

**MINISTRY OF NATURAL RESOURCES AND**  
**TOURISM**

**WILDLIFE DIVISION**

**BASELINE SURVEY OF THE EASTERN PILOT WILDLIFE**  
**MANAGEMENT AREAS**

**FINAL REPORT**

**VOLUME II: IDODI-PAWAGA**

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## **Executive Summary**

### **0.1 INTRODUCTION**

The main objective of this study was to facilitate the collection, analysis and compilation of baseline information from 16 pilot WMAs. This information is intended to be the basis for the development of Monitoring Indicators and Monitoring Plans during the implementation of the proposed Idodi-Pawaga pilot WMA.

### **0.2 METHODOLOGY**

Both primary and secondary data were collected from all villages surrounding the proposed WMA.

#### **Socio-Economic Data**

- Secondary data was collected through extensive literature reviews from documents obtained from different sources, including GTZ, WWF, IRA, DFID, MNRT and WD. There were also consultations with key and primary stakeholders in the above listed institutions, councilors, and other key players. In the study areas we also visited MBOMIPA offices in Iringa Town and Iringa District Wildlife Offices.
- Primary data was collected from all the villages surrounding the the pilot WMAs, except for two villages which were not visited due to their inaccessibility. Two villages were visited per day, spending about three hours of interviews in each village. Within the villages discussions and/or meetings were conducted with village governments, focused groups differentiated by age and gender, and a few of the curious general public.

Data Collection Instruments used included:

- PRAs techniques using through focused group discussions, wealth ranking, key informants and individual villagers' interviews. A checklist developed in Dar es Salaam was used to gather information from the respondents.
- A household questionnaire was also administered to 4 villages. The selection of villages for household interviews was done randomly, while that of the respondent households was stratified in terms of main occupation (agriculture or livestock keeping), gender, age and migration status. From each stratum villagers were selected randomly making a total sample of 30 households per village.
- Photographs were taken where deemed appropriate.

Data weaknesses and limitation:

- The data collected from the villages depended very much on the respondents' recall capability. Most of the villages seem not to have proper record keeping systems that may affect the reliability of the data.

However, secondary data from MBOMIPA, GTZ and the Ministry of Natural Resources and Tourism helped to reduce the weakness in reliability.

### **Ecological Data**

Data collection involved literature review, field reconnaissance surveys, and informal discussions with selected individuals knowledgeable about the area and public meetings with village government leaders.

- The scanty secondary data provided supplementary information to that contained in this report. Various reports were reviewed specifically to collate information and establish ecological status of the area to cover:
  - the current ecological status of the area
  - trends and use of wildlife (consumptive and non consumptive uses)
  - the status of vegetation communities and an assessment of the suitability of the habitats for wildlife
  - the current status and trends in water availability for wildlife
  - an overview of wildlife movements
  - status, trends and use of fisheries, forest and bee keeping resources and other biological resources
  - human-wildlife conflicts and natural resource use conflicts in general.

Primary data collection was done through:

- rapid field reconnaissance surveys on the proposed WMA. In the field visits the ecologist was accompanied by the District Game Officer and/or a local resident who knew the area. The field visit gave room for site discussions and exchange of ideas on the observations made. The purpose of the field reconnaissance was to identify key ecological issues that require immediate action and follow up during the first three years of the pilot project. Due to limited time and resources, fieldwork was limited to road transects around the proposed WMA. Driving along selected roads provided an overview of the ecological status of the area and helped to verify some information provided by villagers, as well as verify information collected from secondary sources.
- interviews with village government leaders and village game scouts selected as representative samples of various communities in the villages where interviews. Village government leaders were selected for the interview because they are elected by communities to represent them in making important decisions. All members of the village government were invited to participate in the interviews, believing that the information provided was representative of community views. Village game scouts were selected because they are directly dealing with natural resources protection in the area, so it is believed that they have a better view of the problems existing in the field than other members of the community.
- a checklist of ecological information relevant to the proposed WMA was administered, together with social and economic aspect questions, to the village leaders of villages in the proposed WMA. Open-ended questions were posed to the village leaders, and each was given the opportunity to respond while

others were allowed to give their comments on the response given. The consensus of the majority was recorded as right response.

- special informants who seemed to understand the area better and had interest in conservation were selected from the local communities and interviewed. They provided ecological information that either verified information collected from secondary sources, or provided information that was unavailable.
- GIS work was done at the Tanzania Wildlife Research Institute. The work involved digitizing specific thematic maps and overlaying selected information to suit the purpose of this study. The package used in this analysis is ArcView. Analysis was done at a limited scale due to limited financial resources.

### **0.3 SURVEY FINDINGS**

#### **Sociological Aspects**

##### **Demographic characteristics**

Population change in the proposed Idodi-Pawaga WMA is very dynamic due to in-migration. More than 50% of the respondents reported to have been born outside their villages of residence. 30% were recorded to have moved in the area in the last ten years in search for agricultural opportunities. The seemingly high influx of in-migrants is balanced by equally high rates of out-migration which in some villages is as high as 40%.

##### **Natural resource use**

Fuelwood is the most used resource in the proposed WMA, followed by charcoal, building poles, thatch grass and medicinal plants. Wildlife is widely recognized as an important resource in the proposed WMA; the influence of the work by MBOMIPA is evident in this respect.

##### **Institutional Set-Up**

The standard village government structure comprising three main committees (Planning and Finance; Peace and Security, and Social Services Committees) prevails in all the villages visited. Under these committees are various specialized sub-committees. The Natural Resources Sub-Committees operate under the Planning and Finance Committees.

##### **Governance**

Infancy or lack of opposition political parties has led to a situation where there is no watchdog to forestall or criticize village government excesses or abuse of power.

There are very few active CBOs. The few that exist include MBOMIPA. Others belong to religious missions dealing with provision of social services such as education and health care.

### **Understanding the concept of WMA**

This was measured by calculating the percentage of people mentioning all the three attributes of the concept, i.e. participation, benefit sharing, and resource conservation in defining the concept. Results show that perception is comparatively low (31%).

### **Level of development of WMA**

Idodi-Pawaga has made considerable progress. MBOMIPA has been converted to an NGO with an Advisory Board. Every member village has a Natural Resources Committee and a group of trained Game Scouts. They still need to form Authorised Associations to carry out the proposed WMA activities.

### **Economic Aspects**

#### **Land use**

Land use pattern consists of residential, agriculture, grazing and conservation (WMA) land. Few villages have set aside land for later use and some have areas set for burial purposes. Except for land set aside for the proposed WMA, no other land was reported to have been conserved for ecological purposes. Attempts to quantify area under different uses were difficult because most of the villages do not have land use and general management plans.

At household level farmers were able to mention number of plots and crops grown but it was very difficult to provide acreage under each crop. This is partly because farmers practice intercropping rather than pure stands.

In many villages land for grain farming other than rice is plenty and many people practice shifting cultivation. However, land for rice farming and gardening is not adequate in all villages visited. The two crops are important for food security and cash incomes. Following the collapse of cotton and pyrethrum cooperative marketing rice has emerged as a major cash crop in the area.

The reasons for limited land for rice production in the villages surrounding the proposed WMA include limited irrigated land, population pressure due to influx of people from other parts of the country and unequal distribution. Few farmers have farms ranging from 10-20 ha. They rent some of farms to other farmers at a cost of Tshs 15,000 to 30,000 per ha per season. This amount is very high for many farmers to afford especially the youth generation who want to start farming activities.

Inadequate land for grazing is also facing the livestock sector. Insufficient water for livestock is common for many villages and has been the major source of conflict between farmers and livestock keepers. But

also poor governance by VG in managing and allocating resources to different users has contributed to these conflicts.

### **Village economic status**

People in Idodi-Pawaga are principally agriculturalists. Almost 99% of the population are either pure farmers or mixed farmers. Other economic activities include livestock keeping mainly by Masai, Sukuma and Barbaig. There is also petty business especially during dry season. It includes shops, transport services, and milling machines. Fishing and beekeeping are operated on subsistence levels.

### **Agricultural farming technology**

Farming is mainly by hand hoe. Input use is very low or non-existent. Farming is both rainfed and irrigated. Although irrigation potential of Idodi-Pawaga is 325 ha and 10,000 ha for Idodi and Pawaga, respectively, the area currently irrigated is only 275 ha and 1,250 ha, respectively.

### **Overall village economy**

The major economic sources existing include agriculture, livestock keeping, petty trade and fishing. Generally, the villages' economy is low due to poor farming technology, low input use and poor marketing. Income from other sources such as employment is almost non-existent. Although households also considerably benefit from natural resource extraction, such information is very difficult to quantify because they are used mainly at subsistence level. Poor record keeping on incomes and expenditure by households makes the assessment of this information rather difficult.

### **Household agricultural production, yield and trends**

Production levels at households for the past five years were difficult to determine partly because most of the crops, except rice and maize, are produced at subsistence level. Also farmers do not keep records of production level so it is difficult to memorize beyond two or three years. The only information available is for current season 2002/2003 and to a large extent it is only for the crops that go through the market.

Agricultural productivity is very low in most villages. For example, in 1995/96 season farmers harvested 1,500, 2,000 and 2,500 kg of maize, paddy and sorghum, respectively, while in the 2002/2003 season this was reduced to only 693, 1,373 and 795 kg, respectively. This yield is significantly low when compared to the past as well as experts recommendations. Experts' recommendations suggest that by using composite seeds farmers are supposed to harvest 1,500, 2,000 and 4,500 kg per ha of maize, paddy and sorghum, respectively.

The reasons given for the declining yield trend include poor soils, drought and poor farming technology. Crop damage by wild animals also contributes significantly in reduction of yield. In some villages wild

animals damage was reported to account for one third of the total crop loss. Post harvest crop losses are also high due to poor storage facilities and techniques.

### **Incomes and expenditure at household and VG levels**

#### **Household income levels**

Field data show that over 82% of the respondents in Idodi-Pawaga earn less than one dollar a day. Most of the income comes from agriculture and related activities. Other sources of incomes at household levels come from business, employment, and remittance.

#### **Expenditure at household levels**

Information at household expenditure was not easily available, especially in the form of quantities and money terms, because farmers do not have the tradition of keeping records for their incomes and expenditures. Rather, villagers were able to list areas of expenditure, which included, buying domestic goods, health costs, education costs and farming expenses.

Health and education appear to consume a lion's share of the households' incomes. Common diseases are water borne diseases such as diarrhea, typhoid, dysentery, and malaria. Thus improving water sources has a big impact on peoples' welfare. TB and the AIDS pandemic were reported to be serious where about 25% and 10% of the population was reported to be affected, respectively.

Many villages do not have health services and the few with them are lacking qualified personnel and drugs. High rates of infection lead to reduced labour force and productivity in the household, increase poverty levels among rural communities. The cost of treating diseases is considerably high and is a burden to the already meager household budgets.

#### **Income sources by VG**

The income sources for most village governments are 10% of the development levy collected, cess from petty trade in the villages, fines for by-law violators, wildlife quotas and other incomes from natural resources use. Income from wildlife account for 73.8% of the VGs' incomes.

#### **VGs expenditures**

Village governments in Idodi-Pawaga spend 64.2 % of their income for recurrent and development purposes. There is a great variation of the VGs income expenditures per village. Four villages out of 15 spend less than 50% of their incomes, while one village spent 198% of its income. The extra income is said to come from villagers' contribution and/or borrowing from rich people in the village. Increasing money for development projects is perhaps the major incentive for villagers to feel sense of ownership for the

proposed WMA. It is not clear whether the balance is saved or used elsewhere. It is important for VGs to have a culture of doing some savings for the part of the money earned annually to meet emergencies and other developmental issues. Saving could also be used for lending money to villagers in the long term, which could have a positive impact on poverty reduction at household level.

### **Natural resource use patterns**

An examination of the natural resources use in villages surrounding the proposed Idodi-Pawaga WMA show a range of items, including fish, charcoal, honey, building poles, thatching grass, minerals, medicine, wild foods, and timber. Although game meat business is also practiced, many villages were not ready to mention or provide actual figures due to its being performed illegally. Almost 100% of the respondents use natural resources in one way or another.

### **Mechanisms for natural resource access**

All villages have almost similar procedures for natural resource extraction. Natural resources for home use are extracted without any permission. For petty business related resources, the villagers need to apply through the village governments and pay a fee. For wild animals or cutting trees for timber permission has to come from the Director of Wildlife and the District Natural Resource Office, respectively. Nevertheless, despite the existing laws and by-laws for natural resource use, there is illegal extraction of resources in many villages visited, suggesting that the laws/by-laws are not properly enforced.

### **Markets for village products**

Most of the farm products go through market. So do live animals and livestock products such as meat, milk, and skins.

Generally, transport system is very poor in all villages. Because of this transport costs to Iringa are very high. A high proportion of farmers sell their farm products locally to itinerant traders or among the farmers themselves at periodic markets (*magulio*). Hence prices received by farmers are very low.

Poor roads and infrastructure also limit farmers from producing potential high value but perishable crops such as tomatoes and vegetables because they cannot sell easily.

The collapse of cooperative unions has left farmers with no representative organization to co-ordinate their production; negotiate prices with buyers and campaign for better support services. Lack of market information is another factor affecting bargaining power by farmers. Most farmers do not have price information from other sources than the traders themselves. Due to lack of quality price information, farmers have quite often realized that same trader who bought their produce paid different prices to different farmers for the same quality of produce and at the same time. One important role the government

could play in these liberalized markets could be to improve access to price information by farmers so that it discriminates less against small farmers and consumers.

The marketing situation is also not favourable for livestock keepers who complain that prices are so low that they cannot sell their herds for enough money to buy food. Good markets for livestock could lead to sustainability of the proposed WMA, as high prices for livestock will provide incentive for livestock keepers to sell their cattle in large numbers. This will lead to the availability of beef or goat meat at affordable prices and therefore reduce pressures for bush meat as a close substitute. Also selling large number of animals by livestock keepers will enable them to purchase enough food from farmers thereby increasing local markets for farmers. Another advantage is that, high incentive to sell livestock may reduce grazing pressure on the WMA, which is good for wild animals.

One of the problems with marketing is the collapse of cooperative unions, which has left farmers with no representative organization to co-ordinate their production; negotiate prices with buyers and campaign for better support services. Lack of market information is another factor affecting bargaining power by farmers. Most farmers do not have price information from other sources than the traders themselves. Due to lack of quality price information, farmers have quite often realized that same trader who bought their produce paid different prices to different farmers for the same quality of produce and at the same time. One important role the government could play in these liberal markets could be to improve access to price information by farmers so that it discriminates less against small farmers and consumers.

### **Economic agents**

#### **Existing investors**

There are very limited investors in Idodi-Pawaga. There is only one tented camp at Tungamalenga village. The camp comprises 6 rooms with en-suites as well as attractive camping sites with very good clean facilities. They are targeting tourists who do not want to pay the high overnight costs in Ruaha, preferring to go into Ruaha National Park on daily basis.

Few villages are being facilitated by religious organizations, especially the Anglican, Lutheran and Roman Catholic churches. These religious groups are involved mainly in education and health services provision on small scale basis. One village mentioned to have been also helped by DANIDA in tape water installation. In addition, an NGO known as Concern has been providing technical assistance for irrigation canal construction/rehabilitation in some villages. Ruaha National Park, through its community conservation unit, provides education to the communities in conservation and promotion of tourism based activities.

### **Interactions between economic agents and local people**

There is no direct link between these economic agents and the local people in the area. Although, villagers might be getting some incomes as commission/fee paid to the village government authorities by investors which is then partly channeled back to the local communities in the area, their role to villages are not yet well defined.

### **Financial facilities**

Formal financial credit is not available in the villages visited. People rely on informal credit, which is limited to a few thousand shillings. The demand for credit is high and the main source of credit is family member or friends. High transaction cost related to formal credit both for lenders and borrowers limits the establishment of these institutions in rural areas. Also low money circulation and lack of collateral for rural communities create disincentives for financial institutions to provide services in these areas.

