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DECLARATION

I, Gloria Johannes Wapalila, declare that this thesis is a result of my research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

Signature.....

Date.....

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ABSTRACT

In many developing countries there are disputes related to the small contribution of national parks and other categories of wildlife protected areas in sustaining livelihoods of the local communities living adjacent to these areas compared to other land use practices. This difference in contribution may cause local communities to have a negative attitude towards wildlife conservation.

This study was done in five villages allocated adjacent to Mikumi national park in order to examine impacts of Mikumi National Park on people's livelihoods, particularly regarding benefits and costs. Additionally the study identified source, triggers and impacts of conflicts on the people's livelihoods and wildlife conservation.

Household survey questionnaires, focused groups discussions, field observations and secondary data from different sources were used to collect information. The data were analyzed using SPSS, STATA, MINITAB and simple descriptive statistics. Local communities' livelihoods were assessed using the sustainable livelihood framework; Household income was calculated by aggregating all households' income sources. Environmental dependency and relationship between household total income and environmental income was investigated using simple linear regression. Sources triggers and impacts of human wildlife conflicts were identified and discussed.

The results revealed that farming was the main livelihood activity for 67.2% of the interviewed households. Other income generating activities found were: seasonal labour (work on other villager's farm), crop and non crop businesses, local beer brewing and formal employment (teaching and nursing). The households income was estimated to be 125,964,000 Tshs per year, which is equal to 2800 Tshs, or 2.3 USD per day. In addition to that calculation of Gini coefficient showed 50% income inequality.

Regarding the environmental income, the study revealed low contribution of environmental income (3.07%) to the total household income because of legal restrictions on consumptive use of the natural resources. However, data analysis revealed that 89% and 48% of the interviewed households depended on firewood and collection of building poles, respectively.

Crop damage by wild animals was the main conflict found in the study area affecting 44% of the surveyed households. On average 11.6% of the total household income was lost due to crop damage. The majority who got crop damage were low income households, who also tended to have farms closer to MINAPA. The findings also revealed a relationship between amount lost and village distance, Crop damage magnitude decreases as the village distance from MINAPA increases.

Based on the findings in this study, a number of recommendations were made, such as sharing of park income with nearby villagers, compensation to villagers for the crop loss, conflict resolution and effective participation of local community in policy planning and implementation for sustainable management of wildlife in protected areas.

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ACRONYMS AND ABBREVIATIONS

ABRU	Animal Behaviour Research Unit – Mikumi Tanzania
CBRNM	Community Based natural resources Management
GCA	Game Controlled areas
GR	Game Reserve
GDP	Gross Domestic Products
MINAPA	Mikumi National Parks
MNRT	Ministry of Natural resources and Tourism
NCA	Ngorongoro Conservation Area
NP	National Park
PAs	Protected Areas
SACCOS	Savings and Credit Cooperative Societies
SCIP	Support for Community Initiated Projects
TANAPA	Tanzania National Parks
TAWICO	Tanzania Wildlife Cooperation
VPO	Vice President Office
WD	Wildlife Department
WMA	Wildlife Management Areas

CHAPTER 1

1.1 Introduction

In recent decades there has been a growing interest of improving rural livelihoods in developing countries within the broad framework of rural development. Emphasis has been placed on understanding the socio-economic aspects of rural households in a view to improving them. Following (Ellis 2000) livelihoods concern with the things people do to earn a living (Chambers and G 1991) elaborate the concept of livelihood as to comprise people, their capabilities and their means of living, including food, income and assets. Some assets are tangible such as resources and stores while others are intangible and these may include things like claims and access.

Different categories of protected areas exist, which vary by level of protection, management objective and enabling laws, rules or regulations (IUCN 1994). Definition of a protected areas adopted by IUCN describes protected areas as areas of land or sea dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, managed through legal or other effective means. Protected areas and park managements are the predominant methods of wildlife and wild lands protection (Hill, Osborn et al. 2002).

In most cases there is a direct relationship between protected areas and local people's livelihoods. Local people cannot be expected to provide support to existence of protected areas if the conservation has negative impacts on their livelihoods (Marshall 1995). Therefore, long-term effectiveness of protected areas requires thorough assessment and support of local people who experience the direct impacts of the establishment and management of those areas (Marshall 1995).

1.2 Background

Tanzania has unparalleled natural resources (William 2000). About one third of the country's total area is protected to a certain degree as National Parks, Game Reserves, Marine Parks and Forest Reserves, which make it one of the countries with the most

extensive protected area network in Africa (Williams 2000). All these natural resources play a big role in the economy of the country in terms of social and economic goods and services.

Currently about 24% of Tanzanian total land is wildlife protected areas (PAs) of which 17.4% consist of the 14 national parks (NPs) and 34 game reserves (GRs). About 6.4 % of the land is under the Ngorongoro Conservation Area (NCA) and 38 game controlled areas (GCAs). In NCA and GCAs wildlife co-exists with humans whereas in NPs and GRs human settlement is not allowed (MNRT, 2007). A number of the country's wildlife protected areas are well-known internationally. Examples are Serengeti national park, Ngorongoro Conservation Area and Selous game reserve. Selous game reserve has been selected as World Heritage Site while Serengeti, Lake Manyara and Ngorongoro are Biosphere Reserves (Songorwa 2004).

Three institutions/agencies co-operating under the Ministry of Natural Resources and Tourism are in charge of these wildlife protected areas. They include Tanzanian National Parks (TANAPA), which is responsible for protection and maintenance of the national parks, the Wildlife Division, which oversees several game reserves and game controlled areas, and Ngorongoro Conservation Area Authority, which manages the Ngorongoro caldera and its surroundings. Like in NPs in the NCA hunting is not allowed, but the Maasai are allowed to live and graze their cattle (Songorwa 2004).

The forms of wildlife utilization currently practiced in Tanzania are game viewing, tourist or trophy hunting, resident hunting (for resident citizens and non-citizens), ranching, breeding and farming, and eco-tourism (MNRT 2007) Game viewing is presently practiced mainly in NPs and NCA. It is the potential earner of local and foreign currency in the country and also provides employment to local people.

Tourist or trophy hunting is an economically viable and potentially sustainable form of wildlife utilization. Currently tourist hunting is generally practiced in game reserves (but

not all), game controlled areas, forest reserves, wetlands and open areas (areas outside protected areas).

Resident hunting is mainly conducted in open areas and GCAs, which are not used for tourists hunting. Tanzanians and resident non-Tanzanians with legal hunting licenses have access to this type of wildlife use. Scales of hunting fees differ for tourists and residents (MNRT 2007).

Wildlife breeding, ranching and farming exist but are not well developed. The Wildlife Policy of Tanzania (MNRT 1998) encourages the private sector to invest in wildlife ranching and farming. Since the privatization of Tanzania Wildlife Corporation (TAWICO), the Tanzanian government does not engage in direct wildlife utilization other than collecting hunting fees. That is why priorities have been given to the private sector. These forms of utilization are the basis of the country's social and economic development through provision of employment, generation of foreign currency and market for local commodities (MNRT 2007).

The Wildlife Conservation Act No. 12 of 1974 is still the principal legislation governing wildlife utilization outside NPs and NCA. The Act allows communities to be involved in consumptive utilization under the banner of authorized associations (Section 26) However, NPs remain conservative in terms of consumptive use of natural resources (Barrow 2000; Sjaastad 2003). The task of protecting wildlife and its habitats gets more and more difficult as a result of increase of human population and demand for more land for agriculture and settlements. These contributed to encroachment of PAs and other wildlife-rich areas due to expansion of settlements, extensive agriculture, livestock grazing, bush fires, deforestation and increased poaching.(Songorwa 2004).

There are 14 established national parks managed by TANAPA. The primary role of those national parks is conservation. A large part of the eco-regions has been preserved to

provide secure breeding sites for flora and fauna and protection from conflicting interests originating from growing human population (TANAPA 2008).

The current Wildlife Policy was adopted by government in 1998 to effectively address wildlife conservation, management and development problems. The policy, however, declared state control and ownership of wildlife resources (MNRT, 1998). Persistent state ownership and control of wildlife resources is reported to be one of the primary sources of natural resource conflicts in many parts of Tanzania (Shauri 1999).

In many parts of the country there are conflicts with wildlife over damage to crops and property reported by rural people, and crop damage by wildlife is the major cause of human-wildlife conflicts in areas where protected areas boarder with agricultural lands (Gillingham and Lee 2003). This presents a dilemma to the management authorities faced with the demand of local communities to have control on wild-animals.

1.3 Problem Statement and Justification

Establishment of NPs and other forms of PAs in one way enables Tanzania to earn local and foreign currencies and also to prevent biological diversity from being destroyed by development and unsustainable land use activities. On the other hand it restricts access to the land and valuable resources to rural communities, which for a long time used the lands for cultivation, pasture and for other livelihood activities (Skonhoft 1998).

Many PAs are located in economically sensitive areas, e.g. wildlife-rich areas, heavy forests etc., which is a source of conflicts with local people. Several issues make wildlife conservation a challenge in Tanzania, one being socio-economic status of the local communities living adjacent to wildlife PAs. The other challenge faced by most NPs and other wildlife PAs is the small contribution of the wildlife sector in sustaining local communities' livelihoods compared to other land use practices. As a result, local people perceive wildlife conservation as a legal responsibility rather than an economic and social advantage or opportunity (Shemwetta and Kideghesho 2000).

For a better solution to be reached to humans and wildlife, actual causes and sources of the problems must be identified together with the critical ways of reducing or mitigating them. Consequently, new and better land-use management practices and policies must be found, to minimize the conflicts that arise when the needs of wildlife and of people clash. This should help people and wildlife share the same landscapes. Efficient wildlife conservation depends on cooperation and support of local people to the conservation. This study gives a better understanding of the relationship between NPs and surrounding local communities in terms of costs and benefits people are getting. Furthermore, the study identifies causes and impacts of conflicts to wildlife and local community livelihoods together with suggesting ways of reducing the conflicts in villages surrounding Mikumi national park, bearing in mind conflict resolution is essential for sustainable wildlife conservation (Conover 2001). If taken into consideration the study may contribute to sustainable conservation of wildlife and poverty reduction in villages surrounding Mikumi national park.

1.4 Objectives of the study and research questions

This study examines impacts of Mikumi National Park on people's livelihoods specifically on benefits and costs to local people, causes and impacts of conflicts on the people's livelihoods and wildlife condition. Under this overall objective, below are specific objectives and research questions.

1. To assess present livelihoods and estimate household total income from different income-generating activities

- (i) What are the present livelihood strategies of the people living adjacent to Mikumi national park (MINAPA)?
- (ii) What is the total household income from crop production, livestock and poultry products, self employed activities and business, wage labour and remittance?

- (iii) What is the percentage contribution of different livelihood activities to total household income?

2. To estimate household environmental income and dependency

- (i) What is the contribution of environmental income to total household income?
- (ii) How much do the households depend on environmental income?
- (iii) How are environmental incomes distributed among households?
- (iv) What are the benefits villagers are getting from MINAPA?

3. To estimate costs household arising because of MINAPA

- (i) What is the total household cost arising from animals and crops lost to and human injuries from wildlife in year 2007?
- (ii) What is the relationship between household costs and village distance from MINAPA?

4. To explore main conflicts between local people and MINAPA

- (i) What are the main types of conflict, which exist in the park?
- (ii) What are the main causes and triggers of conflicts?
- (iii) What are the main outcomes of the conflicts in terms of local people's livelihoods and in wildlife conservation?
- (iv) How are conflicts resolved?

CHAPTER 2: LITERATURE REVIEW

2.1 Wildlife Management in Tanzania

2.1.1 Historical background

In Tanzania, history of formal wildlife management started in the colonial era, in 1891 when German rulers enacted the first laws to regulate off take, hunting methods, trade in wildlife and to fully protect endangered species (MNRT 1998). As a result, in 1905, the first game reserves, which now form part of Selous game reserve were, established (MNRT 2007). Selous was gazetted as the first game reserve by British colonial rulers in 1922, followed by establishment of Ngorongoro crater in 1938 and Serengeti game reserve one year later. Game controlled areas were established by the British colonial government in 1946 for the purpose of hunting trophy animals.

2.1.2 The Arusha Manifesto

After independence in 1961, Mwalimu Julius Nyerere, who was the first President of Tanganyika, released the Arusha Manifesto, which states that:

“The survival of our wildlife is a matter of grave concern to all of us in Africa. These wild creatures amid the wild places they inhabit are not only important as a source of wonder and inspiration but are an Integral part of our natural resources and of our future livelihood and well being. In accepting the trusteeship of our wildlife we solemnly declare that we will do everything in our power to make sure that our children’s grand-children will be able to enjoy this rich and precious inheritance. The conservation of wildlife and wild places calls for specialist knowledge, trained manpower, and money, and we look to other nations to co-operate with us in this important task the success or failure of which not only affects the continent of Africa but the rest of the world as well.”
(MNRT 1998: page 2).

Since then the famous Arusha Manifesto became a useful tool for wildlife conservation in the country together with guidelines, regulations and laws implemented by Wildlife Division and other responsible institutions (MNRT 1998).

2.1.3 Wildlife policy

After the Arusha Manifesto, the Wildlife Policy of Tanzania of 1998 became the first documented and inclusive policy for wildlife conservation and development (MNRT 2007). The policy aims to involve society in wildlife conservation, management and development. This came after recognizing some challenges confronted by the sector one of them being high human population growth.

The policy has the following five objectives:

1. To protect and conserve wildlife
2. To promote sustainable utilization of wildlife
3. Better management and development of wildlife resources
4. To strengthen wildlife resource monitoring and research
5. to enhance community education and public awareness about wildlife

The policy made new institution arrangement to ensure efficient and effective wildlife management. Central government was given role of providing clear national policy and regulatory framework, together with the task of promoting public participation towards policy implementation. Other stakeholders like private sector, non-governmental organizations (NGOs) and the public were given roles of supporting conservation, management and sustainable utilization of wildlife (MNRT 2007).

2.2 National Park Management

2.2.1 Tanzanian National Parks

Like all other NPs, MINAPA is managed by TANAPA. TANAPA was established on 1st of July 1959 according to National Parks Ordinance Chapter 412 – Supp. 59 which states: *“An ordinance to provide for the establishment control and management of National Parks and for purposes connected therewith, and to repeal the National Parks Ordinance”* (TANAPA 2007).

Being a parastatal organization with the primary role of conservation, TANAPA administers controls and regulates 14 NPs by controlling poaching, promoting tourism, maintaining park ecology and other management-related work (TANAPA 2007).

2.2.2 Income from NPs

Wildlife is an important sector in Tanzania for current and prospective revenue generation. Its contribution to GDP is estimated to be between 7% and 10% (show source). Income generation by TANAPA and NCAA is through game-viewing while income generated by Wildlife Division is through hunting, capture of live animals, sale of trophies and sale of licenses.

Table 1: Estimated annual revenue and numbers of tourists by parks (July 2005 to June 2006) (source: TANAPA, 2007).

	<i>Park</i>	<i>Foreign visitors</i>	<i>Domestic visitors</i>	<i>Total visitors</i>	<i>Total Revenue 1000 Tshs</i>
2	Arusha	23481	24680	48161	1,468,670, 123
3	Gombe	521	237	758	138,748,810
4	Katavi	1042	495	1537	98,283,245
5	Kilimanjaro	38631	1843	40474	19,723,632,070
6	Lake Manyara	94942	31356	126298	2,886,405,008
7	Mahale Mountains	1149	6987	8136	260,922,598
8	Mikumi	7071	13719	20790	349,771,657
9	Ruaha	10740	7438	18178	534,401,526
10	Rubondo Island	383	1041	1424	33,543,354
11	Saadani	1140	756	1896	54,038,030
12	Serengeti	127682	115648	243330	14,517,305,762
13	Tarangire	67940	53623	121563	2,887,932,646
14	Udzungwa Mountains	1276	5207	6483	60,643,427
Total		375,998	263,030	639,028	43,014,298,256

2.3 Rural livelihoods

According to (Ellis 2000) livelihood consists of assets (natural, physical, financial, human and social capital), the activities and access to these (mediated by institutions and social relations) that, together, determine the living gained by the individual or household. Access to assets, for example land, together with the crop production activities and other income generating activities, determines the living gained by a household or an individual. In most cases choice of activities is highly dependent on the availability and access to assets. The concept of livelihood is better understood when viewed as a component of rural development considering that even wildlife resources occur in rural landscapes.

However, because rural development is today described and sought consistent with environmental constraints and social context in the target areas, the concept of livelihood tends to evolve with it. At its simplest, the livelihood has to be sustainable with respect to both environmental and social domains.(Mbile 2005) A livelihood is environmentally sustainable when it maintains or enhances the local and global assets on which it depends, and has net beneficial effects on other livelihoods. Furthermore, livelihood needs to be socially sustainable meaning that it can cope with and recover from stress and shocks, and provide for future generations.(Chambers and G 1991; Ellis 1998)

2.3.1 Framework for livelihood Analysis

Framework for livelihood analysis considers assets, meditating processes, trends, shocks and activities as components and processes contributing to rural livelihood strategies (Chambers and G 1991; Ellis 2000). Assets are stocks of capital that can be utilized straight to make survival means or sustain material wellbeing at different level above survival to households. The framework (Figure 1) starts with assets owned or controlled by the household. From these assets the households are able to undertake production, engage in labour markets and participate in exchange with other households (Ellis 2000). Livelihoods framework can be used to guide micro policies, which aim to reduce rural poverty and also in tracing impacts of micro policies at ground level.

Sustainable rural livelihoods concept is becoming a popular concept in rural development and natural resources debate (Scoones 1998). This study uses the sustainable rural livelihood framework to analyze main factors affecting livelihoods of the people living adjacent to MINAPA. The analysis shows that livelihoods are achieved through access to natural, physical, financial, human and social capital and pursuit of livelihood strategies. Moreover, the framework analyzes how formal and informal organizations and institutional factors influence sustainable livelihood outcomes.

