,052 | 0,164 | | | |

Table V Logistic regression analysis showing factors affecting KKWR resources for infrastructural development

| **Area** | **Variables in the equation** | | | | | **Final logistic model** | | | |
|---|---|---|---|---|---|---|---|---|---|
| Whole area | Independent variable | B | s.e | Wald | *p* value | Exp(B) | $\chi^2$ | *p* value | $R^2$ |
| | TA - M-CH | -1,338 | 0,479 | 7,796 | 0,005 | 0,262 | 71,081 | 0,000 | 0,434 |
| | LITLEVEL lit | -0,896 | 0,429 | 4,364 | 0,037 | | | | |
| Kanyenda | LITLEVEL lit | -3.366 | 1,262 | 7,112 | 0,008 | 0,035 | 29,129 | 0.002 | 0.851 |
| Mphonde | EDU PSLCE | 0,767 | 1,212 | 0,401 | 0,527 | 2,154 | 9,616 | 0,008 | 0,267 |
| | EDU JCE | 2,639 | 1,254 | 4,432 | 0,035 | 14,000 | | | |

Table VI Logistic regression analysis showing factors affecting losses due KKWR proximity

| **Area** | **Variables in the equation** | | | | | **Final logistic model** | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Independentv ariable | B | s.e | Wald | *p* value | Exp(B) | $\chi^2$ | *p* value | $R^2$ |
| M-Chanzi | HHSI (5-8) | 4,248 | 1,293 | 10,799 | 0,001 | 70,000 | 40,261 | 0,000 | 0,773 |
| Mphonde | AGE(18-29) | -2.639 | 1,201 | 4,827 | 0,028 | 0.071 | 9,373 | 0,025 | 0,267 |

Table VII Logistic regression analysis showing factors affecting KKWR regulations use

| **Area** | **Variables in the equation** | | | | | **Final logistic model** | | | |
|---|---|---|---|---|---|---|---|---|---|
| Whole area | Independent variable | B | s.e | Wald | *p* value | Exp(B) | $\chi^2$ | *p* value | $R^2$ |
| | LVSTKCL PG | 1,354 | 0,531 | 6,510 | 0.011 | 3,872 | 42,593 | 0,000 | 0,300 |
| | EDU JCE | -1,590 | 0,771 | 4,287 | 0.038 | 0,203 | | | |
| | EDU MCE | -2,554 | 0,947 | 7,280 | 0.007 | 0,078 | | | |
| | LITLEVEL lit | -1,824 | 0,543 | 11,275 | 0.001 | 0,161 | | | |

Table VIII Logistic regression analysis showing factors affecting KKWR regulations familiarity

| **Area** | **Variables in the equation** | | | | | **Final logistic model** | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Independent variable | B | s.e | Wald | *p* value | Exp(B) | $\chi^2$ | *p* value | $R^2$ |
| Whole area | EDU JCE | -3,047 | 1,460 | 4,356 | 0,037 | 0,048 | 70,402 | 0,000 | 0,439 |
| | EDU MCE | -3,167 | 1,678 | 3,564 | 0,059 | 0,042 | | | |
| M-Chanz | AGE (18-29) | 2,909 | 1,274 | 5,209 | 0,022 | 18,333 | 12,805 | 0,005 | 0,330 |
| | AGE (30-39) | 2,708 | 1,282 | 4,460 | 0,035 | 15,000 | | | |

# Appendix 6: KKWR Resources Collection Permit

**FORM 1: RESOURCE HARVESTING PERMIT**

*(DNPW STAMP)*

PERMIT NO:……NAME OF ASSOCIATION/CBO……...
VILLAGE HEADMAN:……TA……..DISTRICT:…….....
VALID FOR:…DAYS (MAXIMUM OF 7 DAYS) FROM..:TO:……
GROUP LEADER:…..NUMBER OF PEOPLE (MAXIMUM OF 10 PEOPLE):.....

**NAMES OF RESOURCE USERS:**

1) ……M/F
2) ……M/F
3) ……M/F
4) ……M/F
5) ……M/F
6) ……M/F
7) ……M/F
8) ……M/F
9) ……M/F
10) ……M/F

**RESOURCES PERMITTED:**

| | |
|---|---|
| 1) READS | 2) BAMBOOS |
| 3) FISH | 4) THATCH GRASS |
| 5) MEDICINAL PLANTS | 6) TERMITES |
| 7) FRUITS | 8) MUSHROOMS |
| 9) PALM LEAVES | 10) HONEY |
| 11) SOIL | 12) FIREWOOD |

RESOURCES TO BE COLLECTED: 1)…….2)……...
LOCATION: ……..
GENERAL ACCEPTED TOOLS:1)…….2)…….3)…….
UNIT OF MEASUREMENTS: 1)…….2)…….....
ENDEMITY

Resource collectors shall enter protected area at their own risk hence no action shall lie against Government for any damage, injury, or death caused to any person or property whilst in the Wildlife Reserve.

The Director or any other officer shall not be held responsible in damages or otherwise to any person by reasons of his exercise or non-exercise in good faith of the powers vested in him under the National Parks and Wildlife Act.

Note:

*After resource collection this form shall be returned to the Chairman of the Association who in turn must submit to the Reserve authority.*

Issuing Officer: ……..Signature: ……...

Date: ……..Association stamp:

**THIS COPY OF PERMIT IS ONLY A SAMPLE, AND THEREFORE NOT ORIGINAL**