### **Poverty levels**

Poverty is widely spread and pervasive in the villages visited. Using their own criteria the local show that over 75% of the households in Idodi-Pawaga face relative poverty. This number is likely to be higher when one compares with the national as well as international standards of poverty monitoring indicators such as access to health services, education, life expectancy, under five mortality rate and access to clean water. These findings are consistent with the household surveys where assessment on income poverty show over 80% of the respondents are poor earning less than one dollar a day.

The poverty levels were also revealed in terms of food consumption patterns. Although people appear to have wide range of food consumption patterns, food composition is dominated by starchy foods with very little protein and fat sources. Many villagers have only two meals a day, which is reduced to one meal during lean periods.

### **Economic opportunities to increase VG incomes**

A high proportion of the villages visited do not have any idea on how they could increase their incomes from wildlife utilisation following the implementation of the concept WMA. Indeed, many villages were not able to say anything on how they are going to improve their VGs' incomes from the proposed WMA. After brainstorming with the researchers the villagers were able to mention economic opportunities such as ecotourism, tourism related to water falls attractions, hot springs tourism and cultural utilization, climbing hills, campsites, optimization of game meat quota's and business on live birds and photographing. People expressed interest in practicing beekeeping. Currently, very few appear to practice it due to lack of knowledge on the sector. Also fishing is one of the potential areas to increase wildlife income and nutrition by villagers.

## 0.4 Ecological Aspects

### Vegetation

This ranges from Acacia to miombo woodlands with interspersed riparian vegetation, bushland and thickets. Some of the areas are open grasslands

### Wildlife Populations

Table 1 illustrates population estimates of large mammal species and densities in the proposed WMA.

**Table 1: Comparison of Large Mammal Population Estimates in Idodi-Pawaga Area**

Species	1990# estimated	Density # km2	1994-95 # estimated	Density # km2
Buffalo	2240	0.67	63	0.02
Impala	2457	0.74	916	0.28
Zebra	397	0.12	249	0.08
Giraffe	777	0.23	358	0.11
Elephant	0	0	888	0.27
Kudu	0	0	220	0.07
Hartebeest	18	0.01	0	0
Sable	36	0.01	0	0
Eland	162	0.05	0	0
Warthog	252	0.08	0	0
Waterbuck	18	0.01	0	0
Cattle	18,214	5.5	28359	8.6
Goats	3,162	0.95	11828	3.6

Source: Taylor, 1995

### Wildlife Utilization

Tourist hunting is the major activity in the area.

### Wildlife Movements

Idodi-Pawaga: a dispersal area for the animals from RUNAPA

### Human-Wildlife Conflicts

Crop raids and livestock attacks by problem animals are major problems in all the villages surrounding the proposed WMA. A few people have also been attacked by lions.

### Potential WMA management problems

Wild fires are constantly set on by honey gatherers and poachers in Idodi-Pawaga.

Poaching is especially rampant in some villages not involved in the MBOMIPA project areas.

## 0.5 Emerging Issues

Based on the above findings and field visits the following are the emerging issues observed:

- Level of knowledge and awareness regarding these new concepts of WMA and AA by villagers including village governments is very low or non-existence. This may affect local communities bargaining power relative to investors and joint ventures related business.
- Natural resource use by villagers is considerable but difficult to quantify and to put in money terms because is used mainly on subsistence levels or used illegally.
- Most of the natural resources is extracted free of charge because either by-laws are not developed or they are not enforceable.
- The capacity to keep records for incomes and expenditure by households and village governments is very poor and in some villages not transparent enough.
- A good proportion of the VG incomes seem to have been used in administrative matters rather than villages' development projects.
- Capacity to identify economic opportunities for their WMA by villages is low which may undermine their bargaining power with investors.
- The benefits accruing from WMA are likely to benefit the community rather than individual households especially in the initial years of implementation. Families that depend on natural resource for subsistence may suffer following WMA's implementations.
- The efficiency in running economic activities is likely to differ from one village to another depending on comparative advantages.

## **0.6 Conclusion and Recommendations**

The most deficiency observed in the field is the knowledge gap and awareness about the whole idea of WMA and AA by villages. With exception of the villages' chairmen who attended the inauguration ceremony by the MNRT in Dar es Salaam, a high proportion of the villagers including VGs do not know exactly what is going on and how this is going to affect their socio-economic lives. Awareness raising for the whole community surrounding the proposed WMA and capacity building for key players in the VG should be the starting point of WMA implementation by the government, donor community and NGOs. Educating villagers on the WMA and associated packages is also important for bargaining power with investors. Education also should be extended to teaching people basic principals of project appraisal and book-keeping or general management skills. Field observations show that VGs cannot keep even simple records for income and expenditure for their villages. Proper monitoring of the impact of the WMA concept

will only be possible if there is proper record keeping in villages. Record keeping techniques should extend to households in terms of harvests, marketed crops and consumption.

Help should be provided to villages to develop by-laws for natural resources utilization as incentives to increase VG incomes and sustainable utilisation of natural resources. Most villages do not know how they will increase their incomes based on this new policy of WMA. At least in the initial years of WMA implementation. The proposed WMA should be allocated with a facilitator that could help them in identifying and implementing economic opportunities.

Since level of investment and joint venture between investors and local communities is almost non-existent at least to the knowledge of villagers, the government should try to build capacity in these aspects providing skills related to investment and joint ventures.

The WMA should be helped to develop general management and land use plans by the MNRT and Ministry of Land and Urban Settlements. This is undoubtedly important and a necessary first step for better identification of land use patterns and economic opportunities.

Incomes and expenditure by village governments are not clear and transparent enough in some villages. Also income from wildlife resources for developmental projects is not clearly indicated which is difficult to make a follow-up. Proper monitoring of the impact of WMA concept will only be possible if there is proper record keeping in villages' incomes and expenditures.

Although many villages are likely to benefit from WMA implementation, most of these benefits will be accrued at communal level and not at the household. There will be losers from natural resource livelihoods, especially wild food extraction, and this category of people may need to be compensated.

Crop destruction by wild animals is considerable in all villages visited. These affect villagers' crop harvests and incomes. The destruction by wild animals is also experienced by livestock keepers where several animals have been killed by wild animals such as Lion, Leopards, etc.

## **0.8 Way Forward**

There should be immediate and extensive awareness raising programmes for the villagers surrounding the WMA and capacity building in WMA, AA and general managerial skills for the key players of the VGs. This work should be performed by WD.

There should be training for households and VG in record keeping for incomes and expenditure as well as quantity/volumes harvested, marketed or consumed. Also there should be an external board to audit VGs'

incomes and expenditures. This work should be implemented by DW in collaboration with Ministry of Finance or Cooperatives.

The MNRT need to contract another firm (economic) to undertake a detailed study in the proposed WMAs case by case to establish cost benefit analysis and comparative advantages for each participating village. This is important for each village to operate in economic areas, which is more efficient and competitive. Comparative advantage could be in terms of wildlife resource endowed, transport advantage, time invested in the business, etc.

The WD should look onto ways of compensating households whose livelihoods to a high extent depend on natural resource extraction/use. This could be through providing alternative livelihoods.

Improvement of good governance at the village level is crucial. There is need for transparency and accountability. Capacity building is also imperative, especially capacity to keep records and identify economic opportunities.

Shortage of back-up staff at ward and district levels needs to be addressed. Awareness raising about the proposed WMA initiative to the local communities is imperative.

## 1.0 INTRODUCTION

### *1.1. Background*

The government of Tanzania through its Wildlife Policy (1998) is advocating the establishment of Wildlife Management Areas (WMAs) as a means of effectively implementing Community Based Conservation (CBC) activities in Tanzania. The underlying assumption is that WMAs will be established where there is a 'health' population of wildlife. WMAs, despite their conservation roles, will run as business entities parallel to other production systems in village lands, as will be determined by land use plans. The new policy stipulates that local communities will benefit directly from wildlife conservation economic opportunities through direct management of WMAs. Benefits are expected through formation of joint ventures and benefit sharing. In this process the CBC in WMAs will be implemented by Authorized Associations (AA). The AAs are basically individual groups and designated organizations within the villages. The AAs will be given authority by the Village Council to manage wildlife outside NPs and GRs. About 15 sites will implement WMAs on a pilot basis for the period of three years.

The concept of WMAs is to be implemented under the Wildlife Conservation Act (1974) as translated in the Wildlife Management Authorities (WMAs) Regulations of 2002, and the Guidelines for designation and management of WMAs which support the implementation of the Wildlife Policy of Tanzania (1998). The Guidelines are administrative rules, which are intended to rationalize in practical terms the Wildlife Conservation (WMAs) Regulations, 2002.

Much of the initial focus of CBC has been on wildlife, which is threatened with displacement by illegal use and growing rural human populations. The new policy approach underlying the WMA concept devolves rights over wildlife to local communities and aims to make wildlife conservation part of the rural poverty alleviation process. In this context, the WMA initiatives must be financially attractive for the community, economically efficient for the nation and financially viable for donors and

the government. Without these incentives, WMAs will not be sustainable, and will not alleviate poverty or conserve wildlife.

### *1.2 Study Objective*

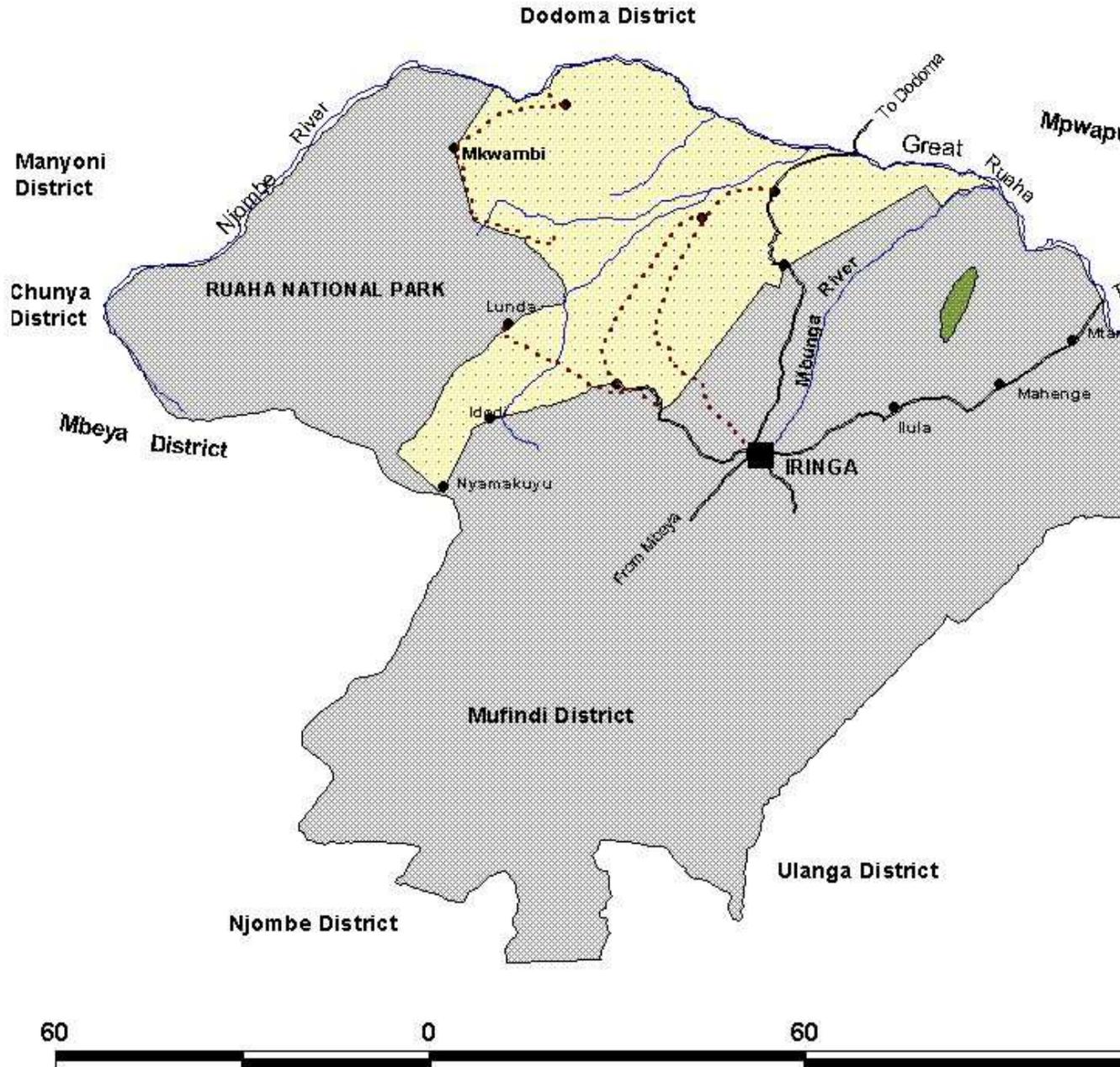
The main objective of this study was to facilitate the collection, analysis and compilation of baseline information from 15 pilot WMAs. This information is intended to be the basis for the development of Monitoring Indicators and Monitoring Plans during the implementation of the WMAs.

Hereunder we present the results of the baseline survey done in villages surrounding the proposed Idodi-Pawaga pilot WMA. This report is divided into four sections. The introductory section is followed by a second section that provides the sociological aspects of the survey. The third section then discusses the economic aspects of the communities, while the fourth and last one presents the ecological aspects of the proposed pilot WMA.

### *1.3 The Study Area*

The proposed pilot WMA is within the Lunda-Mkwabi Game Controlled Area (LMGCA). The communities have developed a memorandum of understanding to jointly manage the area as a Wildlife Management Area. The total area of the Game Controlled Area is 4,046 km<sup>2</sup> (Map 1). The proposed pilot WMA has both ecological and social benefits to Ruaha National Park. The biological, or ecological benefits are a result of the territorial expansion of the protected area that keeps human impact further away. Some of these benefits are:

- Physical barrier from human encroachment
- Enlargement of the natural habitat and reduction of edge effects
- Enhancement of the environmental services provided by the reserved area.



#### 1.4 Literature Review

##### 1.4.1 The concept "Community Based Natural Resources Management" (CBRNM)

Recognition that successful management of protected areas ultimately depends on the cooperation and support of the local people has been growing among conservationists and natural resources managers in many places in the world. Projects like the Communal Area

Management Plan for Indigenous Resources (CAMPFIRE) in Zimbabwe and the Luangwa Integrated Resource Development Project in Zambia have been established under such an assumption and have recently taken the limelight as models of this supposedly new outlook in the management of natural resources in protected areas (Wells and Brandon, 1993).

This outlook is not new to Tanzania. The problem of environmental degradation has been the concern of the government for a very long time. Since the colonial period widespread efforts have been made to conserve and improve natural resources such as forests, wildlife and land. Generally, three types of conservation initiatives and programmes can be distinguished. These are the preservation of forests and wildlife, the rehabilitation and improvement of degraded lands, and environmental resource improvement efforts undertaken at the initiative of local communities and grassroot organizations with varying degrees of financial support of central government, local and foreign donors (Mung'ong'o, 1996).

The preservation of forests and wildlife began during the German period and was emphasized during the British time by gazettement of more conservation areas. People living on the periphery of gazetted national parks, forest and wildlife reserves were evicted to protect the reserves from "poaching" and encroachment. In the wake of Independence from the colonial government in 1961, wildlife parks and forest reserves were increased to cover almost 30 per cent of the country's land resources. (Table 1).

**Table 1: Land Use in Tanzania**

<b>Land Use Category</b>	<b>Area (sq.km.)</b>	<b>Percentage</b>
National parks	41,038	4
Game reserves	102,719	11
Forest reserves	126,306	13
Crop cultivation	51,900	5
Pastures	350,000	37
Other land	214,039	23
Lakes	59,000	7
Total	945,000	100

Note: These figures are very broad estimates. No comprehensive assessment of land use exists so far in Tanzania. Different sources have different estimates.