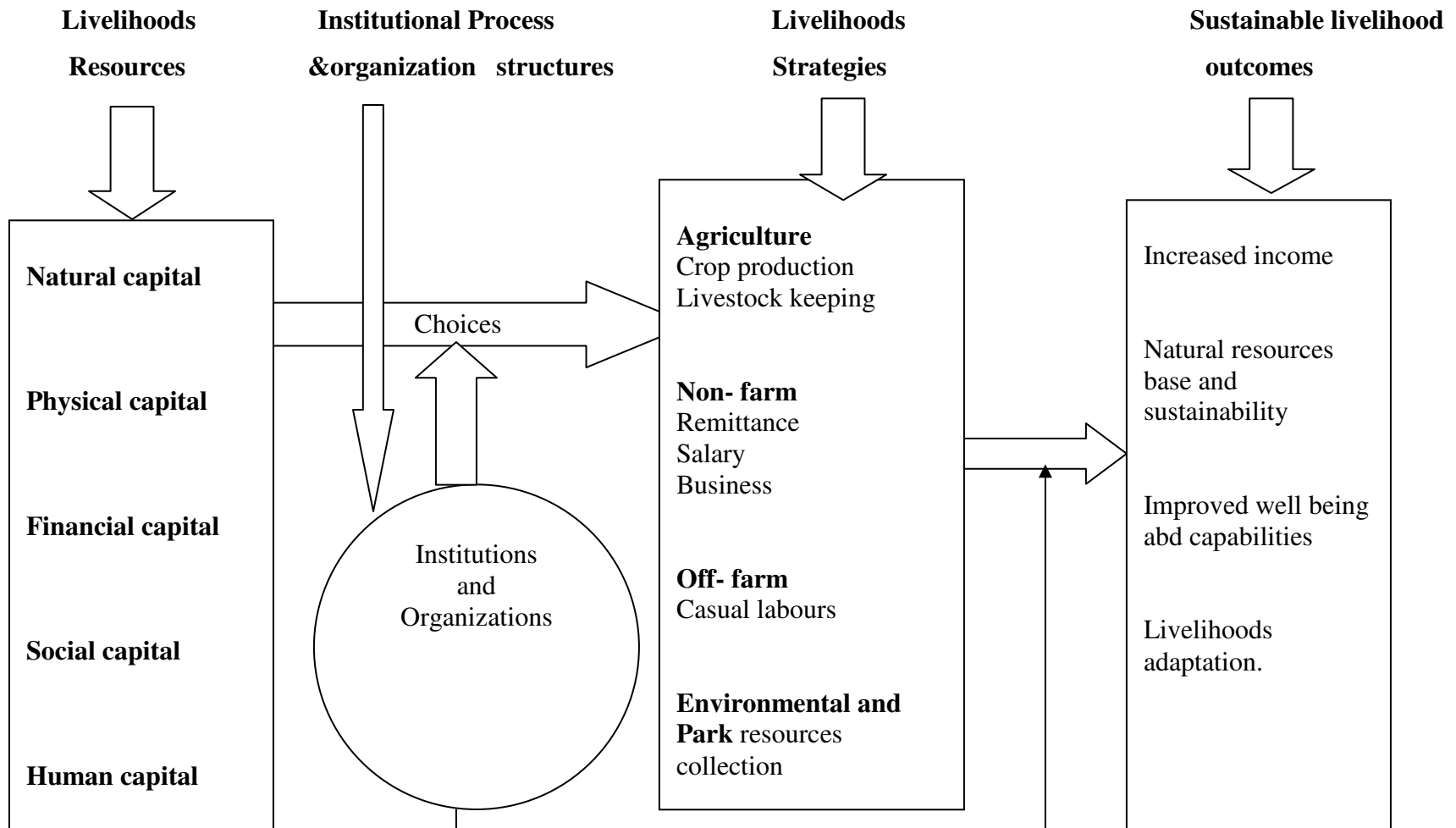


Figure 1: Modified sustainable rural livelihoods framework (Source: (Scoones 1998))

2.4 Livelihoods Resources (Capital)

Access to livelihood resources determines household's ability to pursue various livelihoods strategies (Ellis 2000; Ellis and Freeman 2004). To create livelihoods normally households combine different capital endowments that they have access to and control over (Scoones 1998). This means access to stocks of these resources can be used directly or indirectly to generate means of survival for the households. According to (Ellis 2000), capital is classified into five groups, natural, physical human, financial and social capital.

2.4.1 Natural capital

Consists of natural resource stocks (land, water, air and biological resources) that are utilized by people to generate means of living. From the concept it means wildlife is a natural capital, which can be used by people to generate income for better living. Generating income from wildlife varies; it can be by non-consumptive means by obtaining income through game viewing or consumptive through hunting or capture and sale of live animals and/or trophies. Natural capital can further be classified as renewable and non-renewable resources. Renewable resources replenish themselves over time e.g. fishery and wildlife. Non-renewable resources are those, which can be permanently depleted and cannot be replenished examples include minerals and oil stocks.

2.4.2 Physical capital

Physical capital is the capital created by economic production processes or producer good commonly known in economics. Physical capitals are useful assets in the production process. Examples of physical capital are buildings, irrigation systems, roads etc. Physical assets are important in facilitating livelihoods and livelihood diversification. For example, roads have a greater role of facilitating movements of goods and people in and out of the area. From the experience gained in the five villages visited, it shows that good physical assets especially road and communication systems have positive impacts on local people's livelihoods and vice versa.

2.4.3 Human Capital

Human capital consists of skills, education, health and human labour available. It also includes knowledge, good health and physical capability important for pursuit of different livelihoods activities (Scoones 1998). Human capital can be increased by investments in education and trainings. Labour resource is important in a situation where there is little or no labour market. This can be seen in most rural areas where people cannot afford to pay more for labour. Large household numbers reduces risk of livelihood security of illness and allow livelihood diversification to be perused (Ellis 2000). It is important to consider quantity and quality of human resources, quantity relate with age, size and gender composition of the household while quality involve the skills obsessed.

Human capital has influence in engaging and benefiting from natural resources. For example, age really matters in benefiting household from natural resources. From observation, old people do not normally go to fetch firewood, fodder or collecting poles. This is normally done by young, strong people. The same applies to sex whereby women only collect firewood for household use while men usually benefit more by doing business for cash earning from resources e.g. fishing, cutting timber, and also charcoal making (Arnold 2001).

2.4.4 Social capital

Moser in Ellis (2000) defines social capital as reciprocity within communities and between households based on trust delivered from social ties. Social capital is made up of both networks of inscriptive and elective relationship between household individuals. The relationship may be vertical as in authority relationship or horizontal as in voluntary organization. Vertical relationships involve relationship of people of different ranks or above village level, for example relationship between government and NP authority, while horizontal relationships involve people more or less of the same rank e.g. relationship between villagers themselves. However, Putman *et al.* in Ellis (2000) envisage social capital to comprise of more horizontal social groups e.g. associations, clubs and voluntary agencies that bring individuals together to pursue certain objectives.

Positive relationship between people and park authority is crucial for sustainable wildlife management.

2.4.5 Financial capital

Financial capital is the capital base that households have access to. It is essential for pursuit of any livelihood strategy and is more about savings and access to credit in the form of loans. For many rural communities access to capital is very limited. This results in saving being held in other forms. For example among the five villages visited only in two did people have access to financial capital within the village. The rest, who did not have access to institutions, tended to save in other forms like keeping livestock and buying assets, which could be sold in time of need. Additionally, more access to financial capital has positive impacts on natural resource dependency. Local communities who have financial institutions within the village level tend to diversify income generating activities thus less dependency on natural resources.

2.5 Livelihoods diversification

Livelihoods diversification involves increasing diverse portfolio of activities and assets by an individual or household in order to survive and improve the living standard (Ellis 2000). Livelihood strategies are dynamic and respond to changing pressures and opportunities (Scoones 1998). Sustainable livelihood framework (Figure 1) identifies four livelihood strategies, which are agriculture, off-farm activities, non-farm activities and environmental resources collection. Among these strategies there are natural resources and non-natural resources base activities. According to (Ellis 2000) natural resource-based activities consist of agriculture and environmental resource collection. Non-natural resource activities include business, remittances and salary from employment and also pension for retirees. Farming includes livestock keeping and crop production. Majority of rural people engage in farming activities. Off-farm activities are another way of diversifying household income.

2.5.1 Rural livelihoods and incomes

The main livelihood activity in rural areas of many developing countries is agriculture. In Tanzania, agriculture is a source of livelihood for about 80% of citizens, the majority living in rural areas. Agriculture has strong linkages with the non-farm sector through agro-processing, urban markets and export trade (PMO 2001)

Although the terms livelihood and income are not synonymous, composition of household or individual income at a given time is most direct and measurable outcome of the livelihood process. Income consists of cash and in kind contribution to the welfare of the individual or household originates from livelihood activities engaged by household members (Ellis 2000). Cash income can be from crop or livestock sales, wages, rents and remittances whilst in-kind include consumption of farm produce, payment in-kind and transfer or exchange of products (Ellis 2000).

Categorization of household income into three sub groups according to Ellis (2000) and (Leones and Feldman 1998) consists of

2.5.2 Farm income

Involve income generated from own farming, it also includes livestock's and crop income in cash and in-kind consumption. For the case of households interviewed in all five villages, farm incomes were from cultivating mainly maize, rice, tomatoes, sugarcane sesame, beans, cotton, tobacco and green vegetables

2.5.3 Off -farm income

Refers to wage payments. It includes labour payments in kinds and sometimes income from environmental resources e.g. firewood, charcoal, building poles, wild meat, fodder and grasses.

2.5.4 Non-farm income

Includes non-agriculture income sources further categorized as non-farm rural wage or salary, business income, rental income, remittances and pensions to retirees.

2.6 Livelihoods and Protected areas

2.6.1 Linking Livelihoods and PAs

It has been a perpetual narrative for protection of various potential areas for nature or recreational purposes to exclude humans and other species (Adams and Hulme 2001) and normally exclude local people who previously and hitherto have had access to the resources (Holmern 2003).

Protection of wildlife appeared as a precedence to conservation and development organizations. Approaches to protect natural resources, including wildlife, have been the creation of national parks and other categories of PAs that exclude livelihood activities (Salafsky and Wollenberg 2000). IUCN categorizes PAs into six categories of which four do not allow consumptive use of the resources by strictly defining borders that unauthorized people are not supposed even to cross. The conservation strategy caused local livelihoods to conflict with conservation since local people are forced to use resources outside the park (Salafsky and Wollenberg 2000).

Though PAs are proven to be important for conservation, the idea faces difficult challenges and dilemma interrelated with rural development and wildlife conservation (Holmern 2003). The social, economic, cultural and political challenges have often been beyond the capacity of conservation authorities and even local governments. In developing countries the biggest dilemma is to spend money on strictly protecting wildlife resources while poor people daily need increases (Salafsky and Wollenberg 2000).

Responding to these challenges and limitations, conservationists looked for a trade-off, which will be beneficial to local communities and wildlife conservation. This came after realizing the importance of both PAs as part of conservation and local community economic development.

2.6.2 Community Conservation Programmes

The necessity of taking into account socio-economic aspects surrounding PAs becomes important component of PA design and policies (Ferraro 2002) Involving local community in wildlife conservation becomes to be the new conservation approaches worldwide after failure of fortress approaches to conservation (Holmern 2003). This came after realizing that conserving wildlife will not be possible if it will not involve local people. The main objective of the strategy was to involve people in conservation at the same time to help to meet local livelihoods.

Approaches to community conservation are diverse, which include community-based conservation, community wildlife management, collaborative or co-management and community based natural resources management, state / community co management and integrated conservation and management programmes (Murphree 1993; Barrow 2000) These approaches differ in the degrees to which local people are involvement.

Wildlife Policy of Tanzania developed strategies to ensure effective partnership with rural communities and the private sector outside PAs and providing those communities with direct and indirect benefits from wildlife utilization. The strategies encourage local communities with viable wildlife populations to establish Community-Based Conservation (CBC) programmes through development of Wildlife Management Areas (WMAs) (MNRT 2007).

A number of CBC programmes exists in Tanzania. An example is MBOMIPA project. MBOMPIA is a Kiswahili acronym for Matumizi Bora ya Malihai Idodi na Pawaga. The project is implemented in Idodi and Pawaga divisions in Iringa district, near Ruaha national park (Walsh 2000). Through this project local communities manage natural resources with advice and assistance from local government. The study showed positive impacts of the projects to individual livelihood (Walsh 2000) Worldwide, community-based natural resource management (CBNRM) is believed to be more promising in managing natural resources than protectionist approaches (Holmern 2000) Popular examples of CBNRM programmes in southern Africa include CAMPFIRE in Zimbabwe (Adams and Hulme 2001) and Luangwa Integrated rural Development Project (Kiss 1990).

2.6.3. TANAPA's Outreach Programme

Currently TANAPA recognizes the importance of involving community in wildlife conservation and management. As a result TANAPA introduced an outreach programme, Unlike CBNRM (or CBC), park outreach program builds good links between park authority and local people by facilitating communication and cooperation between two parts (TANAPA 2007). Furthermore, outreach programme provides conservation education so as to create awareness to local communities and win their support.

MINAPA has a number of outreach projects in villages surrounding the park. It is through these projects commonly known in Kiswahili as "Ujirani mwema" (in English means "good neighborhood") where various Community Initiated Projects (SCIPs) like building classrooms, dispensaries, water wells have been getting financial support. TANAPA allocates 10% of its annual income to support these projects (TANAPA 2007).

2.6.4 Rural dependency on natural and park resources

Survival of most rural people in developing countries depends on natural resources that nature provides: water, rangeland, firewood and bush meat.(Holmern 2003) A number of reasons influence the situation. Issues like widespread poverty, extensive agriculture and lack of alternatives especially energy for cooking compel people to over-use their surrounding resources in order to survive. Establishment of national parks and other PAs restrict people from using resources, which, for long time, communities have been using and depended on. In most cases villagers are left without alternatives, which in a long run, results into encroachment and poaching (Gillingham and Lee 2003)

The extent of rural poverty and the natural forest remaining in a community tend to overlap(Sunderlin, Angelsen et al. 2005). In China there is an overlapping relationship between areas with severe poverty and areas with abundant natural resources (Sunderlin & Huynh, 2005). Villagers surrounding MINAPA depend on open areas around the national park to get firewood, poles and grass for building houses, fodder and few of them for making charcoal. Products they collect seem to be important to their livelihoods because most of them do not have sufficient income as will be shown from the statistical data.

Crop destruction caused by wildlife and restricting local people to access resources in the park are the livelihood constrains to communities bordering the park. This makes the communities to face a number of opportunity costs related to conservation (Hill, Osborn et al. 2002) High opportunity costs compared to the benefits make the situation to be worse. Estimated opportunity cost of conservation of Ranomafana national park in Madagascar was about USD 3.37 million (Ferraro 2002). Such high costs develop overwhelmingly negative attitudes towards wildlife conservation to local communities. Zambezi Elephant Project (2002) reported threats to undermine conservation and development efforts in the northern districts of Zimbabwe because of crop damage caused by wildlife

2.7 Conflicts between National Parks and Local people

2.7.1 Types and causes of conflicts

Conflicts between humans and wildlife especially in areas bordering PAs are very common worldwide (Shemwetta and Kideghesho 2000; Hill, Osborn et al. 2002) Rapid changes of the world bio-physical environment and socio-cultural systems influence occurrence of conflicts. Reports documenting examples include (Ogada, Woodroffe et al. 2003) identifies two main causes of human-wildlife conflicts. First, is lack of attention to the process of involving local people and others who care about the PAs in the planning, management and decision making for the areas. Second, influence by the needs of local people e.g. need for agricultural land, grazing lands, firewood, building materials, fodder, wild meat and medicinal plants.

There are several human-wildlife conflicts in and around PAs in many developing countries. In Kenya, for example, human-wildlife conflicts exist in all districts particularly in areas where cropland borders NPs (Idwasi 1996). In Tanzania, crop damage by wildlife is the major of human-wildlife conflict in areas where PAs boarder with agricultural lands (Gilingham and Lee, 2003). Costs imposed by wildlife to local communities have made wildlife conservation to be a concern, which needs immediate attention (Shemweta and Kidegesho, 2000: Hill, 2000).

2.7.2 Impacts of conflict

Human-wildlife conflicts can cause adverse impacts on wildlife and people's livelihoods. Conflicts are not always destructive. Sometimes conflicts, which are properly addressed, can open up opportunities for the problems to be identified and solved thus progress to be achieved. However, many conflicts become counterproductive and destructive (Lewis, 1996). Muruthi (2000) found that 15 elephants (equal to three-quarters of the local population's mortality) had been killed in conflicts with local people between 1996 and 1997 in Kilimanjaro Heartland. At the same time one third of elephant mortality, which occurred in Amboseli in 1974 and 1990 were caused by local people (Muruthi 2005).

This made human-wildlife conflicts to be the major threats to conservation in Africa (Naughton- Treves 1998; Weladji and Tchamba 2003)It also cause dilemma for state and most wildlife management authorities faced with the demand of local communities to control wildlife (Gillingham and Lee, 2003).

2.8 Conflict resolution approaches

Conflicts must be addressed within a particular cultural, political and social perspective. One of the main challenges in resolving conflicts is to address the people's fundamental needs (Lewis 1996).

