SOCIO-ECONOMIC AND INSTITUTIONAL FACTORS INFLUENCING THE MANAGEMENT OF PAWAGA-IDODI PILOT WILDLIFE MANAGEMENT AREA IN IRINGA, TANZANIA

BY

DONASIANI ONESIFORI SHAYO

A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN THE MANAGEMENT OF NATURAL RESOURCES FOR SUSTAINABLE AGRICULTURE OF SOKOINE UNIVERSITY OF AGRICULTURE. MOROGORO, TANZANIA.

2008

ABSTRACT

Wildlife Management Area (WMA) provides an avenue for rural communities to participate in wildlife management. Ideal interventions require initiatives based on felt needs thereby bridging the gap between theory and practice. The intervention is however constrained with socio-economic and institutional factors. The study assessed socio-economic and institutional factors influencing local community adoption and operationalisation of the WMA concept in the management of Pawaga-Idodi pilot area in Iringa, Tanzania. Specifically; the study assessed (1) socio-economic characteristics and their management implications, (2) status, constraints and opportunities, and (3) functioning and appropriateness of the existing institutional framework. Two research phases were adopted, one involving preliminary study where Participatory Rural Appraisal exercise, secondary data collection, questionnaire pre-testing, and key informant discussions were undertaken. Questionnaires were administered to 187 household heads and participants' observations were undertaken in phase two. Content and structural functional analyses were used to analyse information from key informants, participant observations and secondary data. Descriptive and inferential statistical analyses were done. Chi-square and ANOVA analyses were used to explain variations in various aspects across the study villages. Significant variations ($P<0.001$) were observed in income sources, land tenure and perception of membership to the MBOMIPA association. Population increases were significant at $P<0.01$ while off-farm activities and trust to the association were not significant at $P<0.05$. A Logistic model was developed to explain the influence of socio-economic and institutional factors in adoption and operationalisation of the WMA concept. Results were significant ($P<0.001$) implying that, socio-economic and institutional factors influence the adoption process. The study concluded that, uncertainty on wildlife tenure rights, unclear institutional setup at village and inter-village level, and

low awareness are perhaps key areas for concern. The study recommends appropriate attention to the institutional framework at village and inter-village level, benefit sharing and a tailored extension package.

DECLARATION

I, DONASIANI ONESIFORI SHAYO, do hereby declare to the Senate of Sokoine University of Agriculture that, this dissertation is my own original work and that it has neither been submitted nor concurrently being submitted for a degree award in any other University.

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DONASIANI ONESIFORI SHAYO Date

(MSc. MNRSA)

The above declaration is confirmed

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PROF. J. F. KESSY Date

(Supervisor)

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ACKNOWLEDGEMENT

It was not possible to accomplish this work without support from different persons and institutions. Therefore I am taking this opportunity to express my sincere appreciation to my supervisor Prof. J. F. Kessy of the Department of Forest Economics in the Faculty of Forestry and Nature Conservation for his profound guidance, comments, encouragement and suggestions. The Faculty Dean, Prof. P. R. Gillah and to the Head of the Department of Forest Economics, Prof. Y. M. Ngaga for their encouragement and guidance all deserve a special mention.

I remain deeply indebted to the Ministry of Natural Resource and Tourism for sponsoring me and granting me a study leave to undertake the programme. Special thanks go to Mr. E. L. M. Severre, the Director of Wildlife and Mrs. R. Tibanyenda, the Assistant Director responsible for Research, Statistics and Training for their moral and material support during the programme. To all the staff in the Wildlife Division Head Office and special mention to Mr. F. Lyimo, C. Mdoe, Capt. W. Minja, A. Mwanauta, L. Mayeta and E. Sungusia for continued support during the whole term of the programme.

During the field work a number of people and governmental departments provided the necessary support that facilitated the programme. Various government offices in Iringa regional office, MBOMIPA project, Iringa and Mbarali Districts, Ruaha National Park, and Usangu Game Reserve facilitated data collection; all of them deserve my sincere thanks. The Iringa Regional Administrative Secretary and the District Executive Director for their permission to reside and pursue the respective study deserve a special mention. Specific thanks to Mr. K. Ngomello and R. Masawe who were serving Project Managers for MBOMIPA and Usangu Game Reserve respectively, for their moral and, material

support. To Mr. J. Hante, I. Kimaro and Ms. M. Hawa of the Iringa District Council were all very useful and close colleagues during the study. My special appreciation to the WCS–RRP staff for their cordial welcome, material and logistic support while in Iringa. I enjoyed conversation and communications with Mr. B. Mbano and Dr. P. Coppollilo that gave a bright insight of the socio-economic and institutional situations in the study area. Thanks to the WWF for a living planet country office Dar es Salaam, special mention to Mr. W. Kiwango, for the conversation on their previous support to the MBOMIPA association.

In the Idodi, Mahuninga, Ilolo Mpya, Itunundu and Mlowa wards and the villages of Itunundu, Isele, Ilolo Mpya, Malinzanga, Mapogoro and Mahuninga, I would like to acknowledge and thank the Ward Executive Officers, the Village Executive Officers, Village Chairpersons and all the villagers especially those who participated in the household questionnaire and/or PRA exercise for all the information and support during the field work. Particular mention to the field assistants for their profound assistance in data collection deserves special thanks. Special thanks to the MBOMIPA association leaders, the Secretary, Mr. J. Kisangaji and the Chairperson Mr. K. Duma who in one way or the other gave very informative information and assistance facilitating data collection.

Thanks to friends, colleagues, and fellow students who in one way or another made the study a success. In deed their co-operation and support made the academic wheel roll over.

Finally I would like to express my deep gratitude to my wife V. A. Mrosso for taking care of our family in my absence. To my children Onesiphory, Pia, Alfredi and Antoneta for enduring the absence of a caring father.