Source: Mung'ong'o, 1995:82.

Such government initiated conservation efforts had generally not only ignored the needs of the inhabitants and communities living adjacent to game parks and forest reserves, but had also more often deprived them of various means of subsistence through eviction or restrictions on their access to land, forests and pastures. Conservation programmes had therefore become indistinguishable from the destructive aspects of the dominant patterns of development (Ghai, 1994:7).

It was in realization of these weaknesses in the prevailing approach to conservation, perhaps, that some initiatives like that of the Ngorongoro Conservation Area Authority in 1975 began experimenting with the idea of *multiple land use* in the management of the Ngorongoro Conservation Area (NCA). The aim of the programme was to integrate conservation of the Ngorongoro Crater and its archeologically important environs and livestock grazing by the inhabitant Maasai pastoralists (Boshe, 1989). The thirty years of a largely success story of the operationalization of the concept of multiple land use have led not only to attempts by other conservation areas wishing to emulate the experiment, but they

have also virtually fostered the emergence of a new rural development paradigm in Tanzania.<sup>1</sup>

The underlying assumption of the paradigm has been that local communities will best manage natural resources such as wildlife and forests if they are assured of clearly defined user rights, proper incentives, information and the know-how to do it. The local people are thus expected to participate in the process of design, establishment and management of the conservation areas.

The aim of such a participatory approach to decision-making is to allow the stakeholders to express their objectives in natural resource use and management, and to decide on how these can best be achieved. It furthermore allows the stakeholders to evaluate the alternative uses of the ecosystems according to their specific rationales; hence also effectively empowering the local people to make better use and protection of their environment. At a more theoretical level it provides better information to be used in resource management as a result of the intermarriage between indigenous knowledge and scientific knowledge (Tacconi and Benett, 1995:93).

#### **1.4.2 Problems and prospects of CBNRM**

Of recent wildlife conservation in Game Controlled Areas (GCA) and communal lands has become difficult to implement in a centralized manner. It has also become difficult to justify in economic terms. In the preceding paragraphs we have highlighted the changing perception and approach among natural resources managers and conservationists at both the national and district levels towards a recognition that successful management of protected areas ultimately depend on the cooperation and support of the local communities. We have noted the underlying assumption of the emerging paradigm as being based on a belief that local communities value natural resources such as wildlife and forests and would manage them best if they were assured of proper incentives, information and the know-how to do it.

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1. The NCA has, for example, retained some of the most spectacular combination of scenic, wildlife and archeological qualities in the world so as to acquire the status of a World Heritage Site in 1979 and a Biosphere Reserve in 1982.

### 1.5 Methodology

Both primary and secondary data were collected from all villages surrounding the Idodi-Pawaga WMA. The methodology used in accessing these data is detailed in Vol. I of this four-part report.

## FINDINGS

### 2.0 SOCIOLOGICAL ASPECTS

#### 2.1 Demographic Trends

Table 2 illustrates the population change in communities living around the Idodi-Pawaga WMA. Data from the 1988 and 2002 census years show that the population in the area is very dynamic. Much of the population growth has been recorded for Itunundu ward (64%), followed by Mlowa (38%), Idodi (29%) and Mahuninga (23%) wards. The least growth is recorded for Ilolo Mpya ward (17%) due to simultaneous out-migration. (Box 1).

**Table 2: Population Change in Communities Surrounding the Idodi-Pawaga WMA**

Ward	1988			2002			% Pop. change
	Total pop.	No. H/holds	H/hold size	Total pop.	No. H/holds	H/hold size	
Mahuning a	3,278	752	4.3	4,040	1,085	3.7	23
Idodi	7,113	1,782	3.9	9,205	2,290	4.0	29
Mlowa	5,602	1,115	5.0	7,746	1,744	4.4	38
Itunundu	11,554	2,227	5.1	18,962	4,154	4.6	64
Ilolo Mpya	3,309	696	4.7	3,857	930	4.1	17
Total	30,856	6,572	4.6	43,810	10,203	4.2	42

Source: Census Reports 1988 & 2002

## 2.2 *Migration Patterns*

The original ethnic groups to inhabit the villages of Idodi and Pawaga Divisions were the Hehe and Gogo, but many other groups have settled in these divisions in recent years, including the Bena, Wanji, Kinga, Safwa, Sangu, Kimbu, Nyamwezi, Ngoni and Sukuma. These groups were drawn to the area by the agricultural potential provided, especially irrigated crop production. Interview data show, for example, that 28.4% moved into their present villages in search of agricultural opportunities. The divisions have also a sizeable number of livestock keepers, especially the Maasai and Barbaig. Villages in Idodi Division are more heterogeneous than those of Pawaga Division.

Except for villages like Ilole Mpya and Kinyika, there is little out-migration (38.9%) by males from communities in the two divisions. Interview data show that more than 50% of the respondents were born outside their villages of residence, and about 20% of the respondents started living in their present villages during the early 1980s. Much of the population growth in the dynamic villages is, therefore, from in-migration rather than from natural growth. (Box 1).

### **Box 1: History of Ilole Mpya and Kinyika Villages**

Ilole Mpya is a small village on the eastern bank of the Great Ruaha River. It has a population of 727 and 171 households. The original village was called Magangamatitu (Black Stones) and was inhabited by the Hehe people. In 1974 the whole population was moved to Luganga under Operation Vijiji. In 1980 it was decided to move all the people living in the Lunda-Mkwambi Game Controlled Area (LMGCA) adjacent to the Ruaha National Park. The village of Ilole in the LMGCA was moved to this site and the new village came to be known as Ilole Mpya. However, over the years people have found that the land is insufficiently productive to meet their developmental needs. So many have moved to Mboliboli, Kinyika and Kimande, and in many cases back to Kiteleke, their original home. Thus the current population is much depreciated.

On the other hand, Kinyika is a village bordering Ruaha National Park. It has a population of 2,000 and 420 households. The main ethnic groups are Hehe, Gogo, Bena, Kinga, Sukuma, Maasai, and Barbaig. The Sukuma who are the latest comers to the village are said to have introduced the preservation of potatoes by boiling and drying them. The main area of the village was originally settled in 1950 when people living in the present sub-village of Ruaha moved to Kinyika because of frequent flooding of the Great Ruaha River. At that time Kinyika was part of Isele Village. In 1976 Isele Village split into two villages and Kinyika became a sub-village of Kisanga Village. In 1979 people were moved from what had become a national park, and many came to live in Kinyika. Others came from further afield, drawn by fertile rice fields. In 1998 Kisanga Village split and Kinyika became a village in its own right.

## 2.3 *Household Characteristics*

### **2.3.1 Type of households**

Rural households in Tanzania are normally headed by male members of the community. If not a husband then it is a close kin - a son, a brother, or an uncle. Such is the situation in two divisions. According to interview data 70.1% of the respondent households were headed by males. Only 29.9% of households were headed by females as a result of divorce or widowhood.

### **2.3.2 Household size and composition**

Household sizes in the village vary greatly depending on the type of household. In well-off households where polygyn, extended families and bonded labour arrangements are the norm many people tend to stay in one household. On average, however, the household size ranging between 3.7 and 4.6 people with an average of 4.2 people. Aggregately, in an average household between 1 and 5 of the resident people would be women and between 3 and 4 would be men. The age breakdown in such a household would be 5 children (aged between 0-15 years), 4 adults (aged between 16-59), and 1 elder (aged 60 and above).

### **2.3.3 Dependence ratios**

A dependence ratio is the product of the total number of children, the old and the disabled (the dependents) divided by the number of able-bodied adults who form the labour force of a household. The ratio of dependence varies between wealth groups in the village. The highest is among the middle and the well-off wealth groups, followed by those of the poor social group. This tendency is explainable by differentiated access to labour. The well-off households have the biggest labour force in the village and can thus afford to keep large families. On average, however, the dependence ratio in the two divisions is 2.5.

#### 2.4 *Natural Resource Use Patterns and Access Mechanisms*

According to the interview data the main natural resources, other than land, used by the people of the two divisions from the local forests is fuelwood, building poles, timber, wild vegetables, rope, medicine and thatch grass. Others are honey and fruits. The local forest is depended upon by the local people for woodfuel (78%), for charcoal (8%) and for building poles, timber and/or thatch grass (8%). Because of the activities of MBOMIPA wildlife is recognized as an important natural resource in both divisions.

Access mechanisms for the various natural resources are discussed in detail in Section 3.12 of this report. However, in accordance with the tradition of ethnic groups resident in the two divisions the man controls all resources, including land and income generated in a household. The interview data demonstrate that despite the woman's equal contribution to the household income the main decision-maker in the household is always the man. Only a few respondents indicated that both the partners shared the decision-making process, or that the woman made the major decisions in their households. The latter responses came from polygynous or female-headed households. Women in this community are aware of this anomaly. Women representation in the village government and other leadership positions was, for example, suggested as one of the solutions for the problems identified at the women focus group discussions.

#### 2.5 *Institutional Set-Up*

In all the villages visited during this survey the standard village government (VG) structure was prevalent. Below the Village Assembly (Box 2) the VG was headed by an elected Village Chairman. The Chairman was supported in their day to day activities by an appointed Village Executive Officer. These people were in turn supported by three Village Committees (VCs) for Planning and Finance, Social Services and Peace and Security. Under each of these VCs there are various Sub-Committees for various issues, e.g. sub-committees for village shops, milling machines, water supply, the village school, the environment or natural resources, et cetera.

**Box 2 Village Assembly**

The village assembly is composed of all villagers, women and men, who have reached the age of 18 years, and chaired by the Village Chairperson. It operates as the village parliament.

The village assembly is a formal body that is supreme within the village government structure.

The village assembly is required to meet, by law, every three months. There must be proper notification so that all villagers in all sub-villages have had adequate notice of the meeting and its agenda.

The village assembly has the power to elect village government leaders, to recommend village bye laws to be sent to the District Council for approval, and to direct the village government to take specific action and to monitor implementation, to receive village government budgets and financial reports, to discuss policy, and to supervise allocation and use of all village resources,

The village assembly has the final power to allocate land within the boundary of the village.

By law the village assembly is a very powerful body, although in practice it has been weakened.

## 2.6 *Issues of Governance*

Good governance is imperative in any development initiative. In this study local government institutions were analyzed in each of the visited villages to gauge their effectiveness as development levers. Generally, there are serious weaknesses in governance in all the villages. Leaders elected/chosen to lead the various institutions, including the village government, are not trained to do their duties well. Principles of good governance are not imparted to the incumbents. Neither are their responsibilities to their constituency properly understood. The village chairpersons are also chairpersons of the Ruling Party. Due to the infancy of Opposition Parties there is virtually no watchdog to criticize or forestall any excesses or abuse of power in the villages.

## 2.7 *Relationship Between Village Governments and CBOs*

Apart from MBOMIPA there are very few Community Based Organizations operating in the two divisions. Those that are operative belong to church missionaries and most deal with offering social services such as health care and education. (see also Section 3.8) .

## 2.8 *Villagers' Solidarity and Participation in Community Development Initiatives*

Although local governance is problematic in all the study villages, it is more so in semi-arid Pawaga Division villages than in sub-humid Idodi Division. In the former villages there is a major rift between the village council leaders and the villagers, supporting the contention that poor people are vulnerable to political marginalization and alienation. People's participation in decision-making and leadership accountability in resource allocation is at its minimum in these villages. Meetings are not called and income and expenditure reports are not given to the Village Assembly. The village chairpersons hold sway in the villages. Nothing is done until they approve it.

## 2.9 *Understanding the Concept WMA*

A considerable number of the respondents (30.6%) indicated that they understood the concept by properly mentioning the three components of participation, benefit sharing and resource conservation. Some 20.0% mentioned participation and resource conservation, while 17.6% mentioned participation alone. The concept is, therefore, fairly well understood and liked by many of the respondents (89.9%). This is most likely a result of the good work of MBOMIPA in the two divisions.

## 2.10 *Emergent Issues: A Discussion*

### **2.10.1 Good governance**

Representative democracy relies on elected representatives, namely Members of Parliament, District Councilors, Village Councilors and Village Chairpersons to act on behalf of those who elected them. The general conclusion is that the representative system is not functioning properly. MPs and district/village councilors did not engage in regular consultation processes with their local constituents, nor did they report back on decisions made in Parliament, District Council or Village Council. According to many villagers, 'they are around during election campaigns, and then they disappear.' This was leading to growing tension between elected and appointed officials on the one hand, and ordinary citizens on the other.

Underlying resistance at the local level to democratisation of local government is a deep-seated distrust in central and local government of pluralism and public dissent. A low tolerance for difference and alternative views reflects not only formal 'modern' government structures but 'traditional' communal values. The central principle of representative democracy is that people use the power of the vote to choose the leaders they wish, in order to get the kind of policies they want. The hostile reactions shown by some leaders towards local moves of self-organisation and dissent indicate the unwillingness among many to accept this principle, and the desire to hold onto power by any means.

### **2.10.2 Administrative constraints**

The managing of WMAs through Natural Resources Committees requires a local leadership that is incorruptible and well versed in wildlife issues. Such type of leaders is not easily available in most of the villages visited. Capacity building should be a major activity in the pilot WMAs.

Apart from MBOMIPA, Iringa Rural District have no capacity to manage the anticipated WMA. There are, for example, very few wildlife officers at the district headquarters with no reliable transport facilities to visit all the villages of that vast district. In the event MBOMIPA winds up its activities the district cannot carry over the role played by that project. The establishment of the WMA should, in this respect, go parallel with the employment and training of enough wildlife officers, especially so at the ward level to facilitate supervision of village game scouts.

### *2.11 Conclusion and Recommendations*

The institutional set up put in place to manage wildlife resources is very well organized, and the level awareness seems to be high. If given the necessary financial and technical support these communities can manage wildlife resources reasonably well.

### *2.11 The Way Forward*

In the foregoing discussion two points have been raised as the way forward. These are:

- Capacity building should be a major activity in the pilot WMA.
- The establishment of the WMA should go parallel with the employment and training of enough wildlife officers, especially at the ward level to facilitate supervision of village game scouts.

## **3.0 ECONOMIC ASPECTS**

### *3.1 Level of Development of the WMA*

The Idodi-Pawaga WMA has made considerable progress. The Community Based Conservation (CBC) started in 1993 and the MBOMIPA project came in 1997. Starting from 2002, the MBOMIPA was converted into CBO, which forms the umbrella organization for all villages surrounding the WMA. Every village supplies 2 game scouts to undertake patrol activities for 10 days on rotational basis. The game scouts are paid little allowances for the job, which according to them, are too little to meet basic needs. In every village there is natural resource committee for natural resources related matters. However, poor working facilities such as transport, communication, uniform, food have constrained performance of wildlife protection against poaching.

### *3.2 Land Use Pattern and Availability*

According to villagers, land use pattern is divided into residential, agriculture, livestock and conservation (WMA). Few villages have set aside land for later use and some have areas set for cemetery purposes. Except for WMA conserved land, there was no any land reported to have been conserved for ecological purposes e.g. catchment areas.

There was no village that was able to provide quantitative data (area under different land use). This has been occurred partly because village does not have Land Use Plan and General Management Plan. The same problem experienced at household level, where farmers were able to mention number of plots and crops grown but it was very difficult to provide acreage under each crop. This is partly because they practice intercropping rather

than pure stand. In addition, data on the quantities of fish caught are not easily available at village governments. This is mainly because most of the fishing activities are undertaken on subsistence levels and no records are kept for catch volumes. To have such data it needs a separate detailed study, which starts with awareness raising on the importance of record keeping for any economic activity even though this may too prove difficult when activities are indeed undertaken on subsistence level.

In many villages land for grain farming other than rice is not a problem. It is plenty and many people practice shifting cultivation. However, land for rice farming and garden is not adequate in all villages visited. The two crops are important for food security and cash incomes. Following the collapse of cotton and pyrethrum cooperative marketing, rice has emerged as a major cash crop in the area.