Human-wildlife conflict is not new experience to local communities living adjacent to PAs. Several studies have been conducted on how different PAs worldwide minimize the problems. Approaches differ from county to country depending on different factors like magnitude of the problem, conservation institutions involved, existing government policies and economic status of the county etc. For example, in Indonesia, to control human-elephant conflicts in Way Kambas national park several methods were used. Techniques involved construction of electrical fences, trenches and planting of plants scientifically known as *Musa sapientum* and *Saccarum spontaneum* within the park as lure crops, and capture of crop raiders. Santiapillai & Supraham in (Nyhus 2000). In some countries especially developed countries like Norway the system of compensation is used to minimize the problem.

2.8.1 Framework for resolving conflicts

Structure framework, which addresses conflicts, was developed by Lewis (1996). Given the difficulty, complexity and variety of conflict situations that occur in PAs, components of the framework do not necessarily happen one after another. Often components overlap and sometimes repeat as the process evolves. The same resolution approach can be utilized in more than one component. Lewis' framework for resolving conflicts consist of four components, which include:

- **Getting started or determining roles**

This is the initial step during which assessment of the problem is done to determine roles various stakeholders will play. Roles can be advocate, arbitrator, convener, expert decision maker, mediator, negotiator and stakeholder. Taking examples of the study areas local community representatives, village leaders, NP representative, local government leaders and central government official could be involved at this early stage.

- **Assessment**

Conflict assessment components involve collecting information to be used in designing resolution process. It is a continuous process because initial assessment in most cases reveals the need for the additional information to be collected as other conflict resolution components proceed. Most important information to collect include affected stakeholders, who will be the main leaders on both sides, what are the interests, advantages and disadvantages of conflict resolution institutional/ legal context, and financial, human institutional resources available?

- **Involving affected stakeholders**

This is the problem solving and negotiation component of the conflict resolution framework. Normally it involves affected stakeholders in search of a solution to the conflict. Stakeholder involvement ranges from minimum to very intensive involvement. Minimum involvement provides input to decision makers about their views while in intensive involvement stakeholders are involved in negotiation with decision makers to develop alternative solutions.

- **Implementation and evaluation**

This component involves formalizing implementation and then evaluating the solution to the conflicts that stakeholders have agreed to or that decision makers decide on even without stake holder's agreement.

CHAPTER 3

3.1 Study area

3.1.1 Location

MINAPA was gazetted as a national park in August 1964 and its boundaries extended in 1975. It is the fourth largest park in Tanzania covering 3,230 km² (1,250 square miles). The park is located in eastern Tanzania between 7°00' and 7°50'S, and between 37°00' and 37°30'E. The park is located in Morogoro region, 283 km (175 miles) to the west of Dar es Salaam (Figure 2). It shares its boundary in the extreme south with the Selous Game Reserve – a world heritage site. Mikumi and Selous make one ecosystem where animals like elephant, buffalo and zebra normally migrate to and fro, between the northern part of the Selous and MINAPA (TANAPA 2004).

3.1.2 Biodiversity status

MINAPA has a unique combination of flora and fauna. It supports a wide range of large mammals, including elephants, lions, giraffe, zebra and buffalo and more than 300 species of birds (Mercer 1983; Hawkins and Norton 1998)). The bird life is intermediary between north and south. It includes southern species such as Dickinson's kestrel *Falco dickinsoni*, Bateleur eagle *Terathopius ecaudatus* and Boehm's bee-eater *Merops boehmi*, and northern species such as superb starling *Spreo superbus* and straw-tailed whydah *Vidua fischeri*. The park is located in an area where four vegetation zones intersect making it a diverse ecotone. The four vegetation types are miombo woodland in the south, arid bush land in the north, coastal zone in the east and mountain climate in the east and west (Hawkins and Norton 1998) The miombo woodland consists of mainly *Brachystegia* spp, while *Combretum-Terminalia* woodland dominates between hill areas and in floodplain (Mercer 1983). The park is also dominated by other species like *Sclerocarya caffra*, *Cassia abbreviata*, *Borassus flabellifer* and *Hyphaene ventricosa* palms. *Balanites aegyptiaca* and *Ficus* spp.

MINAPA may be seasonally flooded locally in Mkata floodplain. The floodplain and waterholes become a habitat for fish, freshwater crabs, and other aquatic wildlife in the wet season. There are also permanent waterholes with hippos in the center of the park.

3.1.3 Rainfall patterns

Morogoro region has both bimodal and unimodal rainfall patterns. The northern part has bimodal rainfall and, therefore, two growing seasons in a year. Short rains known in Kiswahili as *vuli* start between mid-September and mid-October and continue to December while long rains commonly known as *masika* start in mid-March to late May (Turner and Paavola 2003) Unimodal rainfall dominates the southern part, which also includes MINAPA. The rainfall pattern has one long rain season, which starts from December to May and a single dry season from June to November (Hawkins & Norton, 1998). March and April are the wettest months.

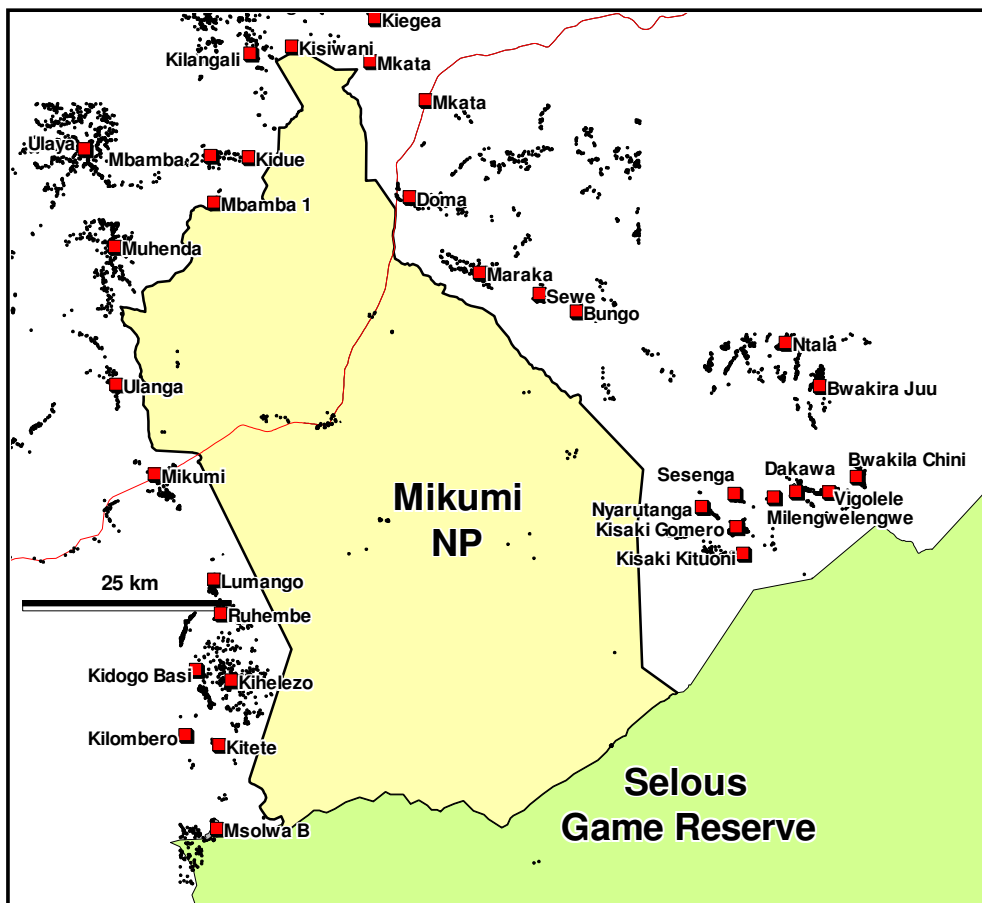


Figure 2: Above: Map of Tanzania (source: Zambezi website, 2008). Below: Map of Mikumi national park Showing study areas. Source: (TANAPA, 2007)

3.1.4 Villages surrounding MINAPA

MINAPA is surrounded by eighteen villages located within three different districts of Morogoro, Kilosa and Mvomero. The study was done in five villages bordering Mikumi national parks, which are Doma (district Mvomero), Mikumi (district Kilosa), Ruhembe (district Kilosa), Kihelezo (Kilosa) and Gomero (district Morogoro rural).

With the objectives of assessing the benefits and costs local people are getting from the park together with the conflict issues, selection of the study villages was done according to district categorization and also on the proximity of the village to the MINAPA office.

The five study villages are located in two different climatic zones. Doma, Mikumi, Ruhembe and Kihelezo have more or less the same climatic condition, which is unimodal rainfall pattern while Gomero has binomial rainfall pattern. Differences in climate and weather influence differences in natural resources occurrence and economic activities, especially in areas where agriculture is the main livelihood activity.

3.1.5 Demography

The three districts in which MINAPA occurs have a total of six wards and 18 villages. According to the 2002 Population census Doma had a total population of 2727 (2002) Mikumi 11778 (2002), Kihelezo 3348(2002), Gomero 4910 (2002) and Ruhembe 5118 (2002) people. Population growth rate in the area is 2.6%.per year (Census 2002)

Within the area there are some cultural and ethnic differences. Doma, which is in Mvomero district, and Mikumi, Ruhembe and Kihelezo all in Kilosa district are ethnically inhabited by Luguru, Sagara and Vidunda tribes. These areas include a high proportion of immigrants from Mbeya, Kilimanjaro, Iringa, Lindi and Shinyanga. Immigrants are coming for different purposes, including business, employment and agriculture. Gomero village is mainly inhabited by one of the coastal tribes known as Kutu. There is a relationship between natural resource utilization and the cultural practices of different tribes regarding land and resource use. Differences in tribes have

influence in livelihood diversification activities and natural resources use. For examples, people from Lindi and Mtwara are more specialized in carving. This means they will cut trees more especially ebony trees. Tribes from Mbeya and Iringa are more specialized in agricultural activities especially crop production. Those from Kilimanjaro are more entrepreneurs, doing businesses more than anything else. They are the ones who own restaurants, bars and guesthouses in the area.

3.1.7 Livelihood activities of the people

The main livelihood activity in the area is small scale farming based on an extensive agricultural system. The farming system is mainly monoculture, although mixed farming was observed in a few households where they mixed maize and beans. Majority of the farmer's farm for subsistence, selling crops only in case of excess yield. For those who do produce for sale, major cash crops grown are tomatoes, sugarcane, coconut, sesame and tobacco. Maize, beans and rice are the main staple food crops grown.

Livestock husbandry was not an economic activity of significance in the visited areas. Few households engaged in keeping animals like goats and pigs. Poultry keeping was commonly observed, although a repeated outbreak of deceases was found to affect the activity negatively.

Non-farm activities like making mats, bricks, tailoring, shop, tea rooms and local beer brewing were also observed.

3.1.8 Financial institutions

Financial services are limited in rural areas of developing countries. Two of the five villages visited had Savings and Credit Cooperative Societies commonly known as SACCOS. SACCOSes are networks of credit unions, which act as community banks in rural areas. Members are able to get loans and also banking services. Mikumi and Ruhembe SACCOS members are able of get loans especially during the agriculture

season when they need money for land preparation and for buying agricultural inputs. Although few villagers were complaining, the entry fee is high for them.

3.2 Methods

3.2.1 Field reconnaissance

Investigation of the study area was done prior to data collection for the purpose of gaining acquaintances, meeting potential people for appointments and for selection of the households to be interviewed. Information was sent to the households in advance to make them available so they could become acquainted with the visit.

3.2.2 Households sampling

Random sampling of household was done based on village registers (of households and their members). These were used to select 25 households in a village. A random sampling technique was used to identify households to be interviewed. Names of the household heads were written in many pieces of small papers mixed together and then chosen randomly. The 25 households were chosen first followed by choosing 6 more household to replace households if a case of travel or illness happened. A household represented people who were living together and who were also having joint economic activities.

3.2.3 Data collection

Quantitative and qualitative data were both collected at household and village level from October to December 2007. Primary data were collected using household level questionnaire with both closed and open ended questions administered to household heads.

Focus group discussions with key informants and physical observations were the other methods used. Focus group discussions involved 5-8 people that were particularly important in the local community, such as village leaders, elders, teachers and some other experienced persons. This was helpful for collecting certain types of information such as the benefits the village was getting from TANAPA and MINAPA in particular, and

conflicts between MINAPA and the village. At household level collecting such general information would be difficult since benefits were not at household level, and the details would not generally be known to the household members.

Direct observation was done in cases where respondents were unable or unwilling to provide the correct information, especially in collecting information about sources of income for the households. Some respondents were unwilling to provide information about economic activities, which are not legal like making charcoal in reserved areas, cutting timber, illegal hunting and other illegal businesses.

Secondary data included reports, published and unpublished papers from the villages, MINAPA, TANAPA, the Ministry of Natural Resources and Tourism, and from Sokoine University of Agriculture.

3.2.4 Data Analysis

To estimate local livelihoods and benefits and costs people are getting from the national park together with the conflict issues, data were entered into computer and coded and then analyzed statistically using EXCEL, SPSS and STATA programmes

To determine the relationship and dependency between total household income, total park and environmental income, and relative environmental income, regression model and tables were used. Sometimes second degree regression analysis was done to look for relationship after removing outliers.

3.3 Income Measurements and Calculation

Total household income was calculated by summing household's consumption and cash income in a year from all income sources. This study classified income sources into agricultural income, non-farm income, off-farm income, environmental income and remittance.

3.3.1 Farm income

Farm income was calculated by summing incomes from agriculture and livestock. Farm income involved absolute income from all crops harvested by a household in year 2007. Estimation of the income was done by multiplying the quantity harvested by the average market price minus the total costs of production arising from labour and agricultural inputs. A household labour cost was also included.

Table 2: Market prices of different crops

Crop	Measurement Unit	Average market price (Tshs)
Maize	Bag (90kg)	30000
Rice	Bag	30000
Beans	Bag	50000
Tomatoes	Tenga (basket)	5000
Sugarcane	Tonnes	35000
Sesame	Bag	50000
Cotton	Kgs	225
Tobacco	String	12500
Vegetables	Kg	1000
Coconut	1 coconut	100

Total agriculture income for each household was calculated using the following formula

$$AI = (Q * P) - (L + F + S)$$

Where

AI = Agriculture income

Q = Quantity harvested for each crop

P = Market price for each crop

L = Labour cost for each crop

F = Fertilizer cost for each crop

S = Seed cost for each crop

Livestock and poultry total income (LPI) was estimated by combining all income from animals owned by the household and income from selling animal products like milk and eggs. Estimated value of the animals was calculated by multiplying total number of animals with the average market price.

Table 3: Average Prices of Animals

Animal /Animal products	Measurement unit	Average price taken(Tshs)
Pig	1 pig	80000
Goat	1 goat	35000
Ducks	1 ducks	4000
Chicken	1chicken	3000
Eggs	1 egg	100
Milk	1 Litre	300

The following formula was used to calculate livestock and poultry income

$$LPI = \sum ((N * M + IP) - C)$$

LPI = Livestock and Poultry income

N = Number of livestock - i

M= Market price of livestock sold

IP = Income from animal products (Milk, eggs, skin)

C= Production cost of animal (Food and veterinary, costs)

Therefore, total agriculture income was calculated by the formula

$$FI = AI + LPI$$

3.3.2 Non-farm income

Non farm income is the income earned by working in other people's farms or work anywhere casual laborers. Estimation of the non-farm income was done by aggregating income from seasonal labour, such as, digging in other farms in the year 2007. The income also included in-kind payment.

3.3.3 Off –farm

Off-farm income was calculated by adding household income from businesses, salary from the employment and income from self employment activities like carpentry, tailoring and art crafts. Pension for retirees was added in this category although it was observed to only 2 out of 125 respondents.

3.3.4 Remittances

Total remittance was estimated by adding all income a household receives as reciprocity from family members and relatives not living in the household. Remittance in consumptive form was converted to the market value.

3.3.5 Environmental income

This is income obtained through consumption of natural resources from aquatic areas, forests and in the national park. In this survey park and environmental income was calculated by aggregating values of all products obtained within and outside the park. Activities included collection of firewood building poles, grass for roofing, fodder, fishing, wild animal hunting, timber selling, and charcoal making. Frequency of collecting products varies from one household to another. It could also depend on the resources themselves. For example, firewood was collected once or twice a week in some

areas, while building poles and grass were collected once in one or two years. All this was taken into consideration. Values of all natural resources were estimated by multiplying the quantities by the market price. All resources had a market price. A shadow price was not used. Honey and mushroom collection was not observed in all visited sites.

3.3.6 Environmental dependency

Percentage contribution of the environmental income to the total household income was computed. Thereafter park and environmental level of dependency was calculated by relating total household income and total environmental income together with relative environmental income.

Relative environmental dependency, which is the share of environmental income over the total household income, was calculated using the following formula

$$\text{RPEI} = \frac{\text{Absolute environmental income}}{\text{Total household income}}$$

From the formula and definition of relative park and environmental income it can be seen that the bigger the share of park and environmental income in total household income the higher the dependency.

3.3.7 Income distribution

Gini coefficients

Gini coefficient is a measure of inequality of income distribution. It is normally a ratio with values ranging between zero 0 and 1. The values show to what extent income is distributed between all income sources. 0 value means perfect equality while 1 value

means perfect inequality. Low Gini coefficient indicates more equal income or wealth distribution while high Gini coefficient indicates more unequal distribution.

3.4 Data validity and reliability

Reliability of the data is a measure of the stability of the concept measure, which represents random errors. It consists of the three prominent factors: stability, internal reliability, and inter-observer consistency (Bryman 2004). Validity, on the other hand, measures the accuracy and possible systematic errors of the research. In this study, an effort was made to collect reliable data by recruiting an assistant who has been doing research in areas surrounding several national parks in Tanzania. The assistant wrote important points when I conducted focus group discussions. Understanding respondents was not a problem because all respondents were able to communicate in Kiswahili, which means I did not need an interpreter. However, there was a problem with some households not telling the truth regarding the resources and benefits they are getting from the park. This happened even though efforts were made before the interviews to inform the villagers that the study was only for academic purposes, some didn't believe this and assumed we were working for TANAPA and were spying on what they are doing. Due to this, information on park and environmental income might not always reflect the real situation.