DEDICATION

I dedicate this work to my family whose love and thirst for knowledge continues to inspire me till today, especially to

My parents for opening my eyes to the world, and for instilling the importance of hard work and higher education;

My sisters and brothers for their ongoing and endless inspiration and encouragement;

My beloved wife Victoria Alfredi Mrosso and our children Onesiphory Donasiani Shayo, Pia Mkasaria Shayo, Alfred Donasiani Shayo and Antoneta Mkasafari Shayo for their patience and prayers;

And to all my old and new teachers who enriched me with knowledge and skills to be capable to be on the path of education and research.

To them I say: ‘The harvest is not always unseen …’

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AA	Authorized Association
ANOVA	Analysis of Variance
CBC	Community-Based Conservation
CBNRM	Community-Based Natural Resource Management
CBO	Community-Based Organization
CCS	Community Conservation Services
CPR	Common Property Resources
DFID	Danish Fund for International Development
FAO	Food and Agriculture Organization of the United Nations
GCA	Game Controlled Area
GR	Game Reserve
HH	Household
IDC	Iringa District Council
LGRP	Local Government Reform Programme
MBOMIPA	Matumizi Bora ya Malihai Idodi na Pawaga
MNRT	Ministry of Natural Resources and Tourism
MRALG	Ministry of Regional Administration and Local Government
NGO	Non Government Organization
NTFP	Non Timber Forest Products
PA	Protected Area
PRA	Participatory Rural Appraisal
pWMA	Pilot Wildlife Management Area
REWMP	Ruaha Ecosystem Wildlife Management Project
RNP	Ruaha National Park
SCP	Selous Conservation Progrmme
SPSS	Statistical Package for Social Sciences for Windows
TANAPA	Tanzania National Parks
UGR	Usangu Game Reserve
URT	United Republic of Tanzania
VA	Village Assembly
VC	Village Council
VNRC	Village Natural Resources Committee
WCA	Wildlife Conservation Act
WCS-RRP	Wildlife Conservation Society – Rungwa Ruaha Living Landscape Project
WD	Wildlife Division
WMA	Wildlife Management Area
WPT	Wildlife Policy of Tanzania
WRI	World Resources Institute
WWF	World Wide Fund for a Living Planet

CHAPTER ONE

1 INTRODUCTION

1.1 Background information

Natural resources management is a complex issue of governance concerned with roles and responsibilities of the major actors (Hulme and Murphree, 2001). The governance mechanisms are commonly referred to as institutions and described as formal or informal. Formal institutions (contractual, incentives, authority) and informal institutions (norms, routines, and political processes) are deeply intertwined and there is a need to consider them together in natural resources management. Zenger *et al.*, (2002) defined formal institutions as rules that are readily observable through written documents or rules that are determined and executed through formal position, such as authority or ownership. On the other hand, informal institutions are rules based on implicit understandings, being in most part socially derived and therefore not accessible through written documents or necessarily sanctioned through formal positions.

Interaction of institutions and socio-economic aspects (characteristics and claims/beliefs of users, and resources) determine decision making at household and society levels. Society is an art that ensure existence and continuance of organized groups whereas the socio-economic factors describe the social as well as the economic state or relationship.

State control to wildlife management in Tanzania dates back to 1891 when rules to control hunting and establish areas for exclusive wildlife use were enacted by the Germans. The move alienated tribal groups from resources they used to control and utilize leading to uprisings against the rulers (Bell, 1950). Rural dependence on natural resources, defined as the fraction of the total income derived from the common pool resources, is rated at

80% (Baldus, 1994) makes the local communities desperate when use was restricted. The approach was maintained after independence and in 1974 the Fauna Conservation Ordinance of 1951 (CAP 302) was repealed by the Wildlife Conservation Act (WCA) No. 12 of 1974 (URT, 1974). This act No 12 and its subsequent amendments (No. 21 of 1978 and No. 29 of 1994) have been consolidated into the WCA Chapter 283 Revised Edition of 2002 (URT, 2002). In all the versions, the WCA prohibited use of traditional hunting methods previously allowed under CAP 302.

Continued state control, local community resentment and low capacity of state institutions entrusted to police wildlife management made it possible for open access situations to prevail (Haule *et al.,* 2002). The outcome was poor management which forced policy makers and scholars to rethink on the potential role of local communities in wildlife management (Agrawal and Gibson, 1999). Most African countries have realised the shortfall and are now redefining property rights with a focus on local community involvement and benefit sharing schemes.

In Tanzania, the wildlife policy (WPT) adopted in 1998 (currently under revision) provides a foundation for sustainable utilization of wildlife by private landholders, rural communities and prospecting investors (URT, 1998). One basic assumption was that, "*communities are interested and willing to manage wildlife on their village lands"* (Leader-Williams *et al.,* 1995). Establishment of wildlife management areas (WMAs) by the local community and benefiting from their management were the key objectives. The WPT defines WMA as *"an area declared by the Minister to be so and set aside by the village government for the purpose of natural resources conservation"*. WMA regulations were prepared to guide the process and a 36 month pilot phase starting January 2003 in 16

selected sites (including Pawaga-Idodi) was adopted to allow for adjustments (MNRT, 2003a).

1.2 Problem statement and justification

The Pawaga-Idodi pilot WMA (pWMA) is formed in the Lunda Mkwambi Game Controlled Area (GCA) by consent of the government as detailed in the WMA regulations (MNRT, 2002) and the revised version (MNRT, 2005). The WCA administers wildlife off-take from GCAs but silent on habitat and does not restrict other human activities. Consequently, 19 villages established in the GCA and a survey in 1998, indicated that, 32.4% of the residents were immigrants (MNRT, 1998). The area is currently threatened by a rapid population growth, environmental degradation and escalating poverty. It is of profound importance to study how the implementation of the WMA concept is likely or unlikely to address this negative state.