The reason for limited land in the villages surrounding the Idodi-Pawaga WMA is both due to population pressure and unequal distribution. In the past 30 years, there has been influx of people from other parts of the country looking for grazing pastures and agricultural land. But also there is unequitable distribution of land. Few farmers mainly local Hehe ethnic group (especially the old generation) are having big farms ranging from 10-20 acres per person. They cannot farm them all nor cannot sell them rather they rent to other farmers at a cost of T.shs 20,000 per acre per season. Very few villagers are charged T.shs 15,000 per acre per season (e.g Iloilo Mpya, Magozi and Luganga) and others go as high as T.sh 30,000 (e.g Malinzanga, Mafuluto) per acre per season. In some occasions they are asked to pay in kind of 2 sacks of rice per season for one hired acre. This amount is very high for many farmers to afford especially the youth generation who wants to start farming business.

Inadequate land is also facing the livestock sector. Insufficient grazing areas and water for livestock is common for many villages and has been the major source of conflict between farmers and livestock keepers. But also poor governance by VG in managing and allocating resource to different users has contributed to these conflicts. Table 1.0 displays land availability, cost and livestock population for each of the villages.

**Table 3.1: Land availability, cost and livestock population by village.**

	<b>Average acreage</b>	<b>Land availability</b>	<b>Renting cost per acre</b>	<b>Livestock population</b>
Mahuninga	1-2	Not adequate	Rice =20,000/=	Moderate
Makifu	1-2	Not adequate	Rice =20,000/= Maize = 6,500/=	High
Tungamalenga	3-4	Not adequate	Rice =20,000/=	Moderate
Mapogoro		Not adequate and unevenly distributed	Rice =20,000/=	High
Idodi	2-3	Not adequate	-	High
Malinzanga		Not adequate	Rice =30,000/=	High
Nyamahana	2	Not adequate	Rice =20,000/=	High
Luganga		Adequate for cultivating but not for fallowing	Rice =15,000/=	Low
Magozi	1-2	Not adequate	Rice =15,000/=	Low
Ilolo Mpya	1-2	Not adequate	Rice =15,000/=	Low
Mkombilenga (P)	2	Not adequate	Rice =20,000/=	Moderate
Mbuyuni (R)	1-2	Not adequate	Rice =20,000/=	Low
Mboliboli(R)	1-2	Adequate	-	High
Kimande (R)	1-2	Adequate **	Rice =20,000/=	Moderate
Itunundu	1-2	Not adequate	Rice =20,000/=	Moderate
Mafuluto	-	Not adequate grazing and agriculture	Rice =30,000/=	High
Isela	-	Adequate	-	High
Kisanga	-	Not adequate	Rice =20,000/=	High
Kinyika	-	Not adequate	Rice =20,000/=	Low

Low = Under 100<sup>2</sup>, Moderate = between 101-200 livestock; High = Over 200 livestock.

<sup>2</sup> The given categories above has reached upon basing on the

### 3.3 Village Economic Status

People in Idodi-Pawaga are principally agriculturalists. Almost 99% of the population is either pure farmers or mixed farmers. Other economic activities include livestock keeping mainly by Masai, Sukuma and Barbaig. There is also petty business especially during dry season. Fishing and beekeeping are operated on subsistence levels.

#### 3.3.1 Agricultural practices and farming technology

As already pointed out, almost all population in the Idodi-Pawaga WMA is involved in farming. Study at household level show more than half of the respondents are farmers (54.6%) or mixed farmers (13.4%) where they practice both farming and livestock keeping while others practicing farming and business (18.6%) and; farming and beekeeping (7.2%) (Table 2.0). This suggests that improving agricultural productivity out of WMA initiatives has a big impact on household poverty reduction.

**Table 3.1 Main economic activities of the head of households (%)**

<b>Activities</b>	<b>Proportion</b>
<b>Total household sample</b>	<b>97</b>
Farming	54.6
Farming and Livestock keeping	13.4
Farming and Business	18.6
Livestock keeping	3.0
Farming and beekeeping	7.2

Source: Survey data

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land availability for agriculture and livestock grazing

### **3.3.1 Farming technology**

The farming practice is both rainfed and irrigation. Available information show that the irrigation potential of the area is 325 ha and 10,000 ha for Idodi and Pawaga respectively. However, area under irrigation cultivation is 275 ha and only 1,250 ha for Idodi and Pawaga, respectively (URT 1996).

The main crops grown are maize, rice, groundnuts and sorghum. Each household usually cultivates 1-4 acres depending on the farming technology and availability of family labour. A high proportion of farmers use hand hoe, few use oxen and very few can manage to use tractors. Nevertheless, the choice for a technology to use is not determined entirely by the poverty levels but also farmers' perceptions about the technology do matter. Many people claim that ploughing with tractors dig too deep, which brings the sand to the surface and takes the fertile soil down too deep where the crops can't use it. Tractors are also seemed to be too expensive for many people to afford. Ploughing one acre costs about 12,000 -15,000/= . On the other hand, cultivation by hand hoe doesn't dig deep enough, so the soil isn't sufficiently mixed and therefore not very good for agriculture. In addition, hand hoe is labour intensive and less efficient. The oxen seem to be the most preferred technology by many due to the fact that the ridges spacing is better and it does not dig too deep which is good for crops. But again the cost paid for ox-plough services of 8000-10000/= per acre is high for many farmers to afford. Consequently, hand hoe dominates the farming technology in the villages surrounding Idodi-Pawaga WMA where over 80% of the population use it.

### **3.3.2 Overall village economy**

Generally, villages' economy in all 15 villages visited is agriculture and related activities e.g selling of farm products. Income from other sources such as employment is almost non-existent. Although households also considerably benefit from natural resource extraction, such information is very difficult to quantify because they are used mainly in subsistence. But also due to the fear about legal implications many people are not willing to mention quantity and amount of money extracted from natural resource use. On the

other hand, poor record keeping on incomes and expenditure by households makes the assessment of this information rather difficult.

Average income per village government per year is only T.shs 1,634,711. This is very little to have any significant impact on villages' development. Most of the income comes from MBOMIPA quota with very little coming from other sources such as natural resource use.

#### *3.4 Agricultural Production, Yield and Trend*

Production levels at villages for the past five years were difficult to determine. This is partly because except for rice most of the crops are produced at subsistence levels. Also farmers do not keep records of production levels so it is difficult to memorize for the past five years. The only information available is for season 2002/2003 and only for only crops that goes through markets.

The data on yield trend is only available in qualitative forms. The reason is linked to the above point that people do not keep records for harvests and incomes. An examination of yield trend shows to be declining. Eleven villages out of 16 reported the yield to be declining. For example, in 1995/96 season farmers harvested 1500, 2000 and 2500 kgs of maize, paddy and sorghum respectively compared to 693, 1373 and 795 kgs in year 2002/2003. This yield is significantly low when compared to the past as well as experts recommendations. Experts' recommendations suggest that by using composite seeds farmers are supposed to harvest 1500, 2000 and 4500 kgs per acre of maize, paddy and sorghum, respectively (URT 1996). The reasons given for such a trend included unfavorable weather (e.g as drought, pest), poor farming technology (hand hoe) and labour constraints. Also crop raiding by wild animals is a serious problem in all villages visited where about quarter of the crops are destroyed in this way. Although, many villagers feel that the fertility of the soil to be good and as a result, most of them do not use any fertilizers, the low yield is among other things an indication of inadequate fertility of the soil. This suggest that the sustainability of WMA may depend very much on improving agricultural productivity through irrigation and controlling the influx of

people especially livestock keepers in the area. If productivity continues to decline the chances for people to invade virgin land in the WMA are high. Table 3.1 illustrates production trend for the Idodi-Pawaga WMA. This also suggests the importance of MNRT to cooperate with other key sectors such as Ministry of Agriculture and Local Governments.

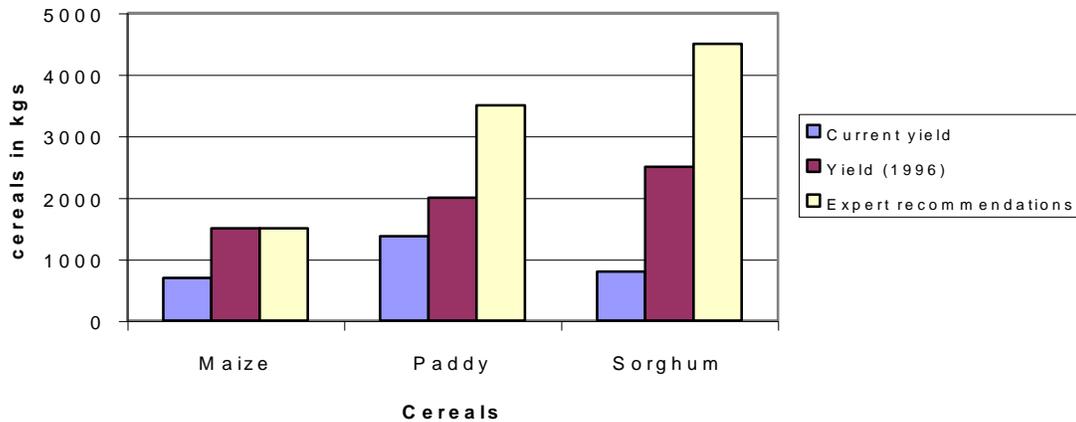
**Table 3.2 Yield trend by village**

Villages	Average acreage	Production (in sacks)		Average Production levels/hh (in sacks)	Production trend	Reason
		Maize	Rice			
Mahuninga	3-4	5-6	-	Maize 17.5-21.0	decreasing	Drought, labour con
Makifu	2-3	7-10	15-20	Maize 17.5-25.5 Rice 35.0-52.5	decreasing	Drought, Low fertil
Tungamalenga	3-4	8-10	10-15	Maize 27-36 Rice 36.5-50	decreasing	Soil degradation, I constraints
Mapogoro	2-3	6-7	15-20	Maize 13-19.5 Rice 35.0-52.5	decreasing	Soil degradation, dr
Idodi	2-3	9-10	15-16	Maize 19-28.5 Rice 31-46.5	increasing	Better extension rains,
Malinzanga	2-3	6-8	10-15	Maize 14-21 Rice 25.0-36.5	increasing	Good rains, irrigatio
Nyamahana	2-4	5-7	10-15	Maize 12-24 Rice 25-50	increasing	Irrigation practices
Luganga	2-3	8-10	15-20	Maize 18-27 Rice 25.0-52.5	increasing	Irrigation practic services, good rains
Magozi	1-2	6-8 *		Sorghum 7-14	decreasing	drought

Ilolo Mpya	1-2	10*	Sorghum 10-20	increasing	Good rains
Mkombilenga (P)	2-3	10*	Sorghum 20-30	increasing	Favourable weather
Mbuyuni (R)	1-2	12-15	Rice 13.5-27	decreasing	over cultivation
Mboliboli(R)	1-2	6-7	15-20 Maize 6.5-13 Rice 17.5+35	increasing	Irrigation practices
Kimande (R)	1-2	6-7	15-20 Maize 6.5-13 Rice 17.5 - 35	increasing	Irrigation practices
Itunundu	1-2	18-20	Rice 18-40	decreasing	Reduced water drought, hand hoe t
Mafuluto	-	-	9-12	decreasing	drought
Isela	-	-	-	decreasing	Inadequate water unfavourable weath
Kisanga	-	-	10-15	decreasing	Hand hoe technolo water for irrigation
Kinyika	-	7-10	15-20	decreasing	Drought, lack of irr

\* Indicates sorghum

**Figure 3.1: Cereal Yield Trend between 1995/96-2002/2003  
(in kgs)**



### 3.5 Incomes and expenditure at the household and VG levels of over time

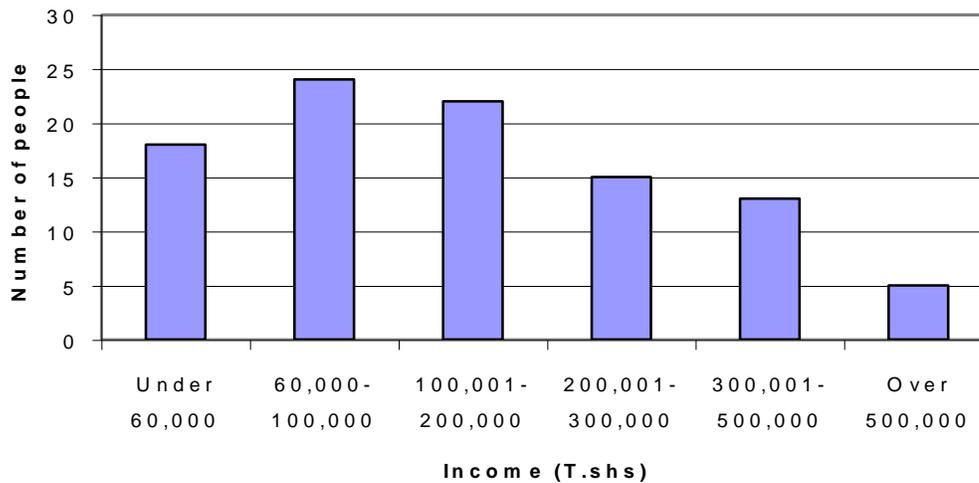
#### 3.5.1 Sources of income

Income sources at household level are mainly from agriculture and related activities. Other activities include business, fishing, beekeeping, carpentry, and charcoal and fuel wood.

Income earning by villagers show over 79% out of the 97 of the respondents are earning less than one dollar a day. Most of the income comes from agriculture and related activities. Only 4 households out of the 97 interviewed reported to have income from employment and business by some members of their families. Once, again this suggests that a high proportion of dwellers depend on agriculture directly or indirectly. When asked whether they receive income in the form of remittance 31.6% of the 97 sample size reported to have access to remittance incomes, while the high proportion of 68.4% do not. Nevertheless, income from remittance sources was considerable amounting to T.shs 41,956 per annum on average, ranging from T.shs 5000 to T.shs 300,000 per annum.

Income from agriculture and related activities is the main source by a high proportion and is highly varied ranging from T.shs 5,000 to T.shs 1 000 000 with any average of T.shs 168,795/= per annum. Income from agriculture is influenced mainly by land accessibility especially land for rice and vegetable farming, family labour availability and technology used e.g irrigation against rainfed agriculture, level of input use, ox-ploughing against hand hoe etc. These findings are consistent with those highlighted by the PSRP (2000), which states that poverty is largely a rural phenomenon and that the poor are concentrated in smallholder and subsistence agriculture and facing the youth, the old and the large household. Although, female-headed households are not necessarily poorer than male-headed households women are generally perceived to be poorer than men (PSRP 2000).

**Figure 5.1: Income (cash) earnings by households in Idodi-Pawaga WMA (T.shs)**



Income sources are mainly from agriculture where 61 out of 97 of the respondents depend on agriculture as their main source of income followed by remittance and finally non-farm incomes, which seem to be insignificant (Table 4.0).

**Table 5.1: Main source of Income**

Source	
Households with income from non-farm activities (%)	4.1 (4)
Households with accessibility to Remittance Money (%)	24.7 (24)
Amount received from Remittance (T.shs)	41,956 (24)
Average income from agriculture (Tshs)	168,795 (61)

Source: Survey data

### **3.5.2 Expenditure at household level**

Information on household expenditure was not easily available especially in quantity terms because farmers do not have a tradition of keeping records for their incomes and expenditures. Rather, villagers were able to list areas for income expenditure, which included, buying domestic goods (e.g soap, sugar, cloth), health issues (e.g buying medicine, paying fare for visiting hospitals), education services (paying school fees for their children, buying uniform and other contribution to education) and farming cost (hiring rice fields, ox-plough, labourers etc). Health and education consumes a lion share of the households' incomes. Common diseases are water borne diseases (e.g diarrhea, typhoid, dysentery) and malaria. Thus improving water sources, providing health services and controlling malaria has big impact on peoples' welfare.