CHAPTER 4: RESULTS AND DISCUSSION

4.0 Introduction

This chapter presents local communities' livelihood strategies and estimate household incomes arising from livelihood activities. It further estimates household's environmental income and dependency. Thereafter the chapter estimates household's costs arising because of the national park and lastly the chapter explores main conflicts between local people living adjacent to the park and MINAPA.

4.1 Livelihoods

In everyday language, livelihoods are the things people do to make a living. On the subject of a sustainable rural livelihoods approach, rural communities have three alternatives to improve their livelihoods: through agricultural intensification, extension of the activity and through diversification into other activities, which are not farm based (Ellis, 2000).

Normally, livelihood analysis does not only focus on livelihood activities, but also on livelihood perspective and social relations, which consist of institutions that influence people's access to natural, human, physical, social and financial capital (Ellis 2000). Communities's access to resources influences income-generating activities they are performing and also environmental resource use and dependency. It is argued that the assets and activities that individuals own determine the living gained by an individual or households (Ellis 2000). The most important step in analyzing livelihoods is to identify livelihood resources required for pursuit of different livelihoods activities (Scoones 1998). Therefore, before discussing livelihoods of local communities living around MINAPA, let us see communities' access to natural, physical, social, human and financial capital.

4.1.1 Natural capital

The main environmental endowment, which the communities were found to have access to was land. About all interviewed households had access to land either by owning or renting. Average land owned, rented and land cultivated in district category is shown in Figure 3.

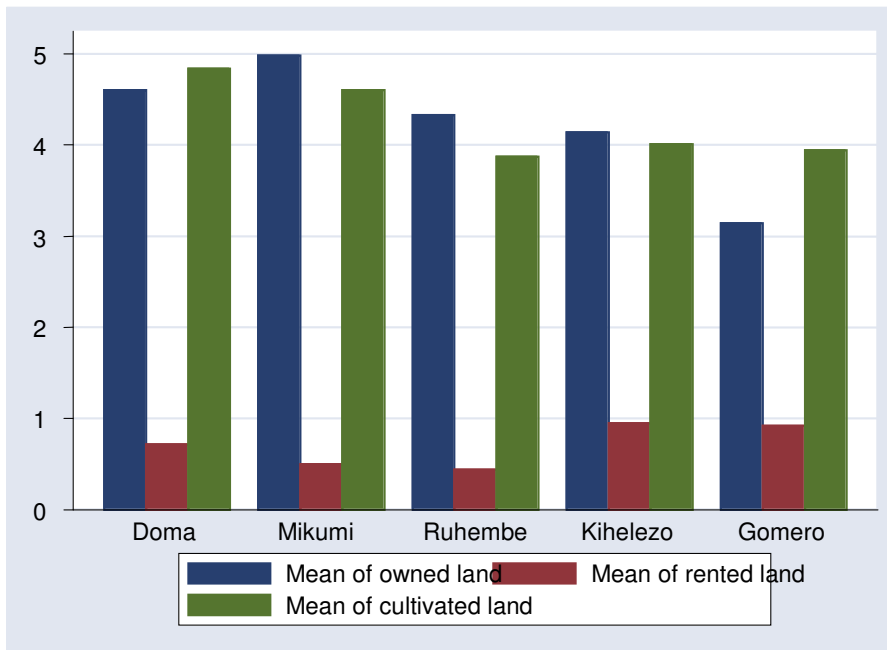


Figure 3: Mean of land owned, rented and total cultivated (Source: Own field data 2007)

The study data shows that the majority 83.2% of the respondents own land either through inheritance or buying, whereas the rest of the respondents were found to own the land through renting. The average land size was 4.94 acres (Std. Dev. 4.83). The minimum size of land was 0.5 acre and the maximum was 30 acres. From the observation the ownership was mainly private based rather than communal based. Land shortage was not a limiting factor of livelihood in the visited areas; rather the farms not reached by wild animals were a point of concern. At the village level, access to land is a determinant

factor of the household income because majority of the villagers depends on crop cultivation. The villagers with big farms are assured of getting income from renting their lands in case they do not want to cultivate the land themselves.

4.1.2 Physical capital

Access to physical capital in terms of machinery, buildings, etc was low in the visited sites; but livestock keeping was a common phenomenon to several households. There are a number of households owning livestock as assets. Keeping animals especially chicken is taken as one way of keeping money in a form of assets. Many households sell chicken, ducks, goats or pigs when they need money for emergencies like illness.

The animals kept are mainly pigs, goats, poultry, ducks, and chicken as shown in Table 4 below. There was no single household that kept cattle or sheep in the study area. .

Table 4: Number of animals kept in the household (Source: Own field data 2007).

Village	Average animal number			
	pigs	goats	ducks	chickens
Doma	0	.12	1.08	8.08
Mikumi	1.2	.72	2.48	10.44
Ruhembe	.12	.56	1.92	8.4
Kihelezo	1.08	.16	.2	12.64
Gomero	0	0	0	2.92

4.1.3 Social capital

The study observed the prevalence of community communication and social connectedness; villages had different village committees like environmental committee, which was responsible for environmental issues. The committee was also working in conjunction with MINAPA in “*Ujirani mwema*” (good neighboring) programmes. Social groups were observed as a livelihood strategy that mainly helps the members to obtain credits and loans from friends. Social groups were seen as a coping strategy for lack of

financial institutions. A number of non-governmental organizations (NGOs) were found in Gomero and Mikumi, being involved in teaching the villagers about agricultural diversification, marketing, and community development

4.1.4 Human Capital

Human capital is an important factor at the household level. Agricultural activities in the rural areas are labour intensive. Therefore, a large number of household members is regarded as an advantage as far as the availability of household labour is concerned. Having large numbers of household members reduce the risks of livelihood insecurity owing to cases of illnesses, the numbers also allow for the pursuance of livelihood diversification. (Ellis 2000). This is an important thing to be considered because most of the rural people cannot afford to pay for hired labour. The survey data shows an average number of household sizes in the five villages as being 5.38, Std. Dev. 2.6; the minimum household number was 1 and the maximum number was 15 members.

In assessing household labour, it is important to make a judgment basing on its quality and quantity. Labour quality assesses skills and education possessed by the members. The data from the study area shows that the average educational level of the respondents was minimum; in that 3.2% had Secondary (FormIV) education, 56% finished primary education i.e. Standard Seven 30% had colonial education and 21% did not get any formal education (Table 3). Low education level affects the household's income. Household members are not able to secured good jobs outside the village.

It was also observed from the focused group discussions that, low education level of the villagers impedes the villagers from being employed by MINAPA. As a result, most MINAPA game rangers are the non-local people; most of them came from outside the village areas.

Table 5: Education levels of respondents (Source: Own field data 2007).

Education level	Freq.	%	Cum.
Secondary edu.form four	4	3.20	3.20
Primary education (STD 7)	70	56	59.20
Colonial education (1-8)	30	24	83.20
No formal education	21	16.80	100.00

The composition of the household members to worker consumer ratio was calculated to determine whether the household size was a benefit or burden to the households. Lower ratio means there are more workers compared to consumers. This is because knowing the number of the household members alone cannot determine the availability of the labour in the household. The survey data revealed that 46.51% of members of the households were a young generation with the age below 16 years (Table 4). In addition, 22 members were above 64 years. Therefore, workers/ consumer ration was 0.97. The ratio means the households do not have many dependants. One worker works for approximately one consumer.

Table 6: Age distribution of household members (Source: Own field data 2007)

Village name	Age			
	(1-6)	(7-15)	(16-64)	(65-90)
Doma	20	24	69	2
Mikumi	15	43	104	7
Ruhembe	44	41	74	4
Kihelezo	20	32	56	1
Gomero	35	39	57	4
Total	134	179	342	18

4.1.5 Financial capital

Access to economic capital was limited in the visited areas. Only two out of five studied villages had access to cooperative unions known as SACCOS. Credit resolves liquidity constraints and facilitates the pursuance of other livelihoods activities like businesses. Diversifying livelihood activities reduces environmental dependency.

4.2. Livelihoods diversification

Households strategies are complex and normally contain multiple and dynamic portfolios of different activities (Ellis, 2000; Scoones 1998). In the study areas, households depended on diverse sources of activities for generating their income but agriculture was the primary source of income practiced by all interviewed households. The distribution of major activities which households depend on in earning income is shown in the pie chart below (Fig. 4)

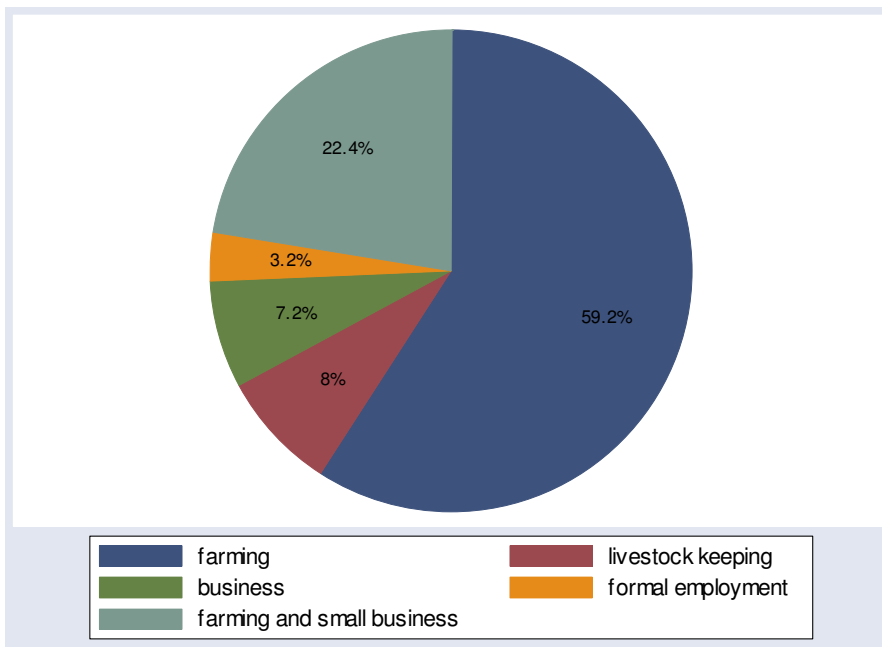


Figure 4: Distribution of main single livelihood activities in the households (Source: Own field data 2007)

All the households are engaged in farming for subsistence and some for business. Food crops like maize, beans and rice are mainly for subsistence, the decision to sell or not to sell depend on whether or not there is excess food. The growing of cash crops is practiced differently from one village to another. In Doma and Mikumi cash crops were mainly tomatoes, cotton and sesame; in Ruhembe and Kihelezo cash crops are sugarcane, rice and tobacco, while in Gomero coconuts, watermelon and sesame are grown as cash crops.

Keeping larger livestock like pigs and goats were insignificant in comparison to poultry, such as chicken and ducks, which were observed in 90% of the households. Keeping poultry and livestock was found as a way of saving money in the form of assets. The majority of the respondents said they would sell chicken or ducks, and sometimes goats, to get money for emergency cases such as sickness.

Off- farm activities found were season labour consisting of digging, planting, weeding or harvesting other villager's farm (commonly known in Kiswahili as *vibarua*). 92% of the respondents said they were doing such jobs to obtain money for buying food or basic requirements like kerosene, salt etc. This happened mostly to households, which happen to have insufficient crop yield for different reasons such as drought, floods, and diseases outbreak or destruction of crops by wildlife. Majority who depended on *vibarua* did not have an alternative source of income.

Non- farm activities were mainly from businesses, like shops, *mgahawa* (local small restaurant), local beer brewing and formal employment as in teaching and nursing. I categorized business in this study into two: crop and non-crop businesses. Crop business involves selling of food crops i.e. maize, tomatoes, coconut, sesame etc. The business was done by middlemen from the same village or sometimes from nearby areas who buy from villagers. Experience from Doma and Mikumi shows that the middle men are getting more benefits by selling the crops along the main road to the on-transit passengers than to the local farmers. Few of them take crops to nearby town centre and sell for a better price compared to what they would be getting along the road.

Non-crop business includes small shops within the village, selling of local beer, village restaurants (*mgahawa*) making chapatti or burns *maandazi*. Migahawa in Mikumi are mainly for on transit people, while the same in Doma, Ruhembe, Kihelezo and Gomero are for guests and bachelors who normally cannot cook at home especially during the day. Additionally, villagers in Mikumi area are more specialized in business such as hotels, restaurants and guesthouses. Business is highly influenced by tourists and guests coming to see the wild animals in the National Park.

Several households in the surveyed areas were doing small businesses for generating daily income. Local beer brewing was very common in the rural areas especially in Kihelezo and Ruhembe. Business has a significant contribution to the household income. Two respondents reported to have been able to pay for school fees, buy bicycles and basic household things from selling local beer only. This type of business is seasonal. It is normally low in the cultivation period, where the majority of the people are usually busy in preparing, planting and weeding their farms. The beer brewing becomes most common soon after harvest.

Concluding livelihood strategies

Important livelihood activity was agriculture. All of the households engaged in food crop production for subsistence but not all depended as the main source of income. Only 67.2% of the households mentioned agriculture as the main source, contributing 95% of the household income. Of this percentage 59.2 % depended mainly on food and cash crop cultivation while 8% depended on livestock keeping. 22.4% of the households complement agriculture income with small businesses like selling fruits, *maandazi* and *chapatti*, and running small shops for selling basic households materials, while 3.2% of the interviewed households depended on salary from formal employment.

4. 3 Total Household Income

Income generating activities explained in section 4.2.1 contribute variably to the total household income. The contribution of agriculture, non-farm activities, off-farm, environmental and remittance into the total households income in percentage is shown in Table 4 below.

Table 7: Contribution of different income-generating activities to total household income (Source: Own field data 2007)

<i>Income sources</i>	<i>Total income (Per year)</i>	<i>Average income (Per year)</i>	<i>Std deviation</i>	<i>% contribution to total income</i>
Agriculture	55400000	442831.2	595363.7	44.00%
Non-farm	51900000	415160	1459025	41.20%
Off-farm	10800000	86504	144870.5	8.57%
Environmental income	3864000	30912	128064.1	3.07%
Remittances	4000000	32000	93048.72	3.17%
Total	125964000	1007407.2	1584369	100.01%

The survey data shows that agricultural and non-farms are the main income generating activities contributing 85% of the total household income. Off farm activities followed then remittance and environmental income, all together contributed about 15% of the

total income. The mean income for all the households interviewed was 1,007,407 Tshs per year, which is approximately 2800 Tshs, or 2.3 USD per day. The minimum and maximum income was 18,500 and 15,500,000 respectively. Although the survey estimates an average income of 2.3 USD, which is above the most used poverty line of 1 USD per day, there is inequality in income distribution. Gini coefficient of the total income was found to be 0.5039, which means there 50% is inequality in the total income distribution.

Further, the distribution of total income with respect to the villages is shown in the Table below (Table 5).

Table 8: Categorization of income generating activities at village level (Source: Own field data 2007)

village name	Tshs				
	agric	remitt	off-farm	Envin.	Non-farm
Doma	10600000	260000	1345000	85000	7485000
Mikumi	11000000	2020000	2355000	1300000	24300000
Ruhembe	14300000	300000	3901000	424000	4650000
Kihelezo	13600000	0	2445000	664000	4420000
Gomero	5723700	1420000	767000	1391000	11000000

Among all the sources, agriculture contributes the largest percentage to the household income in all five villages. Agricultural income consists of farm income derived from cultivating food and cash crops together with income from livestock and poultry keeping. At the village level, agricultural income seemed to be higher in Ruhembe and Kihelezo than in Doma, Mikumi and Gomero. One of the main reasons was the cultivation of sugarcane as cash crop in these two villages. Comparing with other cash crops sugarcane seems to be profitable with minimum production costs.

Sugarcane farmers plant once and harvest five times, which means preparing a new farm is only once in five years. After the first harvest farmers replace un-germinated stems and remove weeds two times before harvesting again. This also reduces costs and time of preparing farm every year. Moreover, sugarcane farmers have an association, which gives loans to farmers, especially for the first preparation of farms and for harvesting. Harvesting sugarcane demands high labour intensity and machines for packing and transportation, usually the association help farmer in harvesting and take the money back after receiving payment from the sugarcane company which is the main buyer.

Non-farm activities, as mentioned before, were the second highest income contributor. Non-farms income includes income from self-employment activities like chapatti and *maandazi* making, carpentry, tailoring, art crafts, crop and non-crop businesses and salary from employment or pension for retirees. Salary and Pension had insignificant contribution; It was only to 1.6% of the total population interviewed. The survey data shows that non- farm income was higher in Mikumi. Mikumi is a small town centre; people are more specialized in business compared to all the other visited areas. Being the only nearest town centre from Mikumi national park, most of the time the area receives guests who normally buy things, eat and sleep in hotels, lodges and guesthouses. In addition, tourist's camps located inside the national park buy most of the perishable goods like food from this area. The area is also used by heavy truck drivers who regularly take a break before proceeding with the long journeys to Malawi and Zambia.

Casual labour (*vibarua*) was the only off farm activity recorded. Many respondents admit they are doing *vibarua* to get money for buying food and basic household's needs. Most of them would not have been engaged in *vibarua* if they had some money to use. This made *vibarua* a strategy to obtain money in the time of need and not a main occupation of the people. 95% of the people doing *vibarua* were men. Men were forced to look for *vibarua* because as the household heads, they need to provide money for buying basic needs for their family, which means they must have some cash to provide.