At the adoption of the WPT in 1998, the MBOMIPA association established in 1997 was already privileged to manage and benefit from wildlife. MBOMIPA is a Swahili acronym, for *"Matumizi Bora ya Malihai Idodi na Pawaga"*, loosely translated as *"Sustainable use of Wild Resources in Idodi and Pawaga Divisions in Iringa District"*. Despite an early start, the institution frequently found itself amidst governance problems and to date improvements in governance, empowerment and enterprise opportunities have not generated significant multiplier effects (DFID, 2003). This may be an indication that, the interactions between the wildlife resources, the community and the institutions which create incentives for people to participate in wildlife management are not clearly known. Understanding these interactions may lead into sustainable wildlife management options. This study aims at contributing to a better understanding of the wildlife - people relations in WMA as influenced by a variety of socio-economic and institutional factors, hence the identification of areas for adjustments in the WMA concept.

1.3 Study objectives

1.3.1 Overall objective

To assess socio-economic and institutional factors influencing the management of Pawaga-Idodi pWMA in relation to operationalisation of the WMA concept.

1.3.2 Specific objectives

i. To assess the socio-economic characteristics of the local resources users and their management implications in the study area.
ii. To assess the status, constraints and opportunities of Pawaga-Idodi pWMA in implementing the WMA concept.
iii. To assess the functioning of existing local institutional framework and its appropriateness in the implementation process.
iv. To recommend on possible areas for adjustment to improve the operationalisation of WMA Concept in Tanzania

1.3.3 Research questions

Based on the above objectives, the following questions guided the research.

i. What are the general characteristics of the local community in the study area?
ii. What is the current status of Pawaga-Idodi pWMA in implementing the WMA Concept?
iii. What are the local communities subsistence met by the Pawaga-Idodi pWMA?
iv. What are the existing institutions that influence the management of the Pawaga-Idodi pWMA?
v. What are the main economic/commercial activities of the local community in the study area?

vi. How do local community's livelihood activities influence the management of the Pawaga-Idodi pWMA?

vii. What are the available incentives and disincentives for people's participation in sustainable management of wildlife in the study area?

1.4 Hypothesis

1.4.1 Null hypothesis (Ho)

The current institutional arrangement and socio-economic factors have no significant influence on the adoption and implementation of the WMA concept in Pawaga-Idodi pWMA.

1.4.2 Alternative hypothesis (Hi)

The current institutional arrangement and socio-economic factors have a significant influence on the adoption and implementation of the WMA concept in Pawaga-Idodi pWMA.

1.5 Conceptual framework

According to Boote and Beile (2005), the importance of a research design is its ability to addresses the what, who and how questions pertinent in achieving the research goal and therefore emphasizing on a thorough review of literature before conducting a research. Despite this emphasis, Maxwell (2006) suggests that, a conceptual framework should be able to justify the research project by providing the necessary pieces of arguments. In such a way the framework will direct a researcher into a systematic and focused fact finding. Fig.1 provides the theoretical framework that guided the study.

It is hypothesized that, characteristics of the wildlife resource, users and their beliefs interact with informal and formal institutions to create incentives important for the users' decision making that affect their livelihood and conservation strategies. Adoption and operationalisation of the WMA concept will be achieved if the created incentives are sustainable, equitably shared, and effective in rural development through wildlife management. It is renowned that, the process is political in nature and therefore works in a continuum and iterative allowing appropriate adaptations prompted by the observed social-political and ecological changes (Appleton *et al.*, 2000; Campbell *et al.*, 2007; Nelson, 2007).