### **3.5.3 Income sources by VG**

In many villages visited, it is only sources of incomes, which was easily provided but not the quantities as well as money income per activity. The income sources for village governments depend very much on development levy (10% of the collected), cess from petty trade in the villages, fines for by-laws violators, wildlife quota and other natural resources uses. In 2002 villages received on average of T.shs one million each, the highest being T.shs 1,500,000 and the lowest being T.shs 700,000. One of the problems realized during this study is poor record keeping. Villages as well as households do not keep records for incomes and it was difficult to memorise everything during the meetings. This suggests that capacity building on record keeping should be one of the

priorities by WMAs. Without proper record keeping by households and villages monitoring and evaluation of the impact of the WMAs initiatives may become difficult.

In many villages income from wildlife accounts for high proportion of the VG incomes ranging from 55% to over 80% (Table 5.1). Overall, income from wildlife utilization is 73.5% of the total VG incomes for Idodi Pawaga WMA. This suggests that proper utilization of wildlife has the potential to increase VG incomes and therefore reduce poverty in the villages through construction of schools, health centers and reducing pressure on local people contribution to the development activities. In the long term, income from wildlife by the VGs could also be used as a source of credit to villagers or establish what is known as SACCOS. Currently, many villages' wildlife incomes come from MBOMIPA quotas with very little coming from other resource utilization such as fishing, carpentry, artisan etc. This occurs due to either lack of by-laws or inability to enforce them. Increasing income from other sources need to be strengthened under these WMAs new approach and this could form a monitoring indicator for future WMAs.

#### **3.5.4 VGs expenditures**

There is great variation of the GV's income expenditures. Four villages (Luganga, Magozi, Mboliboli, Kimande and Magozi ) out of 15 spend less than 50% of their incomes while one village (Mkombilenga) spent 198% of its income. The extra income is said to come from villagers' contribution and/or borrowing from rich people in the village.

Overall, Idodi-Pawaga WMA spends 64.2% of their annual earned incomes. The VG was not able to provide the break down of income expenditures i.e, what proportion is used for village development projects, for conservation, for emergencies etc. It is not clear whether the remaining 36% is saved in villages' bank accounts or spent in recurrent. Nevertheless, villages should be encouraged to show clearly on how income was spent. Also to do savings for the part of the money earned annually to meet emergencies and other developmental issues. Saving could also be used for lending money to villagers in long term, which could have positive impact on poverty reduction at household level.

**Table 5.1 Village government earnings (T.shs)**

Village	Total earnings <sup>1</sup>	Income from	Expenditure	Proportion of	Proportion of
		Wildlife		income from	expenditure from income
				wildlife (%)	(%)
Mahuninga	1,407,044	1,207,044	800,000	86	57
Makifu	1,407,044	1,207,044	900,000	86	64
Tungamalenga	2,007,044	1,207,044	1,500,000	60	75
Mapogoro	1,607,044	1,207,044	900,000	75	56
Idodi	1,407,044	1,207,044	700,000	86	50
Malinzanga	2,207,044	1,207,044	1,400,000	55	63
Nyamahana	1,407,044	1,207,044	700,000	86	50
Luganga	1,557,044	1,207,044	400,000	78	26
Magozi	1,657,044	1,207,044	700,000	73	42
Iloilo Mpya	1,407,044	1,207,044	1,200,000	86	85
Mkombilenga	1,517,044	1,207,044	3,000,000	80	198
Mbuyuni	2,107,044	1,207,044	1,300,000	57	62
Mboliboli	1,607,044	1,207,044	700,000	75	44
Kimande	1,652,044	1,207,044	700,000	73	42
Itunundu	1,567,044	1,207,044	860,000	77	55
<b>Total</b>	<b>24,520,660</b>	<b>18,105,660</b>	<b>15,760,000</b>	<b>73.8</b>	<b>64.3</b>
<b>Average</b>	<b>1,634,711</b>	<b>1,207,044</b>	<b>1,050,667</b>	<b>73.8</b>	<b>64.3</b>

### 3.6 Natural Resource Use Patterns

An examination of the natural resources use in villages surrounding the Idodi-Pawaga WMA show a range of activities including carpentry, fishing, charcoal, beekeeping, building poles, thatching grasses, minerals, medicine, food (fruits, mashrooms, vegetables), timber and brick making. Although game meat business is also practiced,

many villages were not ready to mention or provide actual figures due to the fact that it is performed illegally. As a result, they are feared that our investigations might be for the government. Results from households show that over 80% of the population most of this being used in subsistence level. Any attempt to capture natural resource consumption rates failed because: First natural resource is used mainly on subsistence level. Where it is used on business, people are reluctant to disclose quantities and money incomes due to fear of arrest by the government. Also farmers do not have tradition of keeping records.

### *3.7 Mechanisms for Natural Resource Access*

All villages have almost similar procedures for natural resource extraction. Natural resource for home use e.g fuelwood collection, building poles, thatching grass, food etc, the villagers do extract them without any permission. For petty business related resources, the villagers need to apply through the village governments and pay a fee. For certain type of natural resource e.g wild animals or cutting trees for timber the permission has to come from the director for wildlife and District Natural Resource Office, respectively. Nevertheless, despite the existing laws and by-laws for natural resource use, there is illegal extraction of resources in many villages visited suggesting that either the laws/by-laws are not available or there is no incentive to enforce them due to reasons such as the cost of enforcing outweighs benefits.

### *3.8 Marketing*

Most of the product that goes through markets is maize, rice, beans and millets. Also live animals and livestock products such as meat, milk, skins etc.

#### **3.8.1 Transport as market availability factor**

Generally, transport system is very poor. The Idodi-Pawaga villages are far from town on a road, which becomes very difficult to pass during the wet season. Each division of Idodi and Pawaga depend on one bus only. Because of this transport costs to Iringa town is very difficult and expensive. It cost about T.shs 4400/= for a return trip and about T.shs 1500-2000 per sack (of 90kgs) of grains. These transport costs are translated themselves in prices received by farmers which is very low (Section 6.2).

### 3.8.2 Marketing

Agricultural products are marketed by private traders and periodic markets (*magulio*). The major complains from farmers is low prices offered by traders relative to the cost of production. During the harvesting periods prices are very low and farmers sells their rice at a price of 7000/= per one sack while the same quantity is sold at 16,000/= during the scarcity period. For maize it is 6000/= and 10,000/= during harvest and lean seasons, respectively . Nevertheless, due to high demand for cash as well as lack of efficient storage facilities, a high proportion of farmers sell their produce immediately after harvest and as a result, they get very low prices. Villages which are located off from major roads and towns (e.g Mboliboli) are the most hit by marketing problems. Poor roads and infrastructure also limits farmers from producing potential high value but perishable crops such as tomatoes and vegetables because they can't sell easily (URT 1996).

The marketing situation is also not favourable for livestock keepers who complain that prices are so low that they can't sell their cows for enough money to buy food. The prices for livestock keepers are very varied ranging from as low as 30,000/= to 150,000/= depending on the size of the cow and buyers availability. According to the livestock keepers, cattle buyers come from Iringa town, they know to each other and the auctioneer, and therefore they can easily collude for low prices.

It is important to note that good markets for livestock could lead to sustainability of the WMAs. High price for livestock will provide incentive for livestock keepers to sell their cattle in large numbers. As a result, this will lead to availability of beef or goat meat at affordable prices and therefore reduce pressures for bush meat as close substitute. Also selling large number of animals by livestock keepers will enable them to purchase enough food from farmers thereby increasing local markets for farmers. Another advantage is that, high incentive to sell livestock may reduce grazing pressure on WMAs, which is good for wild animals.

### 3.9 Economic Agents

#### 3.9.1 Existing investors

Except for MBOMIPA as a project, which is now converted to a CBO, there are very few economic agents existing in the Idodi-Pawaga WMA. Most of the existing agents are more as facilitators/donors rather than economic agents (Table 8.1).

Few villages are being helped by Religious organizations especially the Anglican, Lutheran and Roman Catholics. These religious groups are involved mainly in education and health services on smallscale basis. One village (Malinzanga) mentioned to have been also helped by DANIDA in tape water installation. In addition, an NGO known as “Concern” has been providing technical assistance for irrigation canal construction/rehabilitation in Ilolo Mpya, Magozi and Kimande villages. There is also a Ruaha National Park, which through its community conservation unit provides education to the communities in the area of conservation, in particular the education is provided to the local communities and schools. The focus of this education is to promote tourism based activities e.g craft sales and campsites by individuals surrounding national parks.

**Table 8.1 Economic Agents Operating in the Village**

<b>Village</b>	<b>Available NGOs</b>
Mahuninga	MBOMIPA
Makifu	MBOMIPA
Tungamalenga	MBOMIPA, Tungamalenga camp, which is targeting tourist who may not want to pay the high overnight costs at Ruaha National Park, referring to go to Ruaha on Daily basis. There is no much link with the surrounding community rather it is any independent business entity.
Mapogoro	MBOMIPA
Idodi	MBOMIPA, Anglican church which provides tape water and mosquito nets
Malinzanga	MBOMIPA, DANIDA for water services and TANAPA
Nyamahana	MBOMIPA, ELCT supports adult education, paying fee for secondary school

	students. About 4 students per parish/year
Luganga	MBOMIPA, RC-paying fee for secondary school students, constructed a nursery school CONCERN-agricultural irrigation and marketing.
Magozi	MBOMIPA, Anglican-Church provides mosquito nets, Concern-irrigation canal
Ilo Mpya	MBOMIPA, Concern-provides technical assistance on irrigation canal construction, Religious institutions sponsor students from poor families
Mkombilenga	MBOMIPA
Mbuyuni	MBOMIPA
Mboliboli	MBOMIPA, Anglican Church is building a health center for the village
Kimande	MBOMIPA, Concern –irrigation farming.
Itunundu	MBOMIPA
Mafuluto	MBOMIPA
Isela	MBOMIPA
Kisanga	MBOMIPA
Kinyika	MBOMIPA

### 3.9.2 Other economic agents

There is one private tourist camp at Tungamalenga. The camp comprises 6 rooms with en-suites as well as attractive camping sites with very good clean facilities. They are targeting tourists who do not want to pay the high overnight costs in Ruaha, preferring to go into Ruaha National Park on daily basis (MEMA, 2001). There was also a small craft shop with craft from all over Tanzania for sale. In addition, there are two national parks. Ruaha national parks which is found in the west and the Udzungwa national park, which is found in the east. Also there is the Lunda Mwambi game controlled area.

### 3.9.3 Interactions between economic agents and local people

Following interviews with villagers there is no direct link between these economic agents and local people in the area. Although, villagers might be getting some incomes as commission/fee paid to the government authorities by investors which is the partly

channeled back to local communities in the area, their role to villages are not yet known by villagers. Villagers as government are not involved whatsoever in these investments although some individuals are getting employments both skilled and unskilled. It is clear that there is no any sort of joint venture in the villages visited. For the case of facilitators/donors there is some cost sharing mechanisms. The donors are paid funds for technical support or material purchase and the local communities are contributing in kind by providing labour power. They can also contribute financially from their VG earnings.

### *3.10 Financial Facilities*

Formal financial facilities do not exist in Idodi-Pawaga WMA. This is because the money circulation is very low to attract financial investors. Also many villagers do not have collateral for loans applications in formal financial institutions, which creates disincentives for establishing financial institutions in rural areas both for local people and for financial agents.

However, informal money lending is quite common in the WMA. About 40% of the respondents had access to money borrowing where a high proportion received from family member and friends and only one person out of 97 households had a loan from Bank. The money borrowed ranged from T.shs 5,000 to T.shs 20,000. These findings suggest that the demand for credit is high and the main source of credit is family member or friends. One focus of WMAs could be for the villages to lend money to their people to help eradicate poverty. The WMAs also could be playing a role of providing guarantee to its people for formal loans. Table 9.1 summarizes credit sources by respondents.

**Table 9.1: Household Percentage Distribution by Credit Sources**

<b>Source of credits</b>	<b>%</b>
Total household sample (respondents)	97
People who have ever borrowed money	40.2
Source of borrowed money	
Family member	16.5
Friend	15.5
Money lender	2.1
Bank	1.1
Don't know	4.1
Average amount borrowed (T.shs)	10,000

### **3.10.1 Loans and repayments**

The repayment period ranges from less than three months to more 18 months. Of course majority are paid between a periods of less than three months to six months. The high repayment rate is probably due to low amount of money borrowed and the trust build between the two parts in the contract i.e is the moneylender and the borrower.

**Table 9.2: Repayment period**

<b>Period of repayment</b>	<b>%</b>
< 3 months	58.3 (21)
3-6 months	35.9 (14)
7-12 months	2.6 (1)
13-18 months	2.6 (1)
More than 18 months	2.1 (2)

Source: Survey Data

### 3.10.2 Poverty levels

Poverty as per National Poverty Eradication Strategy (1998) is defined as a state of deprivation prohibitive of decent human life. In thus includes both inadequate income as well as deficiencies in non-income human development attributes. The key dimension of poverty identification are (i) inadequate income to purchase basic necessities, (ii) deficiency in human capabilities (illiteracy, malnutrition, diseases etc) (ii) isolation and vulnerability (social exclusion and dependency) and (iv) powerless and hopeless.

At national level in defining poor and non poor the following indicators has been used. Rates of morbidity and mortality, prevalence of malnutrition, illiteracy, infant and maternal mortality rates, life expectancy, housing standards, clothing, per capita income, and expenditure, infrastructure. Other include fertility, lack of access to basic services such as safe water, food security, and technology

In this study poverty assessment did not go in to such sophisticated kind of definition mainly because of the limited time and resources. Instead the poverty levels for the villages surrounding the Idodi-Pawaga WMA was assessed by investigating availability of socio-economic services. At a household level a PRA techniques used villagers were asked to list criteria for defining wealth/ poverty among themselves. Although the criteria for defining wealth vs poverty were almost the same in all villages there was some differences in terms of quantity. For example in some villages one modern house is satisfactory indication of wealth while others were saying at least 5 modern houses for one to be identified as a well off person.

### *3.11 Availability of Socio-Economic Services*

All the villages visited complained about the inadequacy socio-economic services. Roads were reported to be poor in all villages as well as water services. Although most villages are supplied with tape water, they are not adequate and people resort to river water as supplement, which is not safe. The common source of energy is fuel wood where almost all the villagers use it. Charcoal is used by very few residents and kerosene is used mainly for illumination. These findings are consistent by those obtained at household

level where 100% of the respondents reported to have been using fuel wood as main source of their energy for cooking. Health services are also very limited. Some villages such as Makifu, Nyamahana, Mbuyuni and Magozi do not have any health centers. Even in villages where health services exist they are under staffed and there is no medicine. The same applies to education services. Mkombilenga and Mbuyuni do not have any school while the rest villages have at least one primary school in their villages. However, teachers, classrooms, desks were reported to be inadequate in every school. Shops and kiosks exist in many villages but they are not sufficient both in number and facilities provided. Consequently, most villagers depend on periodic markets, which occur once per month or they have to travel to Iringa town for attaining consumer goods and other necessities. Table 9.0 displays social services in Idodi-Pawaga WMA.