Remittance contributed 3.17% to the total household income. Remittance was observed to older respondents than younger ones. The overall contribution is low because there are few households, which receive remittances. The remittance becomes higher if a household had siblings living in towns, rather than if all stayed within the village. Income obtained from the village is not sufficient enough for individuals to help parents or relatives. Old people living with grandchildren, in particular, were found to benefit more in receiving remittance when the children's parents were living in towns or employed in a company.

The contribution of environmental income to the households' income was very minimal. Environmental income in this study refers to income from the park, village open areas, and buffer zones. In the village open areas, villagers can collect firewood; take grasses and poles for building their houses. Villagers are not allowed to use environmental resources inside the park.

Summary of household income generating activities and income: Agriculture was the main livelihood activity of the interviewed households contributing 44% of the total household income. The main cash crops were sugarcane, sesame, tomatoes, tobacco, cotton, and watermelon. This is followed with non-farm and off farm activities contributing 41.20% and 8.57% respectively. Remittance and environment income have very small effect; all together they contributed 6.24% of the total household income. The total income for all households interviewed was estimated to be 125,964,000 Tshs per year, which is approximately equal to 2800 Tshs, or 2.3 USD per day.

4.4 Environmental income

Access and extractive use of natural resources within the MINAPA is strictly prohibited by law. No hunting, grazing, cultivating logging and settlement inside the park is allowed. This made the households to concentrate on other activities than depending on park resources as a source of income. The documented environmental income was mainly

for subsistence like gathering firewood for cooking, grass and poles for building houses. The collection of environmental resources was only possible in the village open areas and sometimes in the buffer zones. The respondents were reluctant to declare cash income they were getting from the environmental resources even though they were doing different activities, such as charcoal making (seen through observation). The respondents kept silence when asked about harvesting of any natural resources inside the park, as such activities are not legally allowed. Some villagers also thought the researcher of the current study was one of MINAPA's employees who wanted to spy on them. This made the situation even worse causing some respondents not to respond to the researcher's questions. A few respondents admitted they were collecting building poles within the park, especially during late evenings, to hide from MINAPA guides who are surveying the area during the day.

The situation was opposite in Gomero Where the villagers were not afraid of saying the source of firewood or timber. Gomero borders Mikumi in the eastern part and Selous game reserve in the western side. Unlike national parks game reserve do not have strong restriction;s and villagers were more free in taking firewood, grasses and even timber and sometimes making charcoal. Moreover, MINAPA game rangers are not surveying the area much compared to Mikumi, Doma, Ruhembe and Kiholezo.

Table 9: Environmental products, people who collects and frequency of collection

Products	Who collects more	Frequency
Firewood	Women	Once a week
Building poles	Men	Once after 3 or 5 years
Wild meat	Men	Once after 2 month
Timber	Men	Once a month
Fodder	Both	Once a week
Trees for making charcoal	Men	Once a month

Summarizing Environmental income:

Gomero contributed 36% of the total environmental income, closely followed by Mikumi 33.6%, Kihelezo 17.2%, Kihelezo 11%, and lastly Doma 2.2%. Field data shows that the contribution of Gomero Park and environmental income was mainly from firewood, building poles, timber, grasses and charcoal making. Honey gathering and collecting medicinal plants were not observed at all in the visited sites.

4.4.1 Contribution of Environmental income to household income

Field data summarized in Table 7 shows low contribution of environmental income (3.07%) to the total household income. Agriculture and non-farm income were the leading income generating activities each one contributing 44% and 41% respectively.

The percentage contribution of environment income differs from one village to another. The variation was due to the availability and contribution of other livelihood activities to the household income. Availability and high contribution of other income generating activities normally suppress the percentage contribution of environmental income. This means better performance of other livelihood strategies in increasing total household income normally decreases household environmental dependency by lowering the share of the income to total household income (Angelsen and Wunder 2003).

As explained before restricting access and extractive use of resources within the park make villagers diversify income generating activities and putting more emphasis on other sources of income (e.g. like land) which they have access to.

Table 10 shows the percentage contribution of park and environmental income versus the total income in each village.

Table 10: Contribution of park and environment income to total household income in each village (Source: own field data 2007)

village name	Envinc.	Totalinc.	Std.Dev(Envinc)	%contrib
Doma	3400	792778	12806.25	0.43
Mikumi	52000	1640844	240000	3.17
Ruhembe	16960	944514	22273.83	1.80
Kihelezo	26560	845632	69227.93	3.15
Gomero	55640	813268	139898.7	6.85

The surveyed data summarized in Table 10 reveals a very low contribution of park and environmental income to the total household income. The highest contribution calculated was 6.84% in Gomero village. The highest contribution of environmental income in Gomero relative to other villages might be caused by a number of factors. One can be the presence of Selous game reserve. As I mentioned earlier, game reserves do not have strong restrictions and villagers were freer in taking firewood, grasses and even timber and sometimes making charcoal. Moreover MINAPA game rangers are not surveying the area as much as they do to Mikumi, Doma, Ruhembe and Kihelezo.

Other reason might be low contribution of other livelihood activities to the household income. Low household income sometimes influences dependency on environmental income due to lack of alternative. Two of the households interviewed in Gomero reported to have been forced into catching fish in order to get something to eat because they did not have any money to buy food.

Internal factors, like physical assets, can contribute to a low household income. In Gomero the infrastructure, especially roads, were poor. Transportation of crops by road to the nearby town of Morogoro was very expensive; the distance together with the condition of the road contributed to the rise in transportation costs. The only secure way

of crop transportation was through TAZARA railway. However, farmers were complaining about transportation charges offered by TAZARA. In the past 10 years, transportation charges by TAZARA were not as high hence crops were transported from the village to Dar es Salaam quite easily.

Mikumi environmental income per year was almost the same as that in Gomero (See Table 10), however the contribution to the total income in percentage was lower in Mikumi than it was in Gomero. The reason was the high total income in Mikumi compared to that in Gomero thus contributing to the reduced percentage. Environmental income at Mikumi was 93% contributed by one member who had a hunting license. Therefore environmental income distribution in Mikumi was completely unequal Gini coefficient 0.9. The majority of the villagers (who did not have hunting license) did not get anything from the park while very few households (with hunting license) were able to get much through trophy hunting. One of the conditions of getting a hunting license is ownership of a firearm. It is however very expensive for a villager to buy a gun. In addition, it is illegal for Tanzanian citizens to own a firearm without permission from relevant authorities. The man who was found with a hunting license in this village was a retiree soldier from the Tanzanian Peoples Defense Forces (TPDF).

The collected data showed Doma as the village with least park and environmental income. Contribution to the total income was very low, almost irrelevant. The observed access to the park and environmental resources was minimum. Besides, the households used stem residues from sorghum and maize cobs to cook. Distance from the households to the open areas was scary to a number of the interviewed respondents. Availability of charcoal was found to be an alternative to firewood especially for the households that could afford to buy it. .

4.4.2 Environmental income and village distance

Distance from the village to the area where environmental resources are collected affects environmental products collections. In the normal circumstances it would be easier to the

households to collect park resources in a nearby area than from distant areas; although sometimes this depends on the importance of the resource concerned. Generally, the current study observed an increasing products collection as the park distance increases. However, Mikumi village was found with a high income although the area is near the park. As observed in Table 10, Mikumi village has highest average total income compared to the other villages. Some of the villages are wealthier thus they can afford to buy hunting license. Owning a hunting license permits a person to hunt wild animals and obtain income selling the proceeds. Trophy hunting in Mikumi increased the total environmental income of the village.

Ignoring Mikumi village, environmental income increases with distance. The trend has some logic since people are restricted from accessing park resources, therefore the longer the distance from the park the village is the freer the people become in collecting resources.

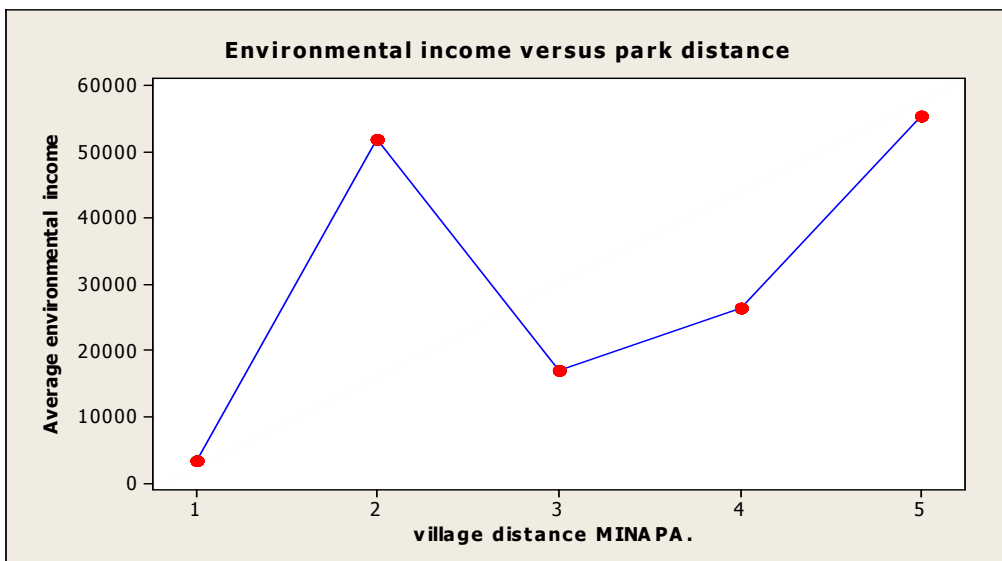


Figure 5: Relationship between environmental income and village distance to MINAPA office. Source: Own field data 2007.

4.4.3 Measure of income inequality

Gini-coefficient

Gini coefficient of the total household income including environmental income was 0.5039. The value is a bit lower than Gini coefficient of household income without environment income, which was 0.5054. A low Gini coefficient indicates more equal income or equal distribution, while a high coefficient indicates more unequal distribution. Gini coefficient of the household income without environmental income increases Gini coefficient by 0.0015 units, which is equal to 0.15 % increase. Therefore, the effect of reducing inequality by environmental income is very little approximating to insignificant.

4.4.4 Dependence of park and environmental income.

The extractive use of resources from the park is strictly prohibited by law, making the villagers generally less depend on park resources, notwithstanding that a few of them did depend on such resources illegally. Villagers used buffer zones and village open areas to collect firewood, fodder, and grass for roofing etc. However, agriculture activities and deforestation are not allowed in the open areas and the buffer zones. Open areas are the part of village land while the buffer zones are more associated with the national parks.

Environmental activities seem to be an alternative income to poor people who takes as a last resort employment (Angelsen and Wunder 2003; Vedeld, Angelsen et al. 2004) It is argued in some literature that widespread poverty, extensive agriculture, and lack of an alternative especially and especially alternative energy for cooking, compel people to over-use their surrounding resources in order to survive (Holmern 2003; Sunderlin, Angelsen et al. 2005) Therefore, it is important to understand the relationship between household total income and environmental income. To examine dependency, the relationship between household total income and environmental income was established (Fig. 6).

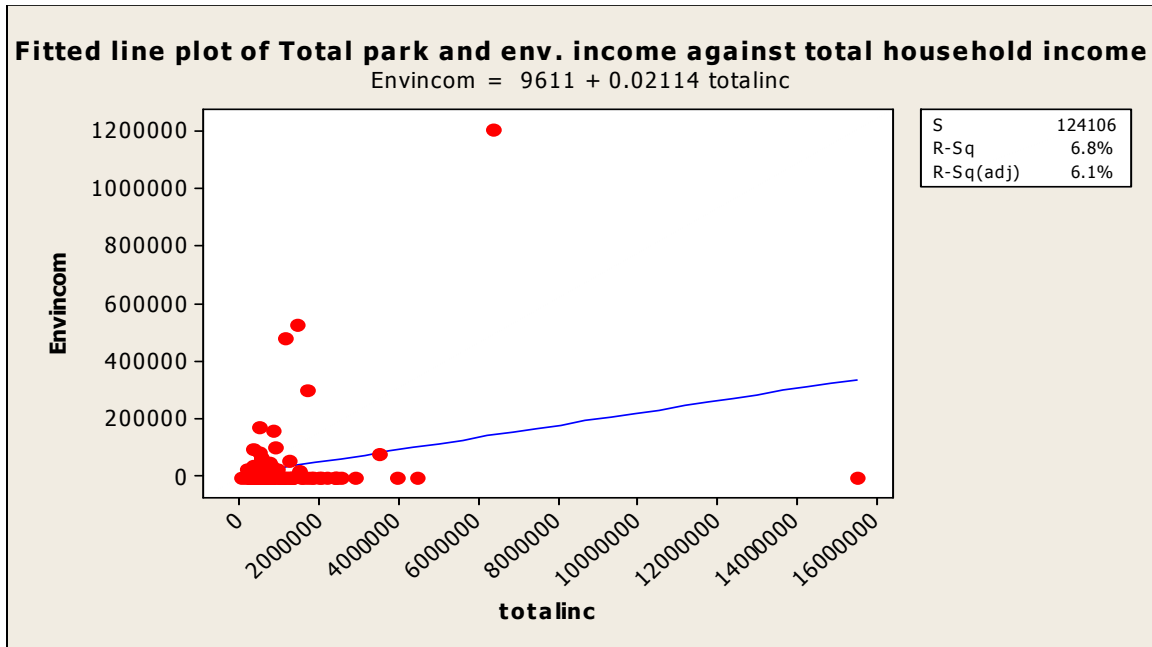


Figure 6: Relationship between Total household income and Total Park and environmental income: (Source: own field data 2007)

The graph reveals two trajectory of income trend. One trend shows richer households extracting more environmental income while the other trend shows richer households not getting or getting very little environmental income. Looking at each of the trends' perspective, the first trend is influenced by the rich who buy hunting license and extract a lot from the park. The other trend represents the poor households who don not have options except to take environmental resources collection as their last resort activity.

The two trends make the statistical fitted line to show positive and significant relationship (R-sq (adj) 6.1%, and $p=0.003$) between the total households' income and the total park and environmental income. From the results, the relationship means that park and environmental income increases as the total household income increases. The graph therefore means rich households extract more park and environmental resources than poor households. The removal of the outliers confirmed that the relationship between park environment income and the total household income was not significant (R-Sq (adj) = 0.0% and $p= 0.332$). The result means there is no clear pattern of environmental

dependency. There are a number of poor households that depended on environmental resources, and the other poor households that did not depend on environmental resources at all. The two outliers had a strong influence on the results, which made the results to have shown a strong relationship.

A number of scholars (e.g. Holmern *et al*, 2004, Velded 2004, Sunderlin *et al*. 2005) argue that poor people depend more on environmental resources, as they do not have alternative sources of income for survival. The findings from this study did not support that argument. In the current study, it was not possible to show any statistical relationship and dependency between those two components. However, the reverse cannot be argued for especially because of the large variation in the data.

Looking at dependency in relative terms, Figure 7 below was developed

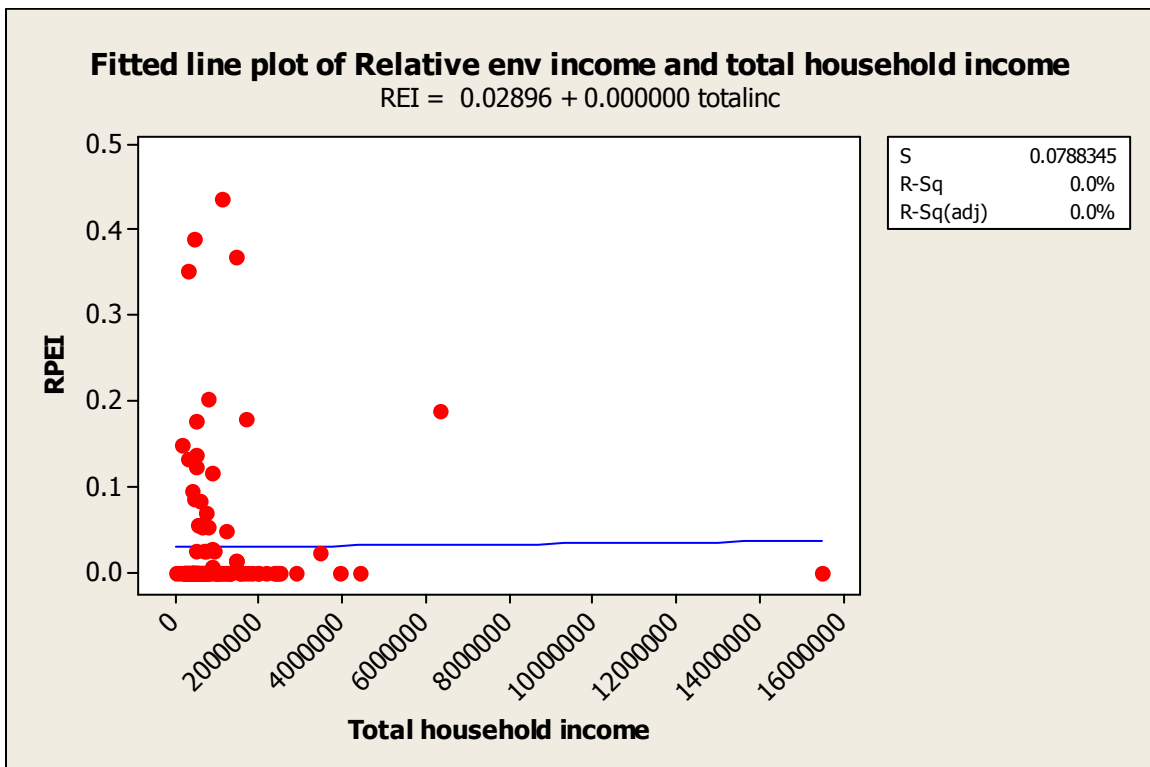


Figure 7: Relationship between total household income and relative park and environmental income: (source: own field data 2007).