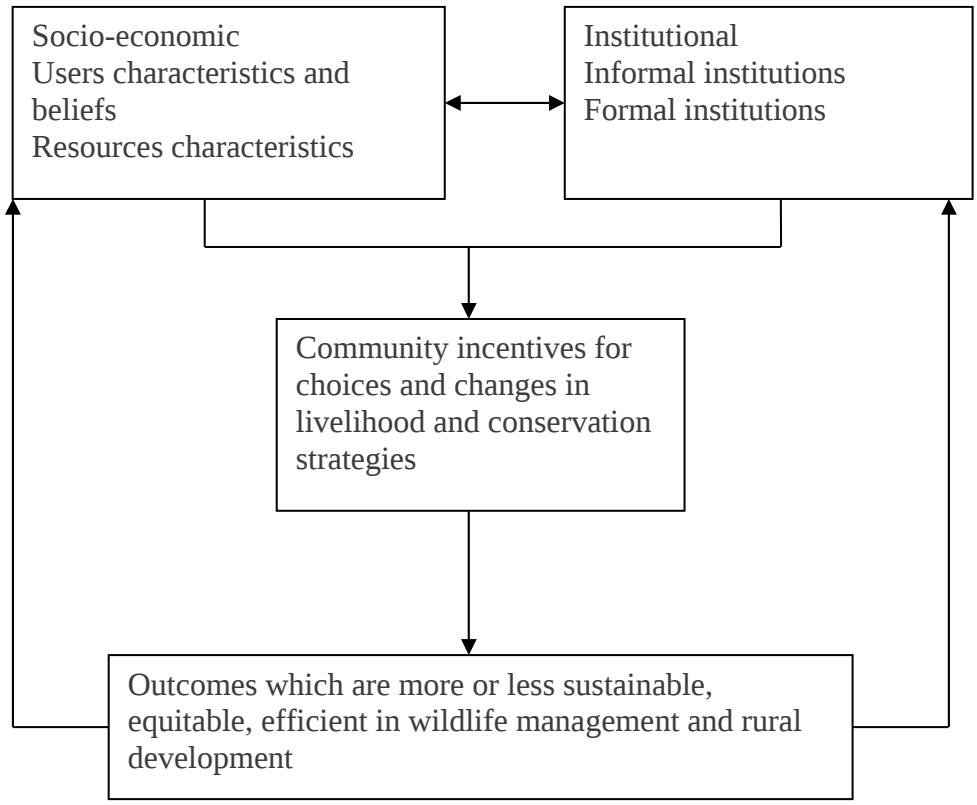

Figure 1: Theoretical framework underlying the study

CHAPTER TWO

2 LITERATURE REVIEW

2.1 An Overview of wildlife management in Tanzania

Tanzania is the most-rich African country in wildlife particularly important in large mammal populations. On 8 March 1996, the Tanzania's Parliament ratified the Convention on Biological Diversity (CBD). The Convention requires members to emphasis on biodiversity conservation both within and outside protected areas (PAs) to conform to the argument that, conservation goals should contribute to meeting basic human needs (UNCED, 1992). The development agenda therefore shifted towards the concept of community emphasising on the need for local community effective participation in designing and implementing public policies (WRI *et al.*, 2005; Ostrom and Nagendra, 2006). This section outlines how Tanzania is placed in the international paradigm shift in conservation.

2.1.1 The role of local government reform in community-based approaches

In the mid 1980s, the government of Tanzania prepared and launched comprehensive economic reforms in an attempt to bring the government closer to the people. It is believed that, decentralization improves equity and efficiency within the local jurisdiction as democracy, economic and managerial efficiency is increased (Ribot, 2004). In implementation, the Ministry of Natural Resources and Tourism (MNRT) prepared and/or reviewed the respective legislation, a process not yet completed in some of its sub-sectors. The MNRT Medium Term Strategic Plan emphasize on the MNRTs intention to devolve some of its responsibilities and decision-making powers to the local governments and civil society without causing any administrative chaos (MNRT, 2003b). The function of the MNRT in a restructured local government administration is indicated to be the 'provision

of clear policies and guidelines on the development of the tourism industry, management and utilization of natural and cultural resources, clarifying responsibilities and building of institutional capacity at lower levels'.

Ribot (2004) argues that, theorists promote decentralization reforms based on the proposition that: 'IF institutional arrangements include local authorities who represent and are accountable to the local population and who hold discretionary powers over public resources, THEN the decisions they make will lead to more efficient and equitable outcomes than if central authorities made those decisions'. Results from studies in countries advanced in decentralization indicate mixed success and failure stories. Partial implementation is considered the main reason behind the failures resulting into poorly managed resources, community disenfranchisement and lack of downward accountability (Ribot, 2004; Nelson, 2007). The same argue that, accountability takes time to evolve especially when new institutions are created.

2.1.2 Policy and legal framework in community-based conservation

The national wildlife policy (WPT) recognizes the responsibilities of the various institutions and actors concerned in wildlife conservation and their responsibilities in its implementation (URT, 1998). It further stipulates that, 'the overall executive and overseeing responsibility for the wildlife sector, PAs devoted to wildlife conservation and wildlife outside PAs will be vested with the Directorate of Wildlife in the ministry responsible for the wildlife sector.'

WPT is structured into 19 objectives clustered in four key result areas and 16 thematic areas. Its implementation framework maintains the administration of wildlife under the following laws:

i. Wildlife Conservation Act (WCA) Chapter 283 Revised Edition of 2002 (CAP 283 R.E. 2002), the main law administering wildlife in Tanzania Mainland.
ii. the National Parks Act (CAP 282 of 2002), responsible for the administration of wildlife within the national parks, and
iii. The Ngorongoro Conservation Act (CAP 284 of 2002), responsible for the administration wildlife within the Ngorongoro Conservation Area.

The WMA regulations (MNRT, 2002; 2005) drawn from sections 19 and 84 of the Wildlife Conservation Act No 12 of 1974 (URT, 1974) are sections 22 and 94 respectively in the Wildlife Conservation Act Chapter 283 Revised Edition of 2002 (URT, 2002a). The WMA regulations were meant to unify and effect the community-based conservation (CBC) projects that had been in practice in the country since the 1980s (MNRT, 2003a).

The WMA concept is therefore an opportunity for communities living amidst wildlife to consider practicing wildlife management as a form land use (URT, 1998). The opportunity allows them to benefit from harnessing the production of wildlife in rural development reversing the long time accentuation by conservationists that wildlife resources is not considered in rural planning. Bearing in mind that the decision required devolution of conservation roles and responsibilities and that it was a new structure in the CBC approaches, 16 sites were selected to pioneer the operationalisation process in a 36 months pilot phase stating January 2003 (MNRT, 2002; 2005; 2003a).

Experiences from the 16 pilot sites in the fourth schedule of the WMA regulations (Appendix 3) are expected to input into an evaluation at the end of the phase (MNRT, 2003a). The evaluation outcomes will facilitate informed discussion in the adjustments in the concept. By the time of writing this dissertation, the evaluation was in process.

2.2 The issue of tenure in wildlife management

Tenure is a complex social institution which is a defined property and what owners can do with it and it also includes traditional and customary practices (Meinzen-dick *et al.*, 2002; WRI *et al.*, 2005). It is derived from state laws, and customary laws and norms described by the bundle of rights (own, hold, manage, transfer, or exploit resources and land) and obligations (harmonious and sustainable utilization) (Meinzen-dick *et al.*, 2002; FAO, 2002; Bruce, 2004).

Evident from field research of for example, a study on factors influencing landowners (private and communal) participation in wildlife conservation in Kenya by Mburu (2002) revealed that, secure land ownership motivates land owners participation in conservation. Ipara *et al.*, (2005) also confirmed the link between secure tenure and wildlife conservation in another study in Kenya. The same, however argued that, introduction of radical land reforms and conservation laws in many African counties have impacted negatively on communities traditional land rights and their participation in wildlife conservation.