**Table 10.1: Availability of socio-economic services**

	Transport	Water	Energy	Medical Services	Ed
<b>Idodi-Pawaga</b>					
Mahuninga	Road (in poor condition)	Tape water River water	Fuelwood use Few charcoal	1 dispensary not sufficient in terms of medicine and staff	1 suf des tea
Makifu	Road (in poor condition)	Tape water River water	Fuelwood use Few charcoal	No health services	1 suf des tea
Tungalemba	Road (in poor condition)	Tape water River water	Fuelwood not easily available Few use charcoal Few use kerosene stove	1 dispensary not sufficient in terms of medicine and staff	1 suf des tea
Mapogoro	Road (in poor condition)	Tape water River water	Fuelwood not easily available	1 dispensary not sufficient in terms of medicine and staff	1 suf des tea
Idodi	Road I bus for 7 villages	Tape water River water	Fuelwood not easily available	One dispensary but not sufficient for drugs and staff	1 for 1 p
Malinzanga	Road I bus for 7 villages	Tape water River water	Fuelwood not easily available Few use charcoal Few use kerosene stove	One dispensary but not sufficient for drugs and staff	1 for 1 p
Nyamahana	Road (in poor condition)	Tape water but not	Fuelwood	No health services	1

	condition)	enough			for 1 p
<b>Pawaga</b>					
Luganga	Road service which is not sufficient	Firewood and is easily available	Tape water but not sufficient	One dispensary but not sufficient in terms of drugs and staff	1 p su des an
Magozi	Road service which is not sufficient	Firewood and is not easily available	Tape water but not sufficient	No health service except in the neighbouring village	
Ilolo Mpya	Road service which is not sufficient, few use waterways	Firewood and is not easily available	Tape water and river water	One dispensary	On
Mkombilenga	Road service which is not sufficient, few use waterways	Firewood and is not easily available	Tape water and river water	0	0
Mbuyuni	Road service which is not sufficient, few use waterways	Firewood and is not easily available, few use charcoal and kerosene for cooking	Tape water and river water	0	0
Mboliboli	Road service which is not sufficient, few use waterways	Firewood and is not easily available	Tape water and river water	Dispensary is under construction	1 p
Kimande	Road service	Firewood and is not	Tape water and	Dispensary and	1 p

	which is not sufficient	easily available	river water	health centers, no laboratory	
Itunundu	Road service which is not sufficient	Firewood and is not easily available, few use charcoal and kerosene for cooking	Tape water and river water	One mission dispensary mission	2 no ter cla an

### *3.12 Household Poverty Levels*

Basing on PRA approach poverty in Idodi-Pawaga is widely spread and pervasive. Using their own criteria (e.g ownership of large number of land, cattle, shops, modern house, milling machine, cars) a high proportion of over 75% of the villages are poor with very few appearing to be better off. This number is likely to be higher when one compares with the national standard as well as international standards of poverty monitoring indicators such as access to health services, education, life expectancy, under five mortality rate and access to clean water. These findings are consistent with the household surveys where assessment on income poverty show over 80% of the respondents are poor earning less than one dollar a day.

The poverty levels were also revealed in terms of food consumption patterns. Although people appeared to have wide range of food consumption patterns, food composition is dominated by starchy with very little protein and fat sources. Many villagers have two meals a day i.e Lunch and Dinner, which is reduced to one meal during lean seasons. The few with three meals per day make a small proportion of the villagers of the area and in most cases these are civil servants employed by the local government or by NGOs in the area.

As already pointed out, many villages do not have health services and the few with them are lacking qualified personnel and drugs. Common diseases were reported to be malaria, dysentery and typhoid. It was reported that at least half of the villages suffer from malaria annually and a high proportion of this segment have repeated malaria incidences of about 3-4 times per year. According to villagers, the minimum cost of treating malaria is T.shs 1,000 and several people in the households can fall sick of malaria. Thus, expenditure on health services by rural households is high. It was also reported that about sixty percent of the population fall sick of dysentery, typhoid and diarrhea and the cost of treating these diseases is even higher where some people have spent about 45,000/= for treating the diseases. AIDS pandemic was also reported to be serious where about 10% of the population were reported to be affected. High rate of disease infections not only affected household budgets but also labour force availability, which leads to low productivity and

increases poverty levels in the area. Trend on the levels of poverty as well as diseases incidences should form part of poverty monitoring indicators in the would be WMA. Table 10.2 displays wealth-ranking criteria for villages in Idodi-Pawaga WMA.

**Table 10.2: Wealth ranking criteria per village**

	<b>Households</b>	<b>Criteria 1</b>	<b>Criteria 2</b>	<b>Criteria 3</b>	<b>Criteria 4</b>	<b>Criteria 5</b>
Mahuninga	750	Shops	M.Machine	Livestock (20+)	Farm land (15+)	Modern House
Makifu	282	Shops	M/Machine	Livestock 30+	Farm land (30+)	Modern House
Tungamalenga	473	Shops	M/Machine	Livestock 15+	Craft shop	
Mapogoro	452	Shops	M/Machine	Livestock 10+	Farm land (10+)	
Idodi	810	Shops	M/Machine	Livestock 30+	Farm land (10+)	Modern House
Malinzanga	715	Shops	M/Machine	Livestock 30+	Farm land (20+)	Modern House
Nyamahana	356	Shops	M/Machine	Livestock 50+	Farm land (5+)	Modern House
Mafuluto	320					
Luganga	318	Shops	M/Machine	Livestock 50+	Farm land (5+)	Modern House
Magozi	179	Shops	M/Machine	Livestock 10+	Farm land (4+)	Modern House
Mkombilenga	147	Livestock 50+	Farm land (7+)	Harvest 70+ sacks of rice	Modern House	
Kimande	Shops	M/Machine	Livestock 40+	Modern House		
Itunundu	649	Livestock	M/Machine	Farm land	Harvest 50+	Modern House

		50+		(5+)	sacks of rice	
Kisanga						
Kinyika	420					
Mboliboli	700	Shops	Livestock 100+	M/Machine	Farm land (5+)	Harvest 50+ sacks of rice
Ilolo Mpya	171	Shops	Livestock 20+	M/Machine	Farm land (5+)	Modern House
Mbuyuni	237	Shops	Livestock 50+	M/Machine	Farm land (5+)	Harvest 50+ sacks of rice
<b>Average</b>						

### 3.13 Opportunities to Increase VG Incomes

#### 3.13.1 Introduction

Given their similar ecological background, economic opportunities are likely to be similar in all WMAs. Nevertheless, the efficiency in running these economic activities is likely to differ from one WMA to another depending on different reasons including wildlife richness, type of wildlife existing, infrastructure, knowledge and experience in conservation. To understand which WMA is efficient in what economic activity may need a detailed study cost benefit and comparative advantages.

A high proportion of the villages visited do not have any idea on how they could increase their incomes from wildlife utilisation following the implementation of the WMAs. Indeed, many villages were not able to say anything on how they are going to improve their VGs' incomes from WMA. Rather, they were asking the consultants to help them identify the opportunities on their behalf. Nevertheless, after brainstorming with the researchers the villagers were able to mentioned economic opportunities such as ecotourism, tourism related to water falls attractions, climbing hills, campsites and business on live birds and photographing. People expressed interest of practicing beekeeping. Currently, very few appear to practice it due to lack of knowledge on the sector. Also fishing activities is one of the potential areas to increase wildlife income and nutrition by villagers. The economic potential are explained in details in the following sections.

#### 3.13.2 Fishing

Idodi Division has got a big number of water sources and fish farming is a viable activity. It is anticipated that fishing and fish farming activities will improve the welfare of those who are involved and thus improve the living standard. Currently, fish farming has been started in Idodi Division. There are 16 ponds in 5 villages (Isack 2001).

Also fishing activities is taking place in little ruaha where people catch fish for subsistence use. These include *kambale*, *tilapia*, *katoga* and *nchema*. However, fish are

only available during rainy season when river fills up. In some villages fishing is said to be destructive and unsustainable. The fishermen build barriers across the river, use spears, set up fish traps, use nets or *kangas* and sometimes use poisoning materials.

In Tungamalenga village, fish are caught from the river Tungamalenga and also sometimes from irrigation canal in the rainy season. The fish caught are mainly *kambale*, *dagaa*, *ngogo*. They catch fish using hooks, *khangas*, and traps. Constraint towards fishing is lack of expertise. They catch fish indiscriminately, even the little ones. In the months when fish are available people eat fish every day. Table 11.1 the scale of fishing activities in Idodi-Pawaga WMA.

**Table 11.1: Fishing Activities**

<b>Villages</b>	<b>Whether available</b>	<b>Scale</b>	<b>Type of fish</b>	<b>Constraints</b>
Mahuninga	Not available			
Makifu	Not available	-		Drought, lack of ponds
Tungamalenga	Available	Home consumption and surplus for sale during rainy season	Kambale, daga, ngogo	Drought, fishing expertise and material
Mapogoro	Available	Home consumption and surplus for sale during rainy season	Kambale, daga, mdomochini, sulusulu, ngogo,	Drought, fishing expertise and material
Idodi	Not available			
Malinzanga				
Nyamahana	Not available			Drought, lack of ponds
Luganga				
Magozi	Available	For subsistence only	-	Low concentration of fish
Ilo Mpya	Exists	Subsistence level	Kambale, perege, ngalala	Drought, fishing expertise and material
Mkombilenga	Available	For subsistence only	Kambale, perege, nchena,	Low concentration of fish
Mbuyuni	Available	Home consumption and surplus for sale during rainy season	Kambale, perege, katoga, nchena, sulusulu, ngogo,	Drought, fishing expertise and material

			ngalala, njonge	
Mboliboli	Available	Home consumption and surplus for sale	Kambale, perege,	Getting license, presence of crocodile, fishing expertise and material
Kimande	Available	Home consumption and surplus for sale during rainy season	-	Fishing expertise and material
Itunundu	Available	For subsistence only	Kambale, perege,dagaa	Fishing expertise and material
Mafuluto	-	-	-	-
Isela	-	-	-	-
Kisanga	-	-	-	-
Kinyika	-			

- Not visited due to inaccessibility

### 3.13.3 Fish farming

In areas where rice is cultivated e.g Pawaga Division, there is a great potential of practicing Rice field fish farming if the knowledge is disseminated to the villagers with a close follow up and supervision. Experience has shown that, in these areas people go in the national park to poach fish while the river (Great Ruaha) passes through the village before it goes to the National Park. These areas could benefit more from the river passing through their fields if they could be advised to practice rice field fish farming. This practice will ensure them to get more fish as well as rice in their rice farms and thus raise their income, alleviate problem of being chased out by National Parks Policemen because it is prohibited to anybody, not only to undertake fishing, but also to enter in the National Park.

#### **3.13.4 Tourism**

There are initiatives to establish a local tourism association where 2 members from each of the 19 villages would join the association. The planned tourism activities includes the conservation and better control of game and investments in campsites, guided photographic tours and craft. The benefits from tourism enterprises will be going to village councils to support community development. They had decided that funding for the tourism projects should come from money raised through their wildlife quota, they were also looking for some support from NGOs community.

#### **3.13.5 Tourist and resident hunting**

Currently, the Idodi-Pawaga WMA through MBOMIPA sells its quota based hunting rights to the tourist hunting companies and/or resident hunting. This activity should be enhanced as it provides economic opportunity for the WMA. Hunting has the advantage of generating considerable revenues right from the beginning with little or no investments needed by the AA. The resource is already presented and available for operation. Hunting can generate profits early that communities can and should reinvest into the other economic opportunities. Nevertheless, hunting tourism to be sustainable, consumptive use of wildlife should not jeopardize the biological and ecological basic requirements. This could be achieved through the systems of monitoring the game populations, and must be jointly developed and implemented by the WD and the AAs along with the system of enforcing quotas.

#### **3.13.6 Photo tourism**

Photo tourism is another opportunity for income raising in Idodi-Pawaga WMA. The high densities of wildlife areas or attractive birds could be targeted for photographic operations. Christopherson *et. al.*, (2000), proposes for example to extend buffer zone around national parks from one kilometer to five kilometers. Where a WMA is situated directly adjacent to a national park a small area of 5km wide buffer zone around national parks could be zoned for limited photo tourism. In this respect, photo safari companies should have small-tented camps located well inside such extended buffer zones, whose guests remain inside the small-gazetted photo tourism area and only access the camps

through the park and only venture inside the park or protected area. These small-gazetted areas would have to be off limits for the hunter. To avoid conflicts between the two operations, conditions for hunting and photo safari companies should be clearly spelled out in the lease contracts and be in compliance with the Tanzania law. Also tented camps should not be too many in the buffer zone to avoid hindering the movement of the game between the protected area and the WMA hunting block.

### **3.13.7 Sport hunting**

Sport hunting could be potentially another major earner of revenues in the WMA. For instance, a report by MNRT (1996) estimates such an activity to generate revenue up to US\$ 40,000 per block per annum for surrounding communities in the SGM bufferzones. The study also proposes that for such an activity to be efficient market forces should be allowed for allocation and pricing of hunting blocks.

The issue of increasing supply of meat for community surrounding WMA could also come from meat recovery from sport hunting. The great deal of the meat arising from sport hunting operations is presently wasted, for various practical reasons (MNRT 1996). Given the nutritional status of the surrounding communities where meat is scarce, this could help reduce the gap.

### **3.13.8 Live animal capture and Sale**

This activity AA could be receiving quota from WD to capture and export live animals. The AA could consider this option along with the hunting and cropping options or some combination with the three. Quotas for capture and sale of non game animals (reptiles etc) could also be established for the WMA

### *3.14 Emerging Issues*

Based on the above findings and field visits the following are the emerging issues observed:

- Level of knowledge and awareness regarding these new concepts of WMA and AA by villagers including village governments is very low or non-existence. This may

affect local communities bargaining power relative to investors and joint ventures related business.

- Natural resource use by villagers is considerable but difficult to quantify and to put in money terms because is used mainly on subsistence levels or used illegally.
- Most of the natural resources is extracted free of charge because either by-laws are not developed or they are not enforceable.
- The capacity to keep records for incomes and expenditure by households and village governments is very poor and in some villages not transparent enough.
- A good proportion of the VG incomes seem to have been used in administrative matters rather than villages' development projects.
- Capacity to identify economic opportunities for their WMA by villages is low which may undermine their bargaining power with investors.
- The benefits accruing from WMA are likely to benefit the community rather than individual households especially in the initial years of implementation. Families that depend on natural resource for subsistence may suffer following WMAs implementations.
- The efficiency in running economic activities is likely to differ from one WMA to another depending on comparative advantages.

### *3.15 Conclusion*

The Idodi-Pawaga WMA has made a good progress administratively. The original MBOMIPA project has been converted to a CBO, which also acts as a facilitator. Natural resource committees have been established in each village. Every village supplies 2 game scouts for 10 days on rotational basis. They are only paid little allowances, which is not

enough to motivate them, and make them active for the job. Also poor working facilities such as transport, communication, uniform, food have constrained performance of game scouts in performing anti-poaching business.

During this study there was no any joint venture existing between villagers and investors. What was seen is cost sharing between government/donors and local communities e.g in areas of education, health and irrigation projects. In most cases the donor/facilitator provides funds or expertise and the communities provide labour force.

MBOMIPA on behalf of the villages sells the quota to the professional hunting companies for money. The earned money is then distributed to all villages equally. About T.shs 1 000 000 per year is given to each village. Income from other wildlife not channeled through MBOMIPA is very low due to either non-existent or weak/unenforceable by-laws.

Incomes and expenditure by village governments are not clear and transparent enough in some villages . Also income from natural resource for developmental projects is not clearly indicated which is difficult to make a follow-up. Proper monitoring of the impact of WMAs concept will only be possible if there is proper record keeping in villages' incomes and expenditures.

Although many villages are likely to benefit from WMA implementation, most of these benefits will be accrued at communal level and not household. There will be losers from natural resource livelihoods e.g food extraction and this category of people may need to be compensated.

Crop destruction by wild animals is considerable in all villages visited. These affect villagers' crop harvest and incomes. The destruction by wild animals is also experienced by livestock keepers where several animals has been killed by wild animals such as Lion, Leopards etc.

Due to similar ecological background, the economic opportunities are likely to be similar in all WMAs. Nevertheless, the efficiency in running these economic activities is likely to differ from one WMA to another depending on different reasons including wildlife richness, type of wildlife existing, infrastructure, knowledge and experience in conservation.

### *3.16 Recommendation*

There should be immediate and extensive awareness raising programme for the villagers surrounding the WMA and capacity building in WMA, AA and general managerial skills for the key players of the VGs. This work should be performed by WD.

There should be trainings for households and VG in records keeping for incomes and expenditure as well as quantity/volumes harvested, marketed or consumed. Also there should be external board to audit VGs' incomes and expenditures. This work should be implemented by DW in collaboration with Ministry of Finance or Cooperatives.