The relationship from the graph reveals that the majority of the households that collect environmental income are low-income households with a total income ranging from 400-2000USD per year. Poor households are the ones with no alternative for cooking energy, and building materials (grass and poles). However, there are two outliers, one with high relative environmental income and medium total income, and the other one has 0 relative incomes but high total income. The two outliers are the ones with the highest total household income (i.e. rich households). High share of relative environmental income means the environmental income contributes a significant amount to the total household income; hence, in one way or another wealth of the household to some extent was contributed by environmental income. The outlier with 0 relative incomes gives an explanation to the fact that the wealth of the household is contributed by other non-environmental income.

Concluding environmental dependency

Extractive use of resources from the park is strictly prohibited by the law. This generally coursed villagers not to depend on park resources, although a few illegally did so. Buffer zones and open areas are used by villagers to collect firewood, fodder and grass for roofing etc; Majority are poor who collect environmental resources as a last resort source. However agriculture activities and deforestation are not allowed in the open areas and buffer zones. Open areas are the part of village land while buffer zones are more associated with the national parks.

There was no clear relationship observed between environmental income and total household income although other studies on forest and environmental dependency found environmental incomes as contributing more to poor households (Tumusiime 2006) That is not always the narrative (Bwalya 2007) In my own opinion, the benefits from natural resources depends highly on the existing rules and regulations going hand in hand with institutional arrangements and conservation policies controlling the resources.

4.4.5 Importance of Environmental resources

Although the data for the current study revealed having been a low contribution of the environmental income to the total household income, the study observed that environmental resources were still important to many households. It was observed that approximately 89% of the households interviewed depended on firewood as the source of energy for cooking. 44.7% of them mixed firewood and charcoal sometimes. This is in line with Vedeld *et al* (2004) observation that Fuel wood is the main source of cooking and heating energy in many developing countries. The respondents reported to have been compelled by the circumstances into buying charcoal, which is very expensive because it is sometimes very difficult to get firewood. According to Velded *et al* (2004), there is an increasing number of households which face fuel wood shortages worldwide. In the study area for example, the majority of the villagers were complaining that the presence of National parks near their areas has been a constraint for them since they do not have a place to collect firewood. And sometimes, park rangers refuse the villagers from collecting firewood in the buffer zones.

Additionally, the study found out that 48% of all the respondents had mud houses with grass-thatched roofs. This means that all the households use building poles and grasses, all of which are environmental resources. This implies that environmental resources are still important to the rural households living adjacent to MINAPA.

Table 11: Distribution of houses raw-materials in each village (source: own field data 2007)

Village name	House materials		
	CB&Ironsheets	MB& grass	BB& Ironsheets
Doma	0	10	15
Mikumi	0	7	22
Ruhembe	0	17	10
Kihelezo	0	16	9
Gomero	1	10	15

Key: CB- Cement bricks, MB- Mud bricks, BB- burnt bricks.

4.5 Benefits and problems of MINAPA to local people

4.5.1 Direct Benefits

Barring access and extractive use of natural resources in the national parks has made communities living around the parks not to benefit at all from the natural resources within the national park and the buffer zones. As shown from the surveyed data, the estimated percentage of overall Park and environmental income is very low to the minimum of 3.07%; moreover 90% of the income is derived from village open areas, which have no association with the National park.

Undermining local communities' right to utilize the natural resources and small contribution of wildlife sector in sustaining local communities' livelihoods compared to other land use practices have compelled TANAPA to think of ways of making local communities living in the fringes of National parks benefit from the resources.. As a result, TANAPA decided to support village-initiated projects using financial resources accrued from tourism as a way of sharing the benefits from conservation and also to improve local communities' social welfare. According to the MINAPA, villagers are supposed to develop a project plan or proposal and request for support from TANAPA.

It was very difficult getting information from the households regarding the benefit they (the households) were getting from TANAPA. In some areas, like Gomero, Ruhembe and Kihelezo, the majority of the villagers did not know of any service benefits from TANAPA. Relevant information about the benefits was obtained from village leaders through focus group discussions. However, even from the focus groups, it was not easy to know exactly the value of the services the villagers were receiving. Village leaders only knew about a number of classrooms TANAPA helped in building in some of the schools, but the exact amount of money used for such purposes was still unknown. Furthermore, whatever the actual amount of money that was used in the project came from TANAPA Head Office in Arusha.

Other social services provided by TANAPA to the villages included a recent construction of a police station at Doma, and the building of a village dispensary more than ten years ago. Although the police station was recently built, 20% of the interviewed households knew nothing about the project. The situation was worse in Mikumi where 48% of the respondents did not know of any benefits from TANAPA. In the focus group discussions a number of projects, which were funded by TANAPA, were mentioned, among them were the construction of classrooms for primary and secondary schools; safe drinking water projects, and the construction of a bank the ward. According to TANAPA Head Office, 5,000,000 Tshs was used to support the water and the ward bank projects. Two classrooms and a teachers' office got financial support from TANAPA in Ruhembe village. Additionally, I personally observed an extension of the village dispensary, which also got support from TANAPA. The extension included the construction of a small maternity room for pregnant women. Despite all these efforts, 28% of the respondents in Ruhembe were not aware that such projects were financially supported by TANAPA.

In 2005 and 2006, TANAPA built two classrooms, teacher's office together with the furnitures (for classes and office) in Kiholezo village. The total estimated costs for classroom and furniture was about 15,410,906 Tshs. Kiholezo has almost 7 sub village areas among which three borders MINAPA. The support for the project on the buildings was highly appreciated by village leaders during focused group discussion, however, 52% of the respondents were not aware of the classroom construction. The few who knew about the project only complained about the primary school being very far from the place they were living. The primary school, in which TANAPA helped in the construction of two classrooms, is located in the village centre, more than seven km from the sub village area, which borders MINAPA, and whereby about 90% of the people who suffers the conservation cost live.

Service benefits from TANAPA were minimal as observed in Gomero. 72% of the respondents did not know about any benefits coming from TANAPA. Most of the respondents could not tell which benefits originated from which source given that other benefits came from Selous game reserve, especially on the issue of employment. Selous

game reserve provides job opportunities to young people, especially men, to work as game rangers in two or three-year interval. It was also known from the focused groups that the wildlife department through Selous game reserve supported the project of building a health station at Kisaki. At Kisaki there is a TAZARA station, and the TAZARA railway provides the only access to Kisaki, Gomero and more than six villages located near Kisaki area.

4.5.2 Indirect benefits

Despite the direct benefits discussed in section 4.5.1 the study found out various other indirect benefits. Findings from focused group discussions in all the study areas, showed that the villages have been playing host to guests and researchers coming for different purposes. The guests contribute to the local economies through purchases of foods and drinks, as well as paying for the services in the local guests houses.. One respondent in Gomero who had a bar and a shop reported to have been receiving benefits from the national park and game reserve by getting foreigners coming to buy drinks from her shop and a bar. She said she was getting more money by selling a larger number of drinks to guests than she would get when rendering the same services to local villagers.

Mikumi was observed to benefit more from indirect services compared to all other villages. The village has a number of guest houses, hotels and recreational sites used mostly by visitors to MINAPA. Transport during illness was another indirect benefit observed in Kiholezo. TANAPA guides provide transport for the villagers incase of emergency, such as illness.

Other benefits TANAPA headquarter reported to have been providing to the local communities include giving opportunities to school children to visit national parks, to appreciate the natural heritage and learn conservation issues and ecosystem processes and values. This was done with a view of including conservation commitment in young brains and future responsible citizens. However such benefits were not reported in the visited sites.

4.5.3 Mikumi national park Revenue- Sharing

National parks system of sharing benefits is one way of benefiting and support local people living adjacent to these areas. In the year 2005/2006, MINAPA received 20790 registered or paying visitors; of these 13719 were domestic visitors. The income generated by these visitors was 349,771,657Tshs (approximately 287,400 USD). According to TANAPA, 2005/2006 51,152,510 Tshs was used to support local communities living adjacent to MINAPA at Kitete Msindazi, Kihelezo, Mikuni and Ulaya wards. This means that 14.6 % of MINAPA income was used to support local community projects. The percentage contribution is higher than what is suggested by TANAPA. 10% of the total Park income should be set aside for local community development projects.

4.5.4 Problems

Despite the benefits discussed in section 4.5.1. The local people reported to be experiencing serious problems by living near the parks. The biggest problem, which was reported by more than 70% of the respondents, includes crop destruction by wild animals. More information about crop destruction is presented in coming section (Part 4.6) of this thesis.

4.6 Human–wildlife conflicts

Conflicts between human and wildlife are one of the major threats affecting relationship between protected areas and the communities living adjacent the areas (Hill 1998; Naughton- Treves 1998)The 5th world park congress in Durban pointed out that “Human wildlife conflicts occur when the needs and behavior of wildlife impacts negatively on the goals of humans or when the goal of humans negatively impacts the needs of wildlife (Lewis 1996)

Conflicts in the protected areas are diverse depending on the source. Most important sources are evictions or removal of people from local areas for the purposes of establishing national parks, insufficient share of park resources, wildlife induces damage,

exclusion from resource access and use, high population pressure with demand for more land. The summary of sources, typology and possible interventions is given in Table 12. Among the conflicts sources outlined in Table 8 the wildlife crop damage appears to be the commonest in the villages bordering Mikumi and in most other wildlife protected areas in Tanzania. For example, Gillingham & Lee (2003) study reports of the wildlife crop damage conflict in the villages bordering Selous game reserve.

4.6.1 Nature of the conflict in the study area

Villages in the study area were located adjacent to Mikumi national park. The park area is separated from the village land by a buffer zone. The buffer zone is normally few meters from the park boundary. However, there is no any physical demarcation such as fences or hedges to separate the park area from the village land. Wildlife normally roams freely inside and outside the national park looking for water and suitable pasture especially during dry seasons. When animals roam outside the protected areas, they cause direct damages to crops planted by villagers, livestock and sometimes causing injuries or even death to human beings. The massive crop losses and wildlife costs were the primary sources of conflict in the study area.

Underlying source	Type of conflict	Possible interventions/measures
Evictions/removals	<ul style="list-style-type: none"> • Disaffection due to inadequate compensation of evictees • Ethnic conflict, and conflicts over land access and use, in areas where evictees are resettled 	<ul style="list-style-type: none"> • Increased compensation • Relocation to uninhabited areas
Exclusion from resources access and use	<ul style="list-style-type: none"> • Boundary conflicts between park and resource users • Conflicts related to illegal extraction of park resources • Sabotage of park infrastructure • Open hostilities between park and locals 	<ul style="list-style-type: none"> • Negotiation and settlement prior to delineation of boundary • Reasonable joint user agreements • Increased security • More reasonable user agreements; increased security
Wildlife induced damages (to crops, animals, humans)	<ul style="list-style-type: none"> • Disaffection due to inadequate compensation of damages • Conflicts over loss of human life or injuries • Conflicts over killing of wildlife 	<ul style="list-style-type: none"> • Increased compensation • Improved control of wild animals; education in human-wildlife relations • All the above; increased security
Insufficient share of park revenues accruing to locals (or insufficient knowledge of such)	<ul style="list-style-type: none"> • Conflicts related to illegal extraction of park resources • Sabotage of park infrastructure • Increased local crime • Open hostilities between park and locals 	<ul style="list-style-type: none"> • Increased investment in local welfare projects; education in terms of actual financial benefits • Increased security
Proliferation of stakeholders, and contact between these	<ul style="list-style-type: none"> • Increased local crime • Resource access and use conflicts 	<ul style="list-style-type: none"> • Constraining tourist and commercial hunting activities • Increased local participation in commercial activities • Increased security

Table12: Developed table of Sources, type and possible interventions for different types of conflicts.

125 households were interviewed in five villages, Doma, Mikumi, Ruhembe, Kihelezo and Kisaki. Of the 125 households interviewed, 59 households representing 47.2% of the entire interviewed household had problems with MINAPA. 93.2% of them reported on crop damage, 1.7% livestock and poultry lost, 1.7% wild animal injury problem, and 3.4% reported boundary disagreement as shown in Figure 7 below.

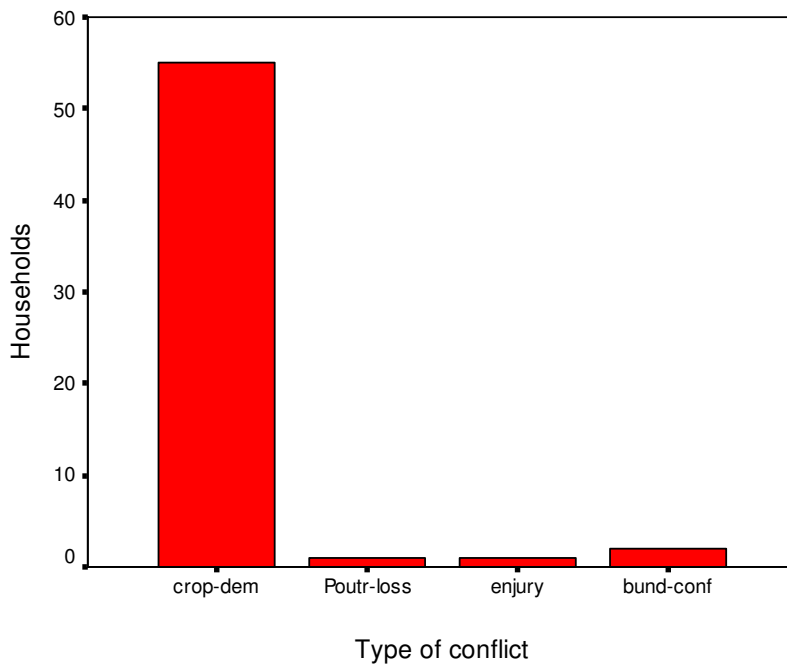


Figure 8: Problem associated with MINAPA (Source: Own field data 2007).

4.6.2 Crop- Damage

Wildlife crop damage is one of the prevalent form of human conflicts in the areas located adjacent to wildlife protected areas ((Idwasi 1996; Naughton- Treves 1998; Shemwetta and Kideghesho 2000; Kideghesho, Roskaf et al. 2007; Linkie, Dinata et al. 2007). Much research has been conducted in Africa (Naughton- Treves 1998; Hoare 2000; Hill, Osborn et al. 2002; Sitati and Walpole 2006) Economic losses of crop damage to

households in developing countries become higher because the people are poor and depend totally on agriculture for their livelihoods (Linkie, Dinata et al. 2007)

The degree of human wildlife conflict varies from village to village. Among 59 of the households who reported different problems associated with MINAPA and wildlife were distributed as follows, 30.5% were in Doma village, 23.7% in Mikumi, 13.6 % in Ruhembe, 25.4 % in Kihelezo and Gomero 6.8%. Doma and Mikumi are the nearest villages to the MINAPA office and these are the villages where many animals are concentrated; on the other hand Kisaki was the furthest village, whereas Ruhembe and Kihelezo were in the Middle.

Table 13. Type of problem and household involved in each village (Source: own field data 2007)

Village name	Type of problem				Total
	Crop-damage	Poultry loss	Human injury	land boundary conflict	
Doma	18	0	0	0	18
Mikumi	14	0	0	0	14
Ruhembe	7	1	0	0	8
Kihelezo	12	0	1	2	15
Gomero	4	0	0	0	4
Total	55	1	1	2	59

The data presented in Table13 above shows crop- damage problem as the major conflict in the surveyed villages. The magnitude of the problem is high in Doma village, followed by Mikumi and Kihelezo. About all of the interviewed respondents in Doma showed intolerant level with the crop destruction issue, compared with other four villages. Doma is a small village with a large population of villagers living very near to MINAPA boarder, and this might be one of the contributing factors to the human wildlife conflict in the area.

Serious crop damage to the area is caused by the tendency of small groups of elephants (4-8) walking in this village especially during the night. The tendency of the elephants walking in the village might be a result of close proximity of the village to the area where many big animals congregate particularly grazing and looking for other animals as prey. Big animals like elephants eat more compared to small animals such as monkeys and birds that take small quantities of animal feed. Elephants are most pervasive, greedy and powerful (Idwasi 1996). They are the worst destructive animals because of their behavior of uprooting the whole plant and eat only small portion, and at the same time destroying crops like tomatoes, beans and other small crops by feet while when they are moving.

The reported level of crop-damage in Mikumi was relatively high with 56% of interviewed household reporting to have their crops especially food crop like maize, tomatoes, bananas, sesame, sorghum, and beans destroyed. Elephants normally destroy crops when crops are in the early stages of growth or when crops have matured and only few weeks left before harvesting. The crop damage problem has been increasing yearly. Despite the fact that Mikumi village is also near the park, the extent of crop damage was lower compared to Doma; the reason might be Mikumi has a larger size of the village land than Doma. . Most people in Mikumi are concentrated in Mikumi-kidoma sub-village for business and employment reasons. Mikumi kidoma is further away from MINAPA border; thus big animals like elephants from the park seldom raid the villagers' farms.

The findings of this study are similar to the Animal Behavior Research Unit (ABRU) report (Gunn, Hawkins et al. 2005). ABRU in collaboration with MINAPA did a study between August 2004-2005 in five villagers bordering Mikumi including Doma and Mikumi. The findings of the study showed that wild animals from MINAPA carry out crop damage more often in Doma (107 days out of 588 days) than in Mikumi (46 out of 588 days). Moreover the report revealed that elephants are more destructive in February,

June and July than other months of the year where they destruct 22000, 18000 and 16000m² respectively.

Crop damage conflict in Kihelezo was low compared that in Doma and Mikumi. Many farms which borders MINAPA are cultivated by new inhabitants coming from different areas for agricultural reasons. The farms were abandoned by native villagers due to problems caused by wildlife. New inhabitants are cultivating these farms, as they do not have other options that the indigenous villagers have.

Crop damage problem in Ruhembe was minimum. Many villagers have big farms of sugarcane which grown as cash crop; according to them most wild animals do not prefer sugarcane in the presence of other crops like maize, bananas, sorghum tomatoes and sesame.