It is also renowned for land owners to cooperate in resources use with strategies grounded within traditional social networking customs as observed by BurnSilver and Mwangi (2007) in a study in Kenya 'beyond group ranches.' Such a move has also been documented in Idodi rangelands in Iringa Tanzania by Williams (2005) who revealed that, despite the lack of titled tenure over resources, livestock keepers' negotiated land and pasture resources use through social relations short of which conflicts are inevitable. The suggestion of the same to solve the land competition problem is probably partially solved following the extensive land use planning in the Idodi rangelands.

This study emphasizes that, the problem is partially solved because land use planning is one thing and effecting the planning is another crucial activity. Luoga *et al.*, (2005) are of the opinion that, local institutional capacities are low and since they are also political in nature, government assistance in for example to ensure operational village by-laws is inevitable for success in resources management despite of such a well defined communal property regime. The rangeland is now divided into several land use blocks dependent on individual Village Assembly (VA) discretion in regard to the village land situation (IDC, 2004). Blocks include but not limited to; WMA, Livestock grazing; crop farming; forest (reserves and/or utilization); public; residential.

Tenure systems are however dynamic and studies have shown that tenure arrangements can be shaped by market forces and proximity to urban areas (Meinzen-dick *et al.*, 2002). Market forces are defined by the Oxford English Dictionary as ‘a demand for a particular commodity or service and therefore the operation of supply and demand’. Land resource is the basic unit of interest in resources tenure, a vision accompanied with various disputes over the land resource. In Tanzania, these disputes necessitated the establishment of the land courts in a hierarchy from village, ward, district, high court and court of appeal to preside over land disputes (URT, 2002b).

Several tenure arrangements are described but of interest in community approaches is the common property tenure despite that co-management may involve individual property tenure. According to Meinzen-Dick *et al.* (2006), in common property tenure, the common property becomes a private property to the group of owners/users but distinct from the individual property in that it allows secondary or transient users.

It is however argued by WRI *et al.* (2005) that, states in Sub-Saharan Africa retain the ownership of all resources considered important to livelihoods and biodiversity conservation. Tanzania provides a good example where the state maintains the overall ownership of all resources considered public and prospecting users access them through some form of usufruct rights (URT, 1998) supporting the argument by Schlager and Ostrom (1992) that, absence of full ownership over natural resources does not preclude access to other tenure rights over it. The approach is however criticized by Agrawal and Gibson (1999) who argue that, when acknowledgement is through official documents, the rural poor will be disenfranchised due to the complexities inherent in tenure. Despite the observation by Agrawal and Gibson (1999), it is perhaps important to note that, the rural poor constrained with low capacity in terms of finance, features low in the access to resources under open access situations as observed by La Ferrara (2002) in rural Tanzania.

2.3 Linking empowerment to effective participation in wildlife conservation

Kinyashi (2006) considers that, participation is best defined according to the activity in which it is engaged to escape the difficulties inherent in defining the term itself. The same is further of the opinion that, genuine participation is the process where the local community take part as a development partners and not as an object to change. The main concern in wildlife management is to achieve sustainability while the interests of the rural poor are taken onboard (Songorwa, 1999). To achieve this, community increased democracy is the immediate window which however can only be achieved through transformation of the economic and political relationships between the major actors. Empirical studies indicate that, robust institutions managing the commons are generated or created through a process of experimentation, observation, adaptations over time and space (Ostrom, 1990; Appleton *et al.*, 2000; Berkes *et al.*, 2003).

Fetterman (2005) and Shyamsundar *et al.* (2005) consider local community empowerment to have a direct influence and control on decisions that affect them. Kinyashi (2006) suggests that, the reciprocal relationship between empowerment and participation can be illustrated pictorially by showing the link between the two as shown in Fig.2. The same hypothesize that, participation is likely to be achieved through empowerment.

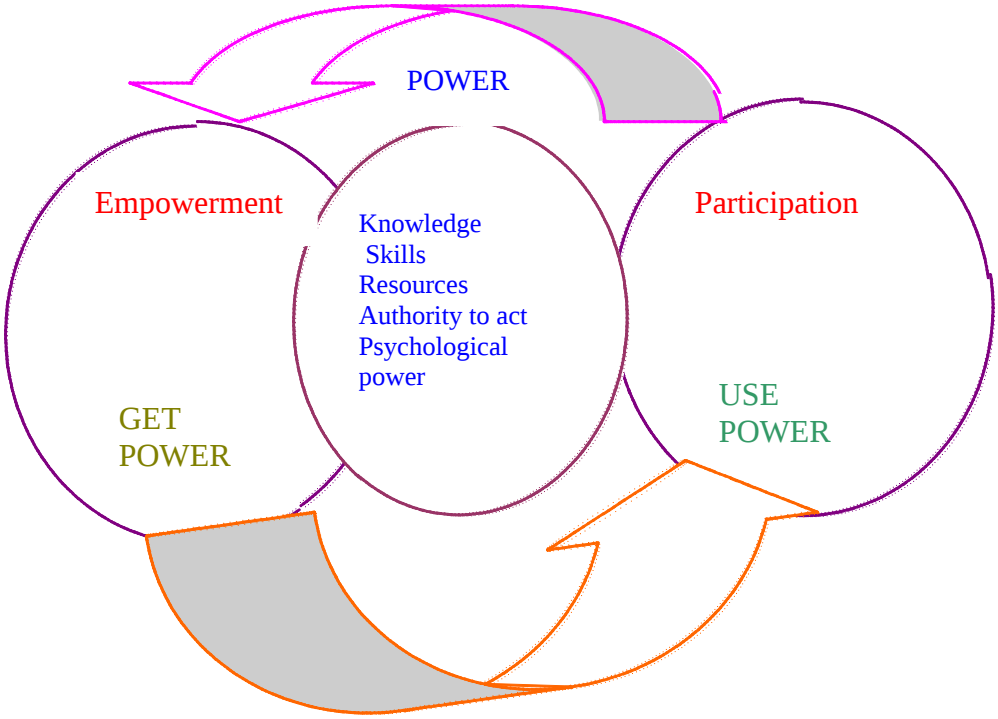

Figure 2: Empowerment – Participation Link
Source: Kinyashi (2006)