The MNRT need to contract another firm (economic) to undertake a detailed study in all WMAs case by case to establish cost benefit analysis and comparative advantages for each WMA. This is important for each WMA to operate in areas, which is more efficient and competitive. Comparative advantage could be in terms wildlife resource endowed, transport advantage, time invested in the business etc.

The WD should look on ways of compensating households, which their livelihood to a high extent depends on natural resource use. This could be through providing alternative livelihoods.

### *3.17 Way Forward*

The most deficiency observed in the field is the knowledge gap and awareness about the whole idea of WMA and AA by villages. With exception of the villages' chairmen who attended the inauguration ceremony by the MNRT in Dar es Salaam, a high proportion of the villagers including VGs do not know exactly what is going on and how this is going

to affect their socio-economic lives. Therefore, awareness raising for the whole community surrounding WMAs and capacity building for key players in the VG should be the starting point of WMA implementation by the government, donor community and NGOs. Educating villagers on the WMA and associated packages is also important for bargaining power with investors. Education also should be extended to teaching people basic principals of project appraisal and book-keeping or general management skills. Field observation show that VGs cannot keep even simple records for income and expenditure for their villages. Proper monitoring of the impact of WMAs concept will only be possible if there is proper record keeping in villages. Record keeping techniques should extend to households in terms of harvests, marketed and consumptions.

Help villages to develop by-laws for natural resources utilization as incentives to increase VG incomes and sustainable utilisation of natural resource. Most villages do not know how they will increase their incomes based on this new policy of WMA. At least in the initial years of WMAs implementation each WMA should be allocated with a facilitator that could help them in identifying and implementing economic opportunities.

Since level of investment and joint venture between investors and local communities is almost in-existent at least to the knowledge of villagers, the government should try to build capacity in these aspects providing skills related to investment and joint ventures.

## **4.0 ECOLOGICAL ASPECTS**

### *4.1 Situation Analysis*

The proposed pilot WMA is within the Lunda Mkwabi Game Controlled Area (LMGCA). The communities have developed a memorandum of understanding to jointly manage the area as a Wildlife Management Area. The total area of the Game Controlled Area is 4046 km<sup>2</sup> (see map 1). The proposed pilot WMA has both ecological and social benefits to Ruaha National Park. The biological, or ecological benefits are a result of the territorial expansion of the protected area that keeps human impact further away. Some of these benefits are:

- Physical barrier from human encroachment
- Enlarge the natural habitat and reduce edge effects
- Enhance the environmental services provided by the reserved

The institutional set up put in place to manage wildlife resources is very well organized, and the level awareness seems to be high. If given the necessary financial and technical support, these communities can manage wildlife resources reasonably well.

## *4.2 Ecological Data and Analysis*

### **4.2.1 The Current Ecological Status of the Area**

#### **Overview**

The area is characterized by semi-arid to arid climate, with a rainfall of approximately 500mm per rainy season. The vegetation is varied ranging from Acacia woodlands to miombo woodlands dominated by Acacia, Commiphora, Combretum and Brachystegia species. Land use is extensive, ranging from subsistence agriculture, agro-pastoralism, to pastoralism.

The area is within the miombo woodlands zone. Ecological studies indicate that, the dynamics of Miombo are strongly influenced by human activities. The structure of the woodlands tend to be substantially modified through slash and burn agriculture, harvesting for fuelwood and charcoal, frequent burning and heavy grazing by livestock. Transformation and modification of the woodlands increase as population grows and economic conditions change. Potential environmental impacts affect biodiversity, ecological functioning, carbon storage, trace gas emissions, hydrology and regional climate.

The vegetation communities in the study area represent two phytocoria, namely the Southern Zambezian *Brachystegia* woodland and Northern dry Somali-Maasai *Acacia-*

*Commiphora*. The two phytocoria are regional centers of endemism, but species richness is relatively poor compared to other moist vegetation communities.

#### 4.2.2 Trends and Use of Wildlife

##### Trends in Wildlife Populations

Several censuses were conducted in the area, and below is the trend in wildlife populations in the area.

**Table 4.1: Comparison of Large Mammal Population Estimates in LMGCA**

Species	1990# estimated	Density # km2	1994-95 # estimated	Density # km2
Buffalo	2240	0.67	63	0.02
Impala	2457	0.74	916	0.28
Zebra	397	0.12	249	0.08
Giraffe	777	0.23	358	0.11
Elephant	0	0	888	0.27
Kudu	0	0	220	0.07
Hartebeest	18	0.01	0	0
Sable	36	0.01	0	0
Eland	162	0.05	0	0
Warthog	252	0.08	0	0
Waterbuck	18	0.01	0	0
Cattle	18,214	5.5	28359	8.6
Goats	3,162	0.95	11828	3.6

Source: Taylor, R. 1995

Ecosystems Consultants (2002), also have made the following estimates of wildlife species of special interests to communities. These estimates are based on sample estimates and the results given in Tables 1.1-1.12 in Appendix 1.

According to EPIQ report (2000), between 1990 and 1995, wildlife densities decreased by more than half whilst livestock numbers doubled. Wildlife populations, especially

large game species such as buffalo were generally depleted for a number of reasons including over hunting and human densities estimated to have reached 18 persons per square kilometer. Systematic Reconnaissance Flight Method Censuses conducted by REWMP in 1994 and 1995, showed a marked increase in settlements and clearing of land for agriculture and livestock.

Surveys done during the wet and dry seasons in 1999, 2000 and 2001 concluded that wildlife populations have remained stable within expected levels of annual/seasonal fluctuations, and recommended increased off take quota for buffalo, kudu, sable, waterbuck, and guinea fowl.

Other wildlife species found in the area include impala, hippopotamus, monkeys, wild pig, lion, wild dog, baboons, jackals, dikdik, crocodiles, ostrich, hyaena, leopard and cheetah. Most of these species are believed to be increasing, with the exception of wild dog whose population is said to be declining.

Communities believe that, these species are increasing because of improved habitat management, and reduced poaching.

### **Endemic, Rare, Threatened and Endangered Species**

There are no species of large mammals are known to be endemic to the area. The following large mammals found in the area are regarded by IUCN as threatened;

- The African Elephant is classified as Endangered
- The Cats: the lion and cheetah are both regarded as vulnerable
- Species in the lower risk category include; waterbuck and oryx.

### **CITES Status**

Because of international concern about the trade in several species and their products, the following large mammals found in the area are placed within the CITES appendices;

- Appendix 1: African Elephant (with recent proviso permitting some trade of elephant products originating in some African States), Wild Dog and Leopard.
- Appendix 11: Hippopotamus and Crocodiles

There are no records for the status of small mammals, amphibians and reptiles in the area. In this case therefore it is also difficult to conclude if there are any endemic, threatened or endangered species among these three groups. Detailed studies are therefore required to document the status and threats of small mammals, amphibians and reptiles.

### **Wildlife Utilization**

The form of wildlife utilization in the proposed pilot WMA is mainly tourist hunting. Records indicate that, tourist hunting in the Lunda Mkwabi Game Controlled Area (LMGCA) started in 1993, but was stopped shortly in LMGCA South due to depleted wildlife populations. At present, tourist hunting continues in LMGCA north. The main species hunted are lion, leopard, buffalo, greater kudu and impala. From the safari operator's perspective, hunting is satisfactory to good but is reliant on and complemented by hunting blocks adjacent to Rungwa Game Reserve.

Hunting quotas for previous years has been as follows:

**Table 4.2: Hunting Quotas**

<b>Resident Hunting</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>
Bushpig	20	20	20
Dikdik	40	40	40
Hartebeest	0	0	0
Impala	130	130	130
Warthog	20	30	30
Eland	5	5	5
Guineafowl	125	125	125
Waterfowl	32	32	32
Spurfowl	125	125	125
<b>Tourist Hunting</b>			
Zebra		10	0
Kudu		5	0
Sable		5	0
Waterbuck		5	0

Source: Ecosystems Consultants (2002)

Resident Tanzanians have been undertaking recreational hunting in South LMGCA. It has been documented that there are allegations of malpractice by resident hunters who have a tendency of shooting animals which they do not have licenses for, frequently breaking hunting regulations by shooting from vehicles, and cross over into Lunda North and Ruaha National Park to take advantage of the rich pickings along the Greater Ruaha River.

Luckily enough, the institutionalization of MBOMIPA in 1997 has made it easy for the project to develop mechanisms for tracking and monitoring hunting. It has also been made mandatory for hunters to report to the office of the Village Natural Resource Committee before and after the hunt, and to be accompanied by a village game scout during the hunt.

Apart from tourist hunting, illegal hunting continues at a small scale. Poaching cases reported for illegally hunted wildlife as follows:

**Table 4.3: Poaching Statistics**

	Lion	Buffalo	Eland	Elephant	Leopard	Hippopotamus	Dikdik	Zebra	Impresso	Crocodile	Cheetah	Giraffe	Warthog	Wildpig	Kudu
98		1		9			1		1			1			
99		5		5	9		2		3		1				
00		10		28		8	3			1		1	1		
01		15		4		7	3		3					5	6
02		11	2	5		1	5		4				3	3	1
03		1			3	1	7							2	2

Source: Antipoaching Records (Iringa), 2003.

#### **4.2.3 The Status of Vegetation Communities and an Assessment of the Suitability of the Habitats for Wildlife**

##### **Vegetation Types**

Nahonyo et al; (2000) classified the vegetation of the area based on the physiognomic and floristic criteria as follows;

**Table 4.4 : Vegetation Units of LMGCA**

<b>Primary Physiognomic Categories</b>	<b>Vegetation Categories</b>	<b>Specifications and Definitions</b>
Riparian vegetation	Moist riparian forest, closed	Narrow belt along rivers, evergreen trees 20-30m tall, crown cover less than 80%, branched trees. Riparian forest is remarkable in Pawaga sections dominated by Acacia and Ficus species. Plenty of wildlife including amphibians and primates
	Riparian woodland open	Less conspicuous dominated by tall Hyphae trees. In seasonal water courses Newtonia and Acacia albida occur.

	Phragmites bushes	These form dense cover along streams, stream banks and stream beds where there is soil deposit and silting. Assists protection against soil erosion and is refuge for wildlife and birds' nestings. Reeds useful for housing
Woodland Vegetation	High altitude Brachystegia woodland	The Brachystegia woodland represents the climatic climax vegetation on higher altitudes in the mountain ranges at the top and on the flanking, escarpments. Crown cover 50%. Usually evergreen, e.g. <i>Afzelia</i> , <i>Brachystegia</i> , except <i>Pterocarpus angolensis</i> which is deciduous. Burning and fire-protection experiments in Zambia suggest that some woodland is secondary and some represents an ecotone between dry evergreen and climax miombo woodlands (White, 1983). Some miombo species e.g. <i>Brachystegia microphylla</i> are confined to rocky hills. They serve as catchment areas.
	Low altitude Brachystegia woodland	These occur on drained deep sandy soils, at the base of hills. Trees 10-20 (or more). The climax here may have been dry evergreen forest. Nearly all Brachystegia woodland in this zone have been subjected to heavy exploitation for timber, plus fuelwood and shifting cultivation and fire. Such degraded areas have many remnant trees of <i>Xeroderris stuhlmannii</i> , and rejuvenating vegetation is characterized by <i>Terminalia sericea</i> . This is the worst affected man made habitat, predominantly edaphic.
	Acacia Combretum bushland/woodland	On valley floor and level areas or Mbuga with clustered bushes of Combretum. On gravel soils <i>Combretum apiculatum</i> dominate, with scattered <i>Sclerocarya</i> , <i>Strychnos</i> and <i>Markhamia</i> . Also scattered <i>Adansonia</i> , very conspicuous as big trees.
Bushland	(1) Steep Escarpment Acacia-Commiphora bushland	Deciduous trees and bushy shrubs on hill slopes and steep escarpment below Brachystegia woodland. Easily distinguishable <i>Sterculia</i> (white stems), <i>Commiphora</i> and <i>Euphorbia candelabrum</i> , <i>Euphorbia matabelensis</i> and especially <i>Commiphora stolonifera</i> .
	(2) Acacia-Commiphora in low	Characteristic species of the Somalia-Maasai regional center of endemism in the rift valley bottom, the

	lying areas	dominant genus is Commiphora.
Scrubland and bushland	Acacia dominants	<p><i>Acacia nigrescens</i> with <i>Terminalia spinosa</i> on heavy clay soils which local people call impeded drainage on clay soils. Soils become impassable in wet season.</p> <p><i>Acacia kirkii</i> forming thick bushland in alluvial river deposited soils along river/stream banks. Also seasonally wet areas sometimes forming riverine bushland. Sometimes associated with <i>Acacia stuhlmanii</i>.</p> <p><i>Acacia drepanolobium</i> dominates as scrubs on black cotton soils.</p>
Thickets	Ravine shade loving spp.	Ravines developing as a result of soil erosion are covered by thick bushes along ephemeral drainage lines (locally known as “Korongo). Two Korongos were identified on the Mlowa to South Lunda road, and one along Ilolo corridor. Common species are <i>Dalbergia arbutifolia</i> .

Adapted from Nahonyo, et. al; (2000)

These diverse vegetation communities are considered to be suitable habitats for wildlife because of the availability of good shade and food for both grazers and browsers.

### **Dominant Species**

Vegetation communities are easily recognizable by key species which characterize the Different community classes. The communities are physiognomically defined by these Species as illustrated by Table 13 below.

**Table 4.5 : Dominant Species**

<b>Vegetation Community</b>	<b>Dominant Species</b>
Miombo Woodlands	Dominated by the genera <i>Brachystegia</i> , <i>Julbernardia</i> and <i>Isoberlinia</i> . Other common leguminous species include <i>Pterocarpus angolensis</i> , <i>Burkea africana</i> , <i>Dalbergia melanoxylon</i> , <i>Dalbergia nitidula</i> and <i>Xeroderris stuhlmannii</i> .
Combretum Woodland	Dominated by the genus <i>Combretum</i> with its constituent species of <i>Combretum apiculatum</i> , <i>C. collinum</i> and <i>C. molle</i> . Some <i>Commiphora</i> species may be co-dominant with <i>Combretum</i> species. These include <i>Commiphora africana</i> .
Acacia-Commiphora Bushland	Dominated by the genera <i>Acacia</i> and <i>Commiphora</i> whose main species are spiny. They include <i>Acacia mellifera</i> , <i>A. nigrescens</i> , <i>A. Senegal</i> , <i>A. tanganyikensis</i> , <i>A. tortilis</i> , <i>Commiphora africana</i> , <i>C. caerulea</i> , <i>C. edulis</i> , <i>C. stolonifera</i> and <i>C. ugogensis</i> (the most abundant).
Other Communities	<i>Acacia drepanolobium</i> , <i>Acacia tortilis</i> and <i>Acacia stuhlmannii</i> .
Acacia nigrescens woodlands	Dominated by <i>Acacia nigrescens</i> and <i>Terminalia spinosa</i> .
Riparian Vegetation	Dominated by <i>Acacia albida</i> , <i>A. mellifera</i> , <i>A. polyacantha</i> , <i>A. xanthophloea</i> , <i>Ficus capraeifolia</i> , <i>Ficus sur</i> and <i>Ficus sycamoros</i> .

Nahonyo, et. al. (2000) also indicates that, within the area, there is a vegetation species by the name *Terminalia sericea*; which is an encroaching species, but a very useful medicinal plant in world-market. It is most endangered and extinct in some areas where it was very common.

#### **4.2.4 The Current Status and trends in water availability for Wildlife**

Rainfall and natural water flows form an important source of water for wildlife in the proposed pilot WMA. Rainfall in the northern part of the area is about 500mm on average, whereas the southern part receives more rain on the average of 750-1000mm. This variability in the rainfall pattern has consequences on the seasonal distribution of wildlife in the area.