The least affected village in terms of crop damage is Gomero. The village is located far from MINAPA office and from MINAPA boarder. However, the village is r nearer the Selous game reserve. Crop-damage caused by wild animals from MINAPA is not a problem at all in this village, though four households reported such cases. Households that reported the problem admitted that monkeys and big rats are the main cause of the problem; and it is not clear as to whether such animals belong to Mikumi or Selous game reserve. Few households complained of crop raids by elephants coming from Selous game reserve.

The widely reported destructive animals were elephants, wild pigs, buffaloes and monkeys. Elephants caused 90% of crop destruction in Doma and Mikumi, while for the t remaining three villages that is Ruhembe, Kihelezo and Gomero monkeys and wild pigs were reported as the most destructive animals. The findings were similar to those in ABRU report. The report indicated that 99.6% of the crop damage was caused by elephants, monkeys and wild pigs; however, elephants caused more destruction than wild pigs and monkeys.

In contrary to these findings, Gillingham and Lee (2003) reported of on-farm crop damage in the areas bordering Selous game reserve as been caused not by big animals like elephants, but by small to medium animals like bush pigs, vervet monkeys, and birds.

4.6.3 Causes and Triggers crop damage conflict

In response to the questions asked concerning the cause of the problem about 90% of the few affected households in Mikumi, Doma and Kihelezo, reported on having a tremendous increase of the number of animals especially elephants in the past ten years. The minority about 10% cited drought as the cause of the problem. Both factors contribute to crop damage to a certain percentage. Water is very essential to elephants, who normally drink more than 200 Litres per day, for this reason the animals tend to move long distances, especially during dry season, in search of water from streams, rivers, irrigation canals (Nyhus 2000).

According to the interviewed households, the problem of crop damage has been increasing every year. A common view across the entire households consulted is that the increased elephants population plus the animals being fearless to people accelerated the problem. Elephants are no longer scared of people as they used to do in the past years. The circumstance is also influenced by limited number of game ranger responsible for the chasing or scaring wild-animals coming to villages. There is only one game ranger per district while a district can have four to ten bordering villages. For example, Mvomero district has four villages bordering MINAPA, Kilosa district has 11 villages, and Morogoro urban has 4 villages. Almost all the villages cultivate more or less during the same time, hence it's impossible for one game ranger to be at two or three areas at the same time. The problem of shortage of game rangers is very serious in Mvomero and Kilosa districts.

Other reason reported by one of the respondents was with regards to the past years experience. 12 years ago, employees of MINAPA used to cultivate different crops

especially maize in the boundaries; for that reason wild-animals were eating these crops thus not crossing boundaries to the nearby villages. Nowadays, MINAPA officials no longer cultivate crops due to the high costs involved in the exercise. This forces the wild animals into venturing further into the people's habitats looking for food and water sources especially during dry season.

4.6.4 Costs related to crop damage

In analyzing the magnitude of crop damage, the surveyed data shows that the most destroyed crops in the order of severity include maize, tomatoes, rice, mangoes, coconut trees, sorghum, millet, banana, sunflower and sugarcane. The order given was based on the responses from the households to the question, '*which crops were eaten by wild animals from MINAPA in your farm during 2006/2007 season*'. For that reasons the order was in accordance to the types of crops cultivated by the households in a specific area; it was these crops, which were more destroyed. Income loss from crop damage was devastating to many households in Doma and Mikumi causing unbearable financial problems. This was particularly the case when the household concerned was indebted, and at the same time relying on agriculture as the major livelihood activity. One respondent in Mikumi said he wanted to sell the house so that he could pay back for the agriculture loan he got from the village SACCOS. He used the money to cultivate fields for growing rice and sesame, but ended getting nothing mainly because of crop damage due to destructive wildlife and partly due to drought.

Table 14: below estimate the total cost from Crop damage, Poultry loss and injury caused by wild animals from MINAPA. (Source: Own field data 2007).

Village name	Total crop lost (Tshs)	Total poultry loss (Tshs)	Cost enquired (Tshs)	Total amount loss (Tshs)
Doma	2400000	0	10000	2410000
Mikumi	1890000	0	30000	1920000
Ruhembe	266000	15000	0	281000
Kihelezo	612000	0	15000	627000
Gomero	153000	0	0	153000

The costs resulting from crop loss is much higher in Doma and Mikumi than is the case in Kihelezo, Ruhembe and Gomero. The percentage crop lost at Doma and Mikuni in relation to the total costs in all the five villages was enormous. As mentioned before, the main reason is the proximity of the two villages to MINAPA where big animals like elephants are concentrated. Large animals such as elephants and wild pigs eat more than small animals like monkey and birds.

At Doma and Mikumi, the problem of crop damage by wildlife was reported by 80% of the interviewed households and was perceived as a primary constraint to better livelihoods. And according to ABRU (2005) report, monkeys, elephants and pigs destroy crops almost throughout the year, although maximum destruction, largely caused by the elephants, occurs in the months of February, June, and August. Crop damage problem causes adverse effects to many poor households with no livelihood alternative apart from agriculture.

4.6.5 Relationship between village distance and Total amount lost

Distance from the national park to the villages is one of the important factors contributing to an increase in the magnitude of crop damage in most areas. Figure 9 looks at the relationship between distance from the villages to MINAPA and the total amount lost due to wild animals.

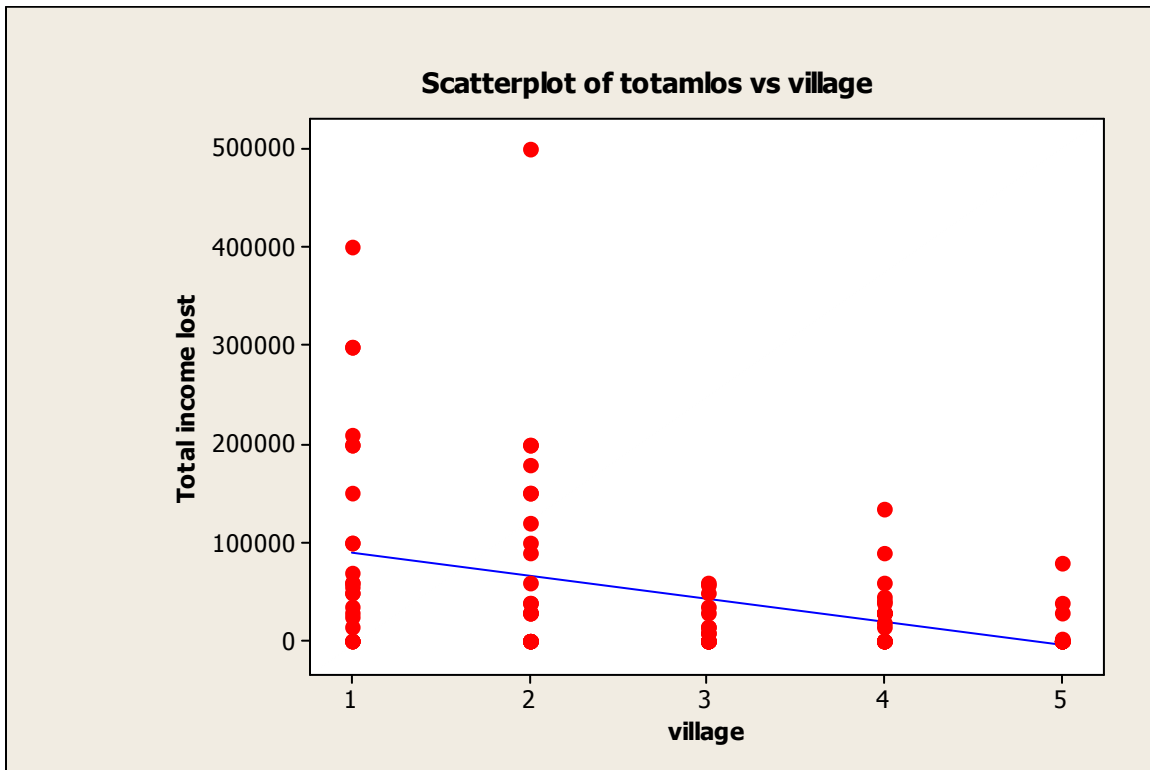


Figure 9: Relationship between village distance and Total amount lost
(Source: Own field data 2007).

Figure 9 reveals that there is a significant relationship between crop damage and distance from the village to MINAPA. ($R\text{-Sq (adj)} = 16.0\%$, $P=0.000$). This means the income loss caused by wildlife decreases as the distance from the village to MINAPA increases. In other words, the villages near the park boarder are under constant assault by wild animals. Therefore village located near MINAPA should be given special attention as far as wildlife crop damage is concerned.

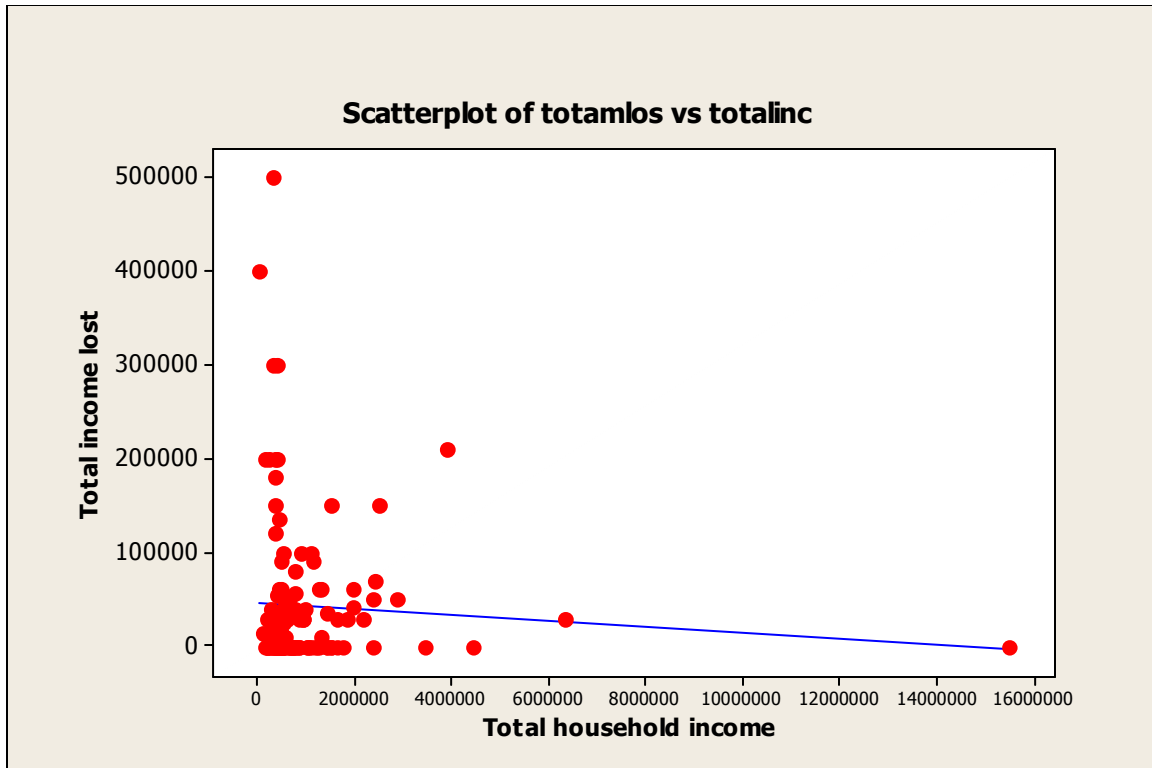


Figure 10: Relationship between total household income and total income lost.
 (Source: Own field data 2007).

Scatter plot shows a negative relationship between total income loss and total household income. The figure indicates that the majority who affected by the crop damage problem are those from low-income households. Poor households loose more income than rich households. Poor households are subsistence farmers who do not have alternative means of generating income rather than crop cultivation. Normally rich households tend to diversify income-generating activities, and usually focusing on most profitable activities. Poor households have no alternative other than continuing with crop production even when they have to face some setback.

4.6.6 Outcomes of conflicts

Conflicts between wildlife and local communities living around the parks are an important factor affecting the local people's livelihoods and sustainable wildlife conservation (Hill, Osborn et al. 2002) For example, the current study has shown the

prevalence of serious crop damage in Doma, Mikumi and Kihelezo due to the mentioned problem. Villagers a lot of spend time, resources and money to mitigate the problem. Under these circumstances, it is difficult to expect villagers to have positive attitude towards wild animals, national park authority or the government.

Impact on people's livelihoods

Agriculture is the main livelihood activity of most rural people in developing countries. It is also an important source of household income. Agriculture plays a central role in Tanzanian's economy. It contributes about half of the national income, three quarters of merchandise exports and provides employment opportunities to about 80 percent of Tanzanians (MAFS, 2000)

Table 15, put forward crop damage cost caused a reasonable impacts to total household's income in Doma, Mikumi and Kihelezo. Many households in Doma depend on agriculture income from selling tomatoes, which fetch good price at the village level compared to all other crops. In one way or another, crop damage caused by wild animals from the park to great extent, contributes to the household income loss. (See table15). To some households, crop damage cases were very serious ones to the extent of causing food insecurity because villagers had to abandon their good cropland as it happened at Doma and Mikumi.

Table 15: Percentage of crop damage costs in relation with the total household's income from agriculture and livestock keeping (Source: Own field data 2007).

village name	Total farm income (Tsh)	Total farm income lost (Tsh)	Percentage of farm income lost
Doma	9671850	2400000	24.8%
Mikumi	7925000	1890000	23.8%
Ruhembe	13000000	266000	2%
Kihelezo	11500000	612000	5%
Gomero	5548200	153000	2.7%

Human and wildlife conservation have conflicting agendas; humans are looking for the improved livelihoods while wildlife conservation aims at protecting wildlife (Chardonnet 2006). The magnitude of crop damage can be so high as making the affected individuals aggressive and intolerable towards wildlife, resulting into killings of the destructive animals. For example, Nyhus *et al* (2000) reported that 12 elephants were poisoned in Way Kambas national park in Indonesia as results of human elephants conflicts. Although negative attitude towards wildlife was not observed in the surveyed villages, but in the long run the situation may change if matters get worse.

4.6.7 Coping strategies in controlling crop damage

In recent years, crop damage problem has become severe in a number of villages bordering Mikumi national park. As a result, villagers have adopted a number of strategies to minimize the problem. The strategies were especially adopted in Doma and Mikumi where villagers experience serious crop damages in their farms due to wildlife.

Many (about 61%) of the interviewed households in Doma and Mikumi keep night vigil, when nearing harvest time, to guard their farms In guarding the farms, which is the most

prevalent method used, the villagers use a combination of strategies including making loud noises by hitting metals or using drum beats, lights from the fire or touches to scare the animals away. Wild animals are usually scared of the noises and the light; thus they would usually run back to the park upon hearing the noise or seeing the light. Though many households are guarding their farm, the method is becoming less effective season after season. Elephants' behaviours have been changing over the years; the elephants have become more intelligent and more accustomed to the noise and light. Therefore, the villagers have to keep changing the strategies to protect their crops.

The task of guarding farms especially in the night seems to be difficult to many households. The risk of sleeping in the farms in very insecure house buildings was a point of concern. According to several respondents, one person got lost when guarding his rice farm at night in Mikumi village. The story frightened many people who eventually stopped guarding their farms during the night

In other times, farmers decide to harvest their crops before fully maturity to avoid the risk of loosing all in one night. Farmers loose economically as they are forced to sell their crops even when the prices are low because waiting for better prices is risky to them. They said it is better to get something rather than getting nothing.

4.6.8 Other park related problems

A total of two cases of boundary conflict were recorded in Kihelezo village. In 2007, TANAPA started a programme of locating park boundary with Geographical Positioning System (GPS). Because boundary markings in the previous years were done manually, some of them could not last long. Locating boundaries manually was unprofessional as the boundaries in some of the areas were wrongly marked. One of the respondents in Kihelezo said

“We have a problem with these people from the park; recently they said part of my farm was found to be inside the park area. I don’t know what is the reason I have been cultivating my farm for many years without facing any problem”.

However Doma village benefited from the park mapping. This was unlike in Kihelezo where the GIS found the park boundary to be inside the village land. Therefore through GPS, the new boundary was established. The adjustment of the boundary increased village land.

On average the impacts of boundary conflict to household livelihoods were minimal as compared to crop damage. The effects of these conflicts were more pronounced when the land taken was considered as a cumulative total of the land taken from individuals” This means that the land taken from each individual is not worth mentioning but cumulative to the whole village. However, the affected households were not compensated for the land.

Personal injury by wild animal was reported by one villager in Kihelezo. The villager was attacked by a buffalo when he (the villager) was on his way to his farm. The villager however managed to escape from the buffalo with minor injury on his leg. Human injury or death from wildlife was not a serious problem in the surveyed areas. According to the reports from households, injury or death was a rare case in the villages. In contrary to the findings, (Idwasi 1996) reported of the wildlife having killed 230 people, and injured 218 from January 1989 to June 1994 in Kenya (Tsavo national park.). Elephants mainly perpetrated the attacks.

The livestock and poultry damage problems were considerably small; only two households lost five chicken. Small chickens are normally eaten by hawks. From the findings, there was no report of attacks on domesticated animals like goat or sheep by big wild animals from the national parks. Livestock damage is a big problem in the national parks boarding pastoralist’s villages. Carnivores including lion, hyena, cheetah and leopard frequently prey upon livestock. Moreover, there is also a problem of disease

transmission which include malignant catarrh fever, east coast fever, rabies, foot and mouth diseases from herbivores and carnivores (Idwasi 1996).