It therefore follows that; empowerment is a process in giving someone and/or community power or authority while participation is its effective utilization. Kinyashi (2006), further argues that, power may be political, financial or psychological. Effective participation in wildlife management is therefore a process in which communities are equipped with sufficient and necessary knowledge, skills, authority, psychological power and resources including the remaining aspects in human, natural, physical and social capital.

2.4 Wildlife conservation theories

In Africa, wildlife management has never been new to local people as they all shared the same ecosystem. For convenience, in this dissertation, wildlife conservation is described under two basic models; the state model and the community model. This section outlines the strengths and weaknesses of the two models.

2.4.1 The state model

Three basic approaches are identified under the state model namely, management in protected areas network, on the commons and privately owned land. The model seeks to consolidate central control of wildlife management.

2.4.1.1 The protected area network approach

According to Neumann (2001), Tanzania consolidated increasingly strict central control over wildlife resources both during the colonial (1891 to 1961), post-independence socialist (1967 to 1986), and post-structural adjustment periods. (1986 to present). This was to safeguard the conventional/classic conservation ideas that wildlife and people can not co-exist. In deed this approach managed to set out large areas for the conservation of biological diversity, endemism and maintenance of among other wildlife values, the existence value. In Tanzania, 24% of the total country land area is devoted for wildlife management under the protected area (PA) network with varying size, objectives and level of protection. Access to wildlife is through permits and licenses.

The approach is however disputed by scholars and development actors to be politically weak as it alienated the local community from resources they depended on and used to own and manage particularly when referring to their customary land rights (Songorwa *et al.,* 2000).

2.4.1.2 Management of wildlife on the commons

The consideration of wildlife as a public good puts it under state control and access is through permits and licenses or extended usufruct right. In the case of Tanzania except for wildlife and some specified tree and fish resources that require permits and/or licences under their respective laws, other anthropological activities are freely allowed for example under the WCA (URT, 1974). The approach is however unpopular and the community access the resources despite lack of tenure as contended by Gibson (1999). The same ague that, when resources are more important to users, even well funded coercive government conservation without the consent of the users fails justifying the failure of the state model in the management of the commons.

Several reasons for the state failures have been listed from empirical studies; for example increased transaction costs (Leader-Williams *et al.,* 1995; Haule *et al.,* 2002), changes in the socio-economic situation (Leader-Williams *et al.,* 1995), open access situations and exacerbated resource degradation (Haule *et al.*, 2002; Madulu, 2004; 2005; Kideghesho *et al*., 2006), disregard of the human dimensions (Handerson, 2005), weaknesses in legislation and state administrative capacity (Songorwa, 2004).

2.4.1.3 Management of wildlife on private land

Until recently there were no formal ways on how landowners access wildlife on private lands apart from through permits and licences. Currently privately owned lands in Sub-Saharan Africa are increasingly being managed for the production of Wildlife and habitat restoration (Damm, 2002). In Tanzania, management of wildlife on privately owned land has not attracted much government attention. It is however renowned that, in-situ wildlife management in the form of zoo and farms is a common practice in urban and sub-urban

areas with game ranching possibilities for large land owners. According to the existing legislation (URT, 1974) access is through permits and licences.

2.4.2 The community model

The work of Ostrom (1990) and Dietz *et al.* (2003) on the management of the commons is probably the main motive behind community approaches to resources conservation. The community model is said to have come in a system thinking when incorporation of the human dimension in conservation was considered a necessity for effective natural resources management (Berkes, 2004). Berkes (2006) further considers community approaches to be complex and requiring a common vision at community, state and international level. Despite of wide variations in its application, most literature does not put boundaries into the different variants. For convenience, the model will be considered under collaborative, community-base, outreach and co-management as separate variants.

2.4.2.1 Collaborative management approach

Main feature is negotiated access to resources between the local community or resources users and the conservation authority with objectives of conservation and rural livelihoods (Barrow and Murphree, 2001). The state and the community agree on sharing of power and responsibilities focusing on co-operation and interactions. It is therefore associated with complex tenure arrangements as it seeks to manage PA (e.g. national parks, forests and game reserves) in close cooperation with local people.

2.4.2.2 Community-based approach

The approach seeks to devolve much of the decision-making process and significant control over wildlife resources to the community level (Barrow and Murphree, 2001). Shyamsundar *et al.* (2005) argued that devolution of natural resources management

empowers the local community consequently creates room for the voices of the poor thereby quashing the inequalities impacts of decentralization. The approach aims at achieving sustainable rural livelihoods through integration of wildlife management into rural development (Barrow and Murphree, 2001; Mburu, 2002). The local resource users own the land, however the wildlife resources are either owned by the users or the state. If state owned, usufruct right is extended to the community in some way (Schlager and Ostrom, 1992).

The approach is therefore associated with devolution of tenure (Barrow and Murphree, 2001) which Mburu (2002) term among others, a major limitation to its success. WRI *et al.* (2005) contend that, local communities are commonly entrusted with duties that are circumscribed in scope (less valuable rights) and subsistence in scale while the state often retain the most lucrative powers such as the right to assess wildlife hunting fees. The same argue that, most national states in Sub-Saharan Africa are unwilling to transfer the alienation right (sell or lease withdrawal, management, and exclusion rights).