There are two permanent rivers in the area, namely Great and Little Ruaha. The Great Ruaha is one of the Tanzania's largest rivers. It starts in the highlands of the Usangu catchment. From here it flows through Usangu wetland-home to 350 species of birds, and onwards to the Ruaha National Park and Mtera Reservoir. The river is said to have dried every dry season since 1993, with the dry period (July to September) tending to start earlier and last longer. This has a lot of severe impacts on the wildlife, including aquatic fauna, and may threaten the tourist potential of the proposed pilot WMA. Over-extraction of water for irrigation in the dry season, compounded by deforestation in the upper catchment are believed to be the main causes of this problem.

When Great Ruaha dries up, the wildlife tends to move to Little Ruaha, which does not have sufficient water. Little Ruaha is much closer to community farms, and as they move to this river, the level of crop damage also increase.

Water is therefore becoming a limiting factor in the area, and the distribution and numbers of wildlife in the area seem to be largely dependent on water.

#### **4.2.5 An Overview of Wildlife Movements**

The growth of human population in the area has led to an expansion of agricultural activities, which limits wildlife habitat, and thus restricting movement outside the existing area. The only known movement is that of wildlife moving from and within Ruaha National Park. In April to December each year, zebra are said to be moving from Ruaha National Park to the Community Wildlife Management Area. In December to June elephants also move in big numbers from the Community Wildlife Management Area to Ruaha National Park. Buffaloes tend to occupy this area in August to November and move back to Ruaha National Park in December.

As reported in Twatwatwa, there is a strong belief that there is a movement of wildlife from Ruaha National Park in the area to and from Twatwatwa through Udzungwa National Park.

This information could not be mapped, as it is considered too raw. Adequate time and synthesis is required before mapping the actual corridors.

#### **4.2.6 Status, trends and use of fisheries, forests and bee keeping resources**

##### **Fisheries**

There is a subsistence level fishery activities taking place in the rivers. Main species of fish harvested are covered in the economic part of the study. The level of fishing taking place is so small, that communities do not pay attention to it. There are therefore no proper records to indicate the problems and potentiality of this sector.

##### **Forests**

In the miombo woodlands there is a natural diversity of trees, providing local people with a wide variety of products, including wood, fuel, fruits, fodder and medicinal plants. A study by Nahonyo, et al (1998) indicate that the Acacia-Commiphora vegetation communities are under pressure from livestock grazing, fuelwood and cultivation. On the other hand, miombo woodlands are under pressure mostly from cultivation, timber harvesting, charcoal processing and fuelwood collection.

Commercially harvested trees, which require immediate attention, are:

- *Brachystegia* species which are mainly used for charcoal and commercial fuelwood
- *Pterocarpus angolensis* which is used for timber
- *Afzelia quazensis* which is used for timber
- *Entandrophragma bussei* which is used for timber.

The most important fuel wood species (in descending order) for each village in Idodi and Pawaga Divisions are provided in Tables 1.13 and 1.14 in Appendix 1.

## **Beekeeping**

The vegetation of Idodi and Pawaga is suitable and has a high potential for beekeeping (Nahonyo *et al*; 1998). At present, beekeeping activities are practiced on an individual basis. Miombo species are most commonly used for making and hanging hives. Forest resources could be used to promote beekeeping through the use of modern hives.

### **4.2.7 Human-wildlife Conflicts and Natural Resource Use Conflicts**

#### **Pastoralist Ethnic Conflicts**

The indigenous ethnic groups have fewer livestock than in the past, but other immigrant groups such as the Maasai, Barbaig and Sukuma have substantial livestock holdings. It is estimated that depending on the season and movement of pastoralists, there are between 40,000 and 60,000 cattle in the area. This is one source of potential conflicts in resource use.

This is usually of cattle raiding among livestock herders. Ecologically, they occupy the same ecological niche. However, there is a conflict between the two ethnic groups due to the tendency of cattle raiding. This has created an antagonism and therefore they tend to avoid one another. The tendency of avoiding one another creates a situation of frequent movements, and this has negative consequences on the environment.

#### **Crop Raiding**

Wildlife is abundant in the proposed pilot WMA and move frequently to the farm areas. Elephants move extensively throughout farming and settlement areas, and are a source of human-wildlife conflicts. The principal species involved include elephant, buffalo, wild pig and baboons.

In most villages, it is estimated that crop damage each year by wildlife is between 5% to 15% at most of the total cultivated area.

### **Pastoralists against Community Wildlife Management Area Leadership**

Pastoralists have a tendency of grazing in the proposed pilot WMA due to availability of pasture and water. This creates conflicts in resource use as they are limited.

### **Illegal/Over Utilization of Forest Products**

As indicated above, there is a problem of illegal harvesting of forest products in the proposed WMA, and most likely over utilization of forest products in the surrounding communities. This threatens the ecological integrity of the area.

## *4.3 Emerging Issues: A Discussion*

### **4.3.1 Ecological Isolation**

It was reported during the field visit that there are ecological links between Ruaha Park and Udzungwa National Park. Wildlife is believed to move from these areas to Twatwatwa area. However, wildlife corridors for these areas are not known. The intensity of land use in between these two areas puts a lot of doubt on the possible continued ecological links.

The major effects of ecological islands of wildlife or forest are the decline of species. There may also be local extinctions of especially rare species and small populations as habitats become more isolated. There also be local extinctions of especially rare species and small populations as habitats become more isolated. Because of discontinuous habitat, dispersal of both animals and plants becomes difficult, and this has more effect on amphibians and reptiles than mammals and birds. Habitat isolation also reduces plant diversity and quality and hence animal diversity will also be affected.

### **4.3.2 Drying up of water in Great Ruaha during the dry season**

Drying up of Great Ruaha river threatens the possibilities of maintaining the potentials of Lunda Mkwabi as a WMA. Great Ruaha river originates from Usangu plains. It is believed that irrigation practices upstream contribute significantly to the decline in water

levels downstream. As a catchment area, there are also threats which impact the water yielding capacity of the area. Among those, the most important are;

#### **4.3.3 Timber Extraction**

Timber extraction is contributing to deforestation. For quite sometimes there have been no controls in place and the extraction was done in unsustainable manner.

#### **4.3.4 Clearing of woodland and bushland for agriculture**

Acacia/Commiphora/Lannea woodland and bushland is found on alluvial soils of low slope and is often cleared to open up new land for cultivation. Because few or no inputs are made in the form of fertilizers to increase and/or maintain soil fertility, the plots are abandoned after a few years.

#### **4.3.5 Overgrazing**

Overgrazing on the Usangu plains is a serious problem. Overgrazing has direct impacts on the vegetation and tend to compact the soil. All these affect water filtration and retention capacity.

#### **4.3.6 Crop damage**

Crop damage is rampant in most villages in the area. While communities now are appreciating the value of wildlife, the continued problem of crop damage may negate these values, especially if the benefits obtained from wildlife are small compared to damages made.

#### **4.3.7 Water pollution through fertilizers and pesticides**

Tobacco farming which is taking place in some villages adjacent to the villages surrounding the proposed pilot WMA tend to use a lot of chemical fertilizers and pesticides. Most of these chemicals are poisonous and may have long term effects to wildlife if discharged to Little and Great Ruaha.

#### *4.4 Conclusions and Recommendations*

The proposed WMA has most ecological qualities which make it qualify to be designated as a pilot WMA. The communities are also well prepared and the level of institutional development is encouraging. In order to add more strengths in the level of ecological information available, it is proposed that the following recommendation be considered by stakeholders involve in the process:

##### **Identify and Map Wildlife Corridors**

There seems to be ecological links between Ruaha National Park/LMGCA with other protected areas, specifically Udzungwa and Mikumi. These links are manifested by the wildlife movements which are believed to occur among these areas. However, the corridors used in these movements are not well known, and if known, then they are not documented. It is therefore recommended that the corridors be identified and mapped.

##### **Monitor Water Quality and Quantity**

Water in Great Ruaha and Little Ruaha are a lifeline for wildlife in the area. The continued declining water levels in these rivers should be considered as a number one priority in designing strategies for managing the area. This will be done properly if basic information is collected to establish the exact changes in the water levels as well as quality. This should be done in collaboration with relevant authorities such as the Ministry of Water and Livestock Development .

##### **Tree Planting Campaigns**

The present demand for fuelwood, timber and other uses of forest products put excessive pressure on the forests in the area. It is proposed that extensive campaigns be initiated to start planting trees as an alternative to dependence on natural wood products.

#### *4.5 Way Forward*

The communities around LMGCA are in a better position to manage the proposed pilot WMA. The immediate step that should be taken at present is to establish an Authorized Association in order to follow up the process of being empowered to manage wildlife resources in LMGCA.

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## APPENDICES

### Appendix I: Important Data and Tables

**Table I.1: Population Estimates of Buffalo in LMGCA**

Year	Number	95% Confidence Level
June 1995	63	
April 1999	80	332
October 1999	1865	249
May 2000	39	189
November 2000	467	189
April 2001	0	-
October 2002	0	-
Merged Estimate	45	250

**Table I.2: Population Estimates Eland in LMGCA**

Year	Number	95% Confidence Level
June 1995	58	
April 1999	51	276
October 1999	47	362
May 2000	0	
November 2000	183	127
April 2001	150	180
October 2001	142	129
Merged Estimate	86	121

**Table I.3: Population Estimates of Elephant in LMGCA**

Year	Number	95% Confidence Level
June 1995	888	287
April 1999	247	139
October 1999	920	117
May 2000	3785	93
November 2000	375	157
April 2001	280	162
October 2002	2,855	

**Table I.4: Population Estimates of Giraffe in LMGCA**

Year	Number	95% Confidence Level
June 1995	358	
April 1999	732	117
October 1999	403	90
May 2000	734	64
November 2000	304	46
April 2001	729	54
October 2002	457	58

**Table I.5: Population Estimates of Hartebeest in LMGCA**

<b>Year</b>	<b>Number</b>	<b>95% Confidence Level</b>
June 1995	0	
April 1999	7	366
October 1999	0	
May 2000	0	
November 2000	0	
April 2001	0	
October 2001	0	

**Table I.6: Population Estimates of Impala in LMGCA**

<b>Year</b>	<b>Number</b>	<b>95% Confidence Level</b>
June 1995	916	
April 1999	690	55
October 1999	419	154
May 2000	743	85
November 2000	446	64
April 2001	1028	60
October 2002	234	105
Merged Estimate	453	44

**Table I.7: Population Estimates of Kudu in LMGCA**

<b>Year</b>	<b>Number</b>	<b>95% Confidence Level</b>
June 1995	220	
April 1999	116	124
October 1999	119	185
May 2000	10	186
November 2000	91	86
April 2001	37	108
October 2002	81	107
Merged Estimate	22	95

**Table I.8: Population Estimates of Reedbuck in LMGCA**

<b>Year</b>	<b>Number</b>	<b>95% Confidence Level</b>
June 1995	0	
April 1999	22	199
October 1999	5	358
May 2000	0	
November 2000	0	
April 2001	0	
October 2002	0	

**Table I.9: Population Estimates of Sable in LMGCA**

<b>Year</b>	<b>Number</b>	<b>95% Confidence Level</b>
April 1999	0	
October 1999	72	203
May 2000	0	
November 2000	101	143
April 2001	299	97
October 2002	132	137
Merged estimate	116	119

**Table I.10: Population Estimates of Warthog in LMGCA**

<b>Year</b>	<b>Number</b>	<b>95% Confidence Level</b>
Jan 1995	106	
April 1999	51	132
October 1999	62	
May 2000	68	117
November 2000	132	188
April 2001	262	178
October 2002	31	139
Merged estimate	59	

**Table I.11: Population Estimates of Waterbuck in LMGCA**

<b>Year</b>	<b>Number</b>	<b>95% Confidence Level</b>
June 1995	0	
April 1999	51	183
October 1999	47	214
May 2000	0	
November 2000	41	190
April 2001	94	163
October 2002	41	191
Merged estimate	48	121

**Table I.12: Population Estimates of Zebra in LMGCA**

<b>Year</b>	<b>Number</b>	<b>95% Confidence Level</b>
June 1995	249	
April 1999	102	209
October 1999	212	156
May 2000	319	87
November 2000	457	109
April 2001	439	80
October 2002	244	75
Merged estimate	243	57

**Table I.13: The Most Important Fuel Wood Species in Idodi Division**

<b>Mahuninga</b>	<b>Makifu</b>	<b>Tungamalenga</b>	<b>Mapogoro</b>	<b>Idodi</b>	<b>Malinzanga</b>	<b>Mafuluto</b>
Brachystegia spiciformis	Combretum spp	Combretum spp	Grewia bicolor	Combretum spp	Combretum spp	Combretum spp
Dichrostachys cinerea	Dichrostachys cinerea	Dichrostachys cinerea	Combretum spp	Dichrostachys cinerea	Brachystegia spiciformis	Cordyla africana
Margaritaria discoidea	Terminalia sericea	Acacia albida	Terminalia sericea	Brachystegia spiciformis	Acacia tortilis	Acacia spp
Terminalia sericea	Combretum zeyheri	Terminalia sericea	Dichrostachys cinerea	Grewia bicolor	Dichrostachys cinerea	Crossopteryx febrifuga
Acacia albida	Brachystegia spiciformis	Grewia bicolor	Brachystegia spiciformis	Acacia tortilis	Rourea coccinea	-
Combretum spp	Acacia albida	Julbernadia glabiflora	Entada abyssinica	Terminalia sericea	Combretum hereroense	Ochna pulchra
Combretum zeyheri	Margaritaria discoidea	Margaritaria discoidea	Margaritaria discoidea	Entada abyssinica	Combretum hereroense	Combretum spp
Canthium burtii	Grewia bicolor	Combretum zeyheri	Acacia albida	Margaritaria discoidea	Solanum panduliformae	Acacia nilotica
Brachystegia spp	Canthium burtii	Grewia bicolor	Dichrostachys cinerea	Acacia albida	Ochna pulchra	Grewia bicolor
Julbernadia glabiflora	Acacia tortilis	Brachystegia Spiciformis	Cassia abbreviata	Combretum hereroense	Entada abysinica	Bauhinia spp

**Table I.14: The Most Important Fuel Wood species in Pawaga Division**

Isele	Kisanga	Kimande	Itunundu	Mboliboli	Mkombi-lenga	Ilolo	Magozi
Acacia kirkii	Acacia tortilis	Ochna pulchra	Acacia spp	Ochna pulchra	Ochna pulchra	Acacia tortilis	Crossopteryx febrifuga
Acacia spp	Cordia quercifolia	Acacia tortilis	Ochna pulchra	Acacia spp	Acacia spp	Combretum parvifolium	Acacia tortilis
Ochna pulchra	Solanum panduliforme	Acacia sieberiana	Acacia nilotica	Acacia tortilis	Combretum parvifolium	Ochna pulchra	Combretum parvifolium
Cordia quercifolia	Acacia albida	Acacia nilotica	Combretum parvifolium	Acacia kirkii	Acacia tortilis	Acacia kirkii	Ochna pulchra
Acacia drepanolobium	Acacia spp	Ochna pulchra	Acacia tortilis	Cordia quercifolia	Acacia kirkii	Acacia nilotica	Acacia spp
Acacia tortilis	Acacia kirkii	Cordia quercifolia	Acacia albida	Balanites spp	Cordia quercifolia	Acacia albida	Terminalia sericea
Acacia albida	Acacia campylacantha	Combretum parvifolium	Acacia sieberiana	Tricalysia spp	Combretum parvifolium	Cordia spp	Ochna pulchra
Acacia campylacantha	Crossopteryx febrifuga	Cordia spp	Ocimum americana	Acacia drepanolobium	Grewia bicolor	Crossopteryx febrifuga	Entada abyssinica
Tamarindus indica	Tamarindus indica	Ficus sycomorus	Entada abyssinica	Solanum panduliformae	Acacia albida	Acacia sieberiana	Acacia albida
Combretum parvifolium	Acacia sieberiana	Acacia albida	Cordia quercifolia	Ochna pulchra	Acacia albida	Acacia spp	Acacia kirkii