4.6.9 Conflict resolution

Human and wildlife conflict as a result of crop damage and illegal hunting has been threatening the world heritage of African wildlife (Kiss 1990). The management of protected areas depends more on the cooperation and support from the local people. Therefore understanding the reasons and possible solution to wildlife is crucial to enhancing positive relationship between the local people and wildlife within national parks (Nyhus *et al* 2000). There is a need for the protected areas to be viewed within a holistic approach to enhance sustainable conservation of wildlife.

In the study area, there were no conspicuous efforts made in mitigating or minimizing the conflicts. The villagers were complaining about the problem becoming more serious every season. The villagers have been reporting the problem to village leaders with no avail at least in minimizing the problem. Few of the respondents said they were no longer reporting the problem because they normally get nothing after reporting. No any assistance or compensation is given to them to sustain their livelihood.

Concluding Human wildlife conflicts

The surveyed data reveal of there being a serious crop damage conflict in the study areas. The magnitude of the problem differs from one village to another. It was high in Doma village, followed by Mikumi and Kihelezo. Most cited destructive animals were Elephants, wild pigs, buffaloes and monkeys. The animals normal raid the village farms throughout the year, however in the months of February June and August, elephants are the most destructive (in terms of hectares damaged).

Villagers use diverse methods of protecting their crops against wild animals. The commonest one is guarding the farms especially at night, although the method is

becoming less the effective of season after season as elephants become more intelligent accustomed to methods. The villagers complain of not seeing efforts made in mitigating or minimizing the problem, which is becoming more serious year after year in the study area. .

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This particular study aimed at assessing the livelihoods of the communities living in the villages located adjacent to Mikumi national park. Also looked at the benefits and constrains of the national park on people's livelihoods and on wildlife conservation; and lastly the study explored the main conflicts between the local people and MINAPA.

The findings from the study show that households are engaging in diverse portfolios of income generating activities but farming was the main livelihood activity to 67.2% of the interviewed households. All of the households engaged in food crop production for subsistence, but not all depended as the main source of income. Other income generating activities found were seasonal labour (i.e. working on other villagers' farms), crop and non crop businesses, village shops, mgahawa (local small restaurants), local beer brewing and formal employment like teaching and nursing.

The total income for all the households interviewed was estimated to be 125,964,000 Tshs per year, which is approximately equal to 2800 Tshs, or 2.3 USD per day. Farming activities contributed 44% to the total household income. The main cash crops in the surveyed villages include sugarcane, sesame, tomatoes, tobacco, cotton, and watermelon. Non farm and off farm activities are the next main activities contributing to 41.20% and 8.57% of the household income respectively. Remittance and environment income have very small effect; all together contribute 6.24% of the total household income.

Regarding the environmental income, the findings reveal low contribution of environmental income (3.07%) to the total household income. The extractive use of resources from the park is strictly prohibited by law, making the villagers not having any alternative of accessing environmental resources. Despite the low contribution of environmental income to the total household income and the restricted access to environmental resources, such resources were found to be vital. Approximately, 89% of

the households interviewed depend on firewood as the source of energy for cooking, and 48% of all the respondents had mud houses with grass-thatched roofs. This means these villagers depend on environmental resources to collect building poles and grasses.

The study observed an increasing products collection as the park distance increases. However, Mikumi village was found with a high income although the area is near the park. Some of the villagers in Mikumi are wealthier thus they can afford to buy hunting license. Owning a hunting license permits a person to hunt wild animals and obtain income after selling the proceeds.

There was no significant environmental dependency found. Regression results showed two trends of trajectory. One trajectory reveals richer households extracting more environmental income while the other trajectory shows poor households depending more on environmental income. Richer households are the ones who benefit more through hunting as they can afford hunting licenses as opposed to poor households who depend on environmental resources as the last resort because of lack of alternative. Gini coefficient of the total household income including environmental income was 0.5039. The value is a bit lower than Gini coefficient of the household income without environment income, which is 0.5054. The findings means environmental income reduces the households' income inequality although to a very small extent.

A number of service benefits provided by TANAPA through Community Initiated Projects (SCIP) programmes were found in the study area. Almost all of the visited sites, the projects which got support from TANAPA include social services such as dispensary, primary and secondary schools, and safe drinking water projects.

Crop damage was the main cost of park found in the study area as it affects 44% of the surveyed households. On average, 11.6% of the total household income was lost due to crop damage. To some households crop damage cases were very serious to the extent of causing food insecurity. Several strategies were adopted by villagers to minimize the

problem like to guard the farms at night, cultivate in other farms located far from the park boarder and to harvest the crops earlier.

The findings reveal significant relationship between the amount lost and the distance from the village to MINAPA. This is because as the distance from MINAPA to the village decreases economic loss caused by wildlife increases. Majority who experience crop damage problem are those from low income households. Poor households loose more income than rich households. These are subsistence farmers who have no alternative to crop cultivation in generating income. Normally rich households tend to diversify income-generating activities, through focusing on the most profitable activities.

The study observed there being limited number of game rangers in the villages, and this could be the major trigger of the problem. There are however, other reasons such as drought and increased number of elephants, which accelerated the problem. Furthermore, there were no efforts made by village authorities or TANAPA resolving the crop damage problem observed in the affected areas. The villagers especially in Doma complained that the magnitude of the crop damage has been increasing every year. The general villager's perception was that TANAPA and the government cares more about wild animals than they do about people's livelihoods.

5.2 Recommendations

Sustainable management of wildlife resources in Mikumi national parks needs active community involvement of local people , well established institutional framework, logical and holistic policy which put into consideration long term benefits of local communities and environmental sustainability.

Benefit sharing

Due to socio economic situation local communities living adjacent to MINAPA, The park must include benefit sharing schemes as a way of compensating local people for restricted access to the resources. The present system focus only on supporting public

services like schools and hospital. It is time now to include cash benefits to these communities. Sharing cash benefits will be a conservation incentive to local communities to strengthen the cooperation hence sustainable wildlife conservation.

Compensation

Government and TANAPA should think a way of compensating people when significant damage or crop loss occurs. Currently there is no compensation for crop or animal lost. Compensation doesn't mean total refund of crop lost rather some things to show concern. Full compensation will make households not to guide their farm as they will know for surely they are going to be compensated from the damage. In Indonesia, Way Kambas national park villagers were given a can of cooking oil and five cartoons of noodles because of crop damage they got.

Local people's participation

Effective wildlife conservation can be successful if full participation of local community is involved; therefore there is a need to develop effective mechanisms for joint management, which effectively involve local communities. I encourage MINAPA officers to carry out thorough meeting with local communities, discussing conservation problems and how to solve problems. Participation of communities is needed not only in discussing but also in policy planning and implementation.

Conflict resolution

Human wildlife conflict resolution is important for wildlife management, failure to resolve conflicts it will be difficulty to achieve wildlife conservation objectives, basing on the fact local communities living adjacent to protected areas plays an important role in conservation issues. The following needs to be done to reduce the magnitude of the problem.

To increase the number of game rangers, instead of having only one in a district, could also be effective. Each village with serious crop damage conflict should have two or

more game ranger specifically for the area. Collaboration of game together with villagers will help to reduce the enormity of the problem.

MINAPA with collaboration with wild animal ecologists should study the path where animals are using to enter village lands; the study shows wild animals like elephants enter villages with land boundaries than areas with river or trenches (Nyhus *et al* 2000). Identifying animal path will help to a greater extent to plan for mitigation measures.

In villages where crop damage problem is severe, TANAPA should construct fences to prevent free movements of the elephants or increase the number of game rangers who will camp in these areas to guide village farms against destructive animals from the park.

More research on destructive animal behavior should be done to understand temporal and spatial factors that predict crop raiding and effective guarding techniques.

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Appendix i

Household survey Questionnaire

Date _____

District _____

Questionnaire no. _____

Division _____

Interviewee name _____

Village _____

1. Household Characteristics

1. Age of the household _____

2. Sex _____ (1)-Male (2)-Female

3 Marital status (1) - Married (4)- Widow
(2)- Single (5)- Living together
(3)- Divorced

4. Level of education (1)- University education (4) - secondary form four
(2)- Diploma (5) - Primary Std seven
(3)- Secondary form six

5 Occupation _____ (1) - Peasant (2) - Village council leader (3) - Business person
(4) Formal employment (5) -Self employed (6) - Others (Specify)

6 Household members

Age (Yrs)	Number
1-6	
7-15	
16- 65	
66 to oldest	

7. Children going to school

Age (Yrs)	Sex	Education level

8a. Do you have Child/ Children in school- age not going to school? (1) Yes (2) No

8b. If Yes, What is the reason(s) _____

2. Assets and wealth

A. Land

Size of own land	Size of hired land	Total land under cultivation

B. Animals

12a Do you own animals (1) Yes (2) No

12b. which animals do you have

Animal	Number	Animal	Number	Animal	Number
Cattle		Chickens		Sheep	
Pig		Ducks		Turkey	
Goat		Guinea fowls			

C. House

13a Do you own a house (1)Yes (2) No

13 b How many houses do you own _____

No. of rooms	Building materials	Costs	Roof	Floor	Current Value (Tshs)
	1.Cement		grass	cement	
	2.Burnt bricks		galv.iron	tiles	
	3.Mud bricks		mud/cow dung	earth	
	soil				

D. Equipments

14. Do you have one of these equipments?

Name of equipment	Number	Current Value(Tshs)	Name of equipment	Number	Current value Tshs
Ox- Plough			Electrical/gas cooker		
Bicycle			TV		
Motorcycle			Radio		
Sowing machine			Wheel barrow		
Brick-making machine			Fridge		
Car			Tractor		

3. Incomes and Costs

A. Cash Income

(i) Agriculture

Crop	Total yield	Amount sold	Price / unit	Income obtained	Labour Cost	Fert. cost	Pestci. cost	Seeds cost	Net income
Maize									
S/potatoes									
Beans									
Rice									
Irish potatoes									
sunflower									
Millet									
Onions									
Tomatoes									
Peas									
G/nuts									
Cabbage									

(ii) Animal products

Product	Amount produced per month	Amount sold per month	Price per unit	Cash obtained	Food cost per month	Labour cost	Vet and Med. cost	Other costs	Net income Per month
Milk									
Eggs									

(iii) Animals

Animal	Price bought	Food cost	Vet. And medical cost	Labour cost	Current Price	Net income
Cattle						
Pig						
Goat						
Sheep						
Chickens						
Ducks						
Guinea fowls						
Turkey						

(iv) Self employed activities and business

Income source	Income per consignment	Material cost	Labour cost	Net income (per consignment)
---------------	------------------------	---------------	-------------	------------------------------

Brick making				
Mat making				
Maandaz/chapatti business				
Carpentry				
Art crafts				
Tailoring				

(v) Other sources

Source	Amount per month	No. of month received	Total income per year
Salary			
Remittance			
Seasonal labour			

(vi) Income from Natural resources

Wild resource	Origin of the resource	Amount gathered	Price per unity	Total income
Honey				
Fish				
Wild meat				
Timber				
Fuel wood				
Fodder/grass				
Wild medicine				

B. Non-cash

Activity	Quant. obtained	Market- Price	Est. income
Work for food			
Hunting for food			
Fishing for food			
Collecting fruits			
Food aid			

Do you get any goods (incl. foodstuff) by exchanging them for other goods (bartering?)
 (1)Yes (2) No

If Yes: Which goods did you give and which goods did you receive? _____

Costs

Cost	Quantity lost	Cost enquired	Value of lost asset	Compensation	Total amount lost
Animal lost					
Crop lost					
Wildlife damage human					

4. Food Security and Coping strategies

Is the food sufficient for your family throughout the year? (1)-Yes (2)- No

If not, what are the coping strategies used in the period of food shortages
 (1) Sell cash crop to get money (2) Sell labour to get money (3) Sell household assets (4) Borrow money (5) sell livestock (7) Others specify

In the past five years, how many years did you get food shortages? _____

5. Natural resources use and Management

Do you have access to any natural resources within the national parks? 1. Yes 2. No

If Yes 1. What are the resources? 1. _____ 2. _____

What are the benefits (cash and services) you are getting from using these resources or from National park authority

- 1. _____
- 2. _____
- 3. _____

Are the benefits equally shared to all villagers? 1. Yes 2. No

If Not, Who benefits more (1) Rich (2) Poor (3) Males (4). Females (5) Young people (6) Old People

What are the main problems do you get by having National park near your area?

1. _____

2. _____

What are the sources of energy for cooking for your family? (1) Firewood (2) Charcoal (3) Kerosene (4) Electricity

Where do you get such energy for cooking _____

6. Conflicts

Have you/ any of your household members been engaged in conflict with the national park authority?

If Yes, What was/were the main causes of conflicts?

Do you think the conflict caused negative impacts on wildlife condition, If Yes what wwere/ are the impact(s)

1. _____

2. _____

What was/were the impact conflict to your daily life?

1. _____

2. _____

Do you have any legal office in to resolve these conflicts in your village?
If not, how you resolve conflicts?

Appendix 11

Regression Analysis: totalinc versus totamlos

The regression equation is
totalinc = 1059868 - 1.216 totamlos

S = 1587735 R-Sq = 0.4% R-Sq(adj) = 0.0%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	1.19695E+12	1.19695E+12	0.47	0.492
Error	123	3.10071E+14	2.52090E+12		
Total	124	3.11268E+14			

Regression Analysis: totamlos versus village

The regression equation is
totamlos = 112812 - 23228 village

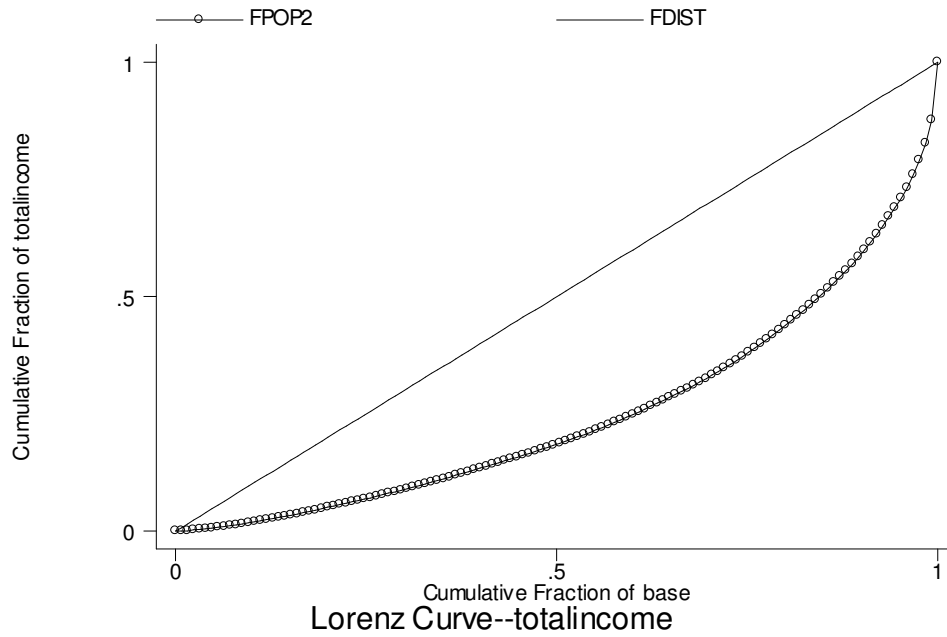
S = 74028.4 R-Sq = 16.7% R-Sq(adj) = 16.0%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	1.34885E+11	1.34885E+11	24.61	0.000
Error	123	6.74065E+11	5.48020E+09		
Total	124	8.08950E+11			

Appendix iii

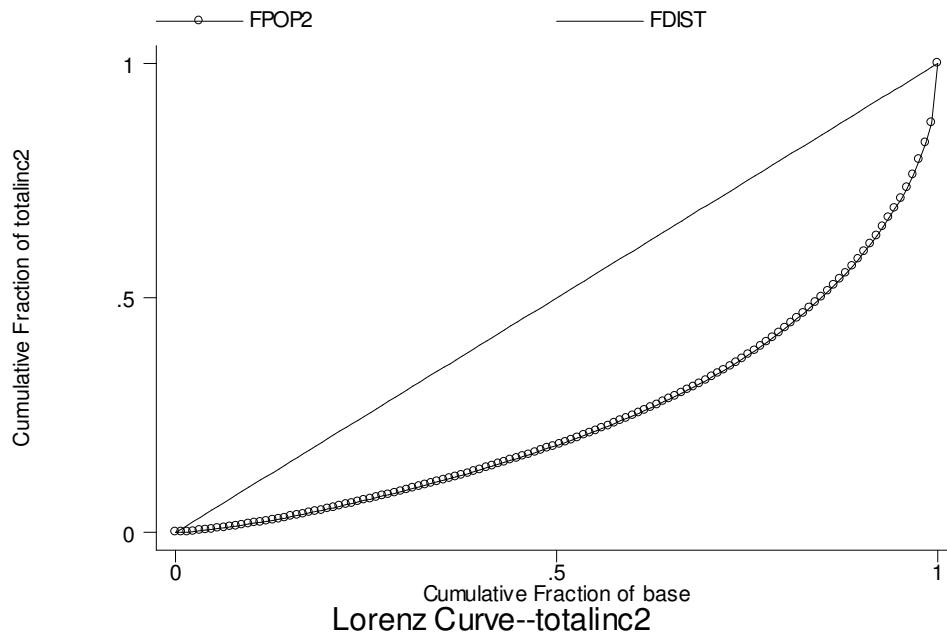
Gene coefficient total income with environmental income



	Mean Dev. about							
Max.	Mean	Median	MeanDif	CV	CD	Gini	SEMean	% Dev.
Totalin	7.5e+05	6.3e+05	1.0e+06	1.5727	1.1425	0.5039	1.4e+05	1437.31%

Appendix iv

Gini without environmental income



variable	Mean	Dev. about Median	MeanDif	CV	CD	Gini	SEMean	Max. % Dev.
Totalin2	7.3e+05	6.1e+05	9.9e+05	1.5932	1.1181	0.5054	1.4e+05	1485.98%