Despite that, the approach is well cherished and several projects prefer using the community-based ante (Songorwa *et al.,* 2000). However, its performance has not matched the expectation of many actors and scholars. Evidence from empirical studies indicate various reasons such as inappropriate extension services (Kideghesho *et al.,* 2005); weak governance (Bwalya, 2003; Songorwa, 2004); rapid population increase (Kideghesho *et al.,* 2006); linking of two equally important objectives – conservation and rural development (Redford and Sanderson, 2000); exclusion of outsiders from a common property regime (Dzingirai, 2003); tying resources tenure to formal processes (Agrawal and Gibson, 1999); failure in attempts to integrate conservation and rural development (Jones and Murphree, 2004).

On the other hand, Murphree (2002) argues that, the failure of the community-based conservation is not a result of the concept weaknesses or impracticability but rather its improper implementation especially with regard to the element of devolution of authority and responsibility (institutional barriers). This observation is further strengthened by the study results reported by Ribot (2004) which indicated that, state fears in decentralization and its partial implementation are perhaps the main course of failures in all aspects and objectives of decentralization.

Amidst these arguenebts, successful interventions have been reported, for example in the Selous Conservation Program (SCP) in Tanzania and in Namibia's conservancy areas where wildlife populations have rebounded impressively as poaching has fallen and conflicts considerably reduced (Shyamsundar *et al.*, 2005). In Namibia conservancies, a 2002 survey reported 29% increase in per capita income not including bush meat and therefore significant in fighting rural poverty (Bandyopadhyay *et al.*, 2004).

Despite some disappointments, the approach is still popular as its theoretically justified benefits serves to reproduce and market it among actors (Blaikie, 2006). Moreover, Jones (2006) argues that, a judgement on the approach is premature, supporting an earlier suggestion by Berkes (2004) for a need of in-depth studies to understand the factors underlying successes and failures to facilitate appropriate judgement and/or adjustments.

2.4.2.3 The outreach approach

This is basically concerned with state-owned land and resources (e.g. national parks, forests and game reserves) with the main objective on ecosystem conservation (Barrow and Murphree, 2001). The adjacent communities receive material incentive aimed at reducing conflicts and improve relationship between the community and the conservation

authority without the need for tenure arrangements (Hulme and Infield, 2001; Barrow and Murphree, 2001).

The approach, although quite popular in East and Southern Africa inherits some social political problems emanating from the fact that local communities have little if any access to participate in decision making (Barrow and Murphree, 2001). For this reason the same is of the opinion that, the approach requires an institutional change to effectively contribute to rural development. Field evidence from empirical studies of for example in Serengeti national Park, Emerton (2001) concluded that, the trickle down of park revenues to the local community is less than 1%. The amount is practically insignificant when considering her suggestion in the economic equation of wildlife.

2.4.2.4 Co-management approach

It is an approach viewed to be in between collaborative management and community based approach. This implies that in the context of devolution of powers, the local community roles are expanded but at the same time the state retains a substantial role in resource management. Borrini-Feyerabend (1996) define co-management as 'a partnership by which various stakeholders agree on sharing among themselves the management functions, rights and responsibilities for a given territory, area, or set of natural resources which may or may not have protected area status.' The approach seeks to complements the weaknesses of both the traditional institutions and the state strategies in natural resources management outside the protected area network.

Mburu (2002), in a study on factors influencing land owner participation in wildlife management considered co-management approach to be well fitted in the power devolution process. The same consider that, effective participation of land owners is

important to reduce management costs. It is argued that, transaction costs are reduced as trust among actors increase (Jones, 2004) through the achieved sense of responsibility, increased legitimacy, rule compliance and self monitoring by the actors (Ostrom and Nagendra, 2006).

However, in a study by Mayaka (2002) on institutional development in co-management in Cameroon revealed a slow development due to inadequate legislation, poor planning, and insufficient policy formulation. Moreover, the same banking on the results suggested ecosystem approach where all the stakeholders are effectively involved in the innovation.

2.5 The Tanzania experience in community-based approach

Community based conservation started as trial project in villages abutting protected areas (such as Selous, Ruaha and Serengeti) in an attempt to win conservation support. To-date these villages are privileged to access hunting quota of which in almost all villages, it is either hunted for the pot or sell and at times licensed hunters are allowed to hunt on village lands at a fee. In for example Ngarambe village abutting Selous Game Reserve under SCP, a village fee for an eland (*Tragelaphus (Taurotragus) oryx*) is TAS 200 000.00; that of buffalo (*Syncerus caffer caffer*) is TAS 150 000.00 (Shayo, 2003). This fee does not account to the hunting licence fee which is TAS 10 000.00 for an eland and TAS 6 000.00 for a buffalo paid at the District Council.

These incentives managed to lure political support thereby considerably reducing poaching and conflicts leading to recovery in animal numbers as evidenced by Shyamsundar *et al.* (2005) in a review of the contribution of tenure devolution in poverty reduction. Despite such achievements, careful facilitation is needed since increased

communal revenue may brew political struggle between the village council and the managing institutions as evidenced by Walsh (2000) in Pawaga-Idodi pWMA.

While enduring challenges as observed in section 2.4.2.2 above, the adoption of the WMA concept emphasize on community-based approach in Tanzania. As the process continues in other areas, among the 16 pilot areas (Appendix 3), 8 have been gazetted to full blown WMAs (Appendix 4). The progress of the 16 pilot WMA up to December 2006 is summarized in Appendix 5.

2.6 Socio-economic values and their association with wildlife management

Socio-economic encompasses both social and economic aspects and is renowned to influencing wildlife management. According to Cernea (2005) existing empirical evidence suggests that, disregard to the social and cultural context of a project/innovation many times leads to inappropriate/poor design and ultimate failure sharing the same concern by Handerson (2005). This section outlines some basic facts on the influence of socio-economic factor on wildlife management.

2.6.1 Definitions: socio-economic and incentive to wildlife management

Socio-economics is variously defined to suit individual needs for different purposes. The Oxford English Dictionary categorises socio-economic into social aspects being those related to society and the economic aspects reflect the economy part justified in terms of profitability. The same defines incentives as ‘a thing that motivates or encourages someone to do something’ and disincentive as ‘a factor that discourages a particular action.’

Socio-economic incentives to natural resources management are defined by McNeely (1998) as 'inducements designed and implemented to influence community or any other recipient to participate in conservation or use the biodiversity resources in a sustainable manner'. It therefore stimulates mutual interests by the group members. These socio-economic incentives, which may take the form of policies and laws (Emerton, 2001), can motivate land owners engagement in conservation activities (Sanchirico, and Siikamäki, 2007) since they are expected to open the market for environmental goods and services.

2.6.2 The influence of social and demographic factors on wildlife management

Evidence has shown that, an increasing population is associated with increased demand for natural resources (Borrini-Feyerabend *et al.*, 1997). It is argued by Madulu (2005) that, the implications of population increases puts the commons at stake and calls for appropriate institutional arrangements emphasising on effective community participation. Concerned with wildlife conservation, Songorwa (2004) is of the opinion that, population build-ups in wildlife rich and areas adjacent to PAs can affect the conservation status if the human dimension is not taken onboard.

Borrini-Feyerabend *et al.* (1997) however, further suggest that, migrations may on the other hand be beneficial to the local community in terms of increased opportunities in for example intensifications in agricultural production and services provision. On the other hand social scientists argue that, there is no direct link between population increases and resources degradation as existing managing institutions are capable of mediating the effects (Varughese and Ostrom, 2001) especially with increased resource scarcity (Ostrom, 2003).

It is also acknowledged that, aging and length of stay in one location arouses concern and interests to nature and ability to predict correctly leading to adoption of a low discount rate to the environmental resources in anticipation for future benefits (Ostrom, 1999). At times experienced users may increase the spatial extent of the common property regime in an attempt to increase autonomy and resources availability in future in order to ensure continued future benefits and reduced costs in management. An empirical study on aging and conservation is exemplified by a study in Handeni District by Kajembe and Mwihomeke (2001) which revealed that, younger generations continued to cut trees in order to obtain building poles against the will of the older generations. This suggests the older generations are more aware of the role played by the environmental services and goods to their livelihoods.

Education, training and raising of awareness on the importance of wildlife management are the doorways to effective participation and empowerment of local community in wildlife management. These can be achieved through formal/informal education, training workshops and seminars, and the various mass media. An increase in awareness consequently increases the perception of the world around and leads into attitude change and appropriate action (Kinyashi, 2006). For example, in a study by Jalan *et al.* (2003) on willingness to pay for better drinking water in India revealed that, awareness such as schooling and exposure to mass media significantly influenced adoption of better drinking water quality. Formal education is argued to enhance understand training on new technology which is a motivation to participate (Mbwilo, 2002) whereas informal education is considered an important tool for the success of wildlife management (Aslin and Bennett, 2005). The same in a study in Australia revealed traditional knowledge and decentralized management as key features for a success in wildlife management.

Participation brings in togetherness and an assumption of trustworthy thereby attracting a monitoring process to either prove or reject. Trust is thus considered as a VETO power as users either enter or exit (Hill and O'hara, 2005). In literature review on wealth and collective action in Kerala India, Jones (2004) is of the opinion that, trust enables people to put aside differences in asset endowment to arrive at a collective action. The same source argue that, trust is associated with the predictable dilemma of costs and benefits streams in collective action and therefore allows creation of different roles. It therefore enhances individuals' willingness to socialize and participate in various initiatives. Ostrom (1992) is of the opinion that, users who lack trust at the beginning gain it as the process builds up. However, Hill and O'hara (2005) consider the necessity of instituting regulatory measures to enhance social gain and reduced organization costs.

Such measures bring in a common vision which enhances collective action. A study undertaken by Beard (2006) in Indonesia revealed that, the main determinants of collective action are relationships among multiscalar social, political and historical factors, internal and external to communities. The same source identified two distinct forms of collective action namely; based on community cohesion, stable social relationships and adherence to social hierarchy and the second being community's perception of an interdependent future and a shared desire for structural change.

The argument by Beard (2006) and the dependence of communities on natural resources and wild places (Narain *et al.*, 2005) necessitate them to device ways of harmonizing their living with the general environment (Varughese and Ostrom, 2001). The ultimate result may be new institutions appropriate with the prevailing situations (Appleton *et al.*, 2000). It is argued by Meinzen-Dick *et al.* (2006) that, common pool resources users generate rules or employ existing norms, often based on custom, to specify who can benefit from

the resource and how, including specific obligations to maintain the resource. Further arguments consider that, when users have autonomy and are secure from external pressures, common property regimes can provide users with the necessary incentives for sustainable resource management (WRI *et al.*, 2005; Meinzen-Dick *et al.*, 2006).

2.6.3 The influence of income and income sources on conservation

The link between the environment and rural livelihoods is inevitable. WRI *et al.* (2005) argue that, ecosystem services and goods are the basic income sources for the rural poor who comprise three-quarters of all poor households worldwide and therefore a fundamental stepping stone to their economic empowerment.

Researches have shown that, agricultural growth is augmented by other forms of environmental income. Existing evidence indicates that, proceeds from agriculture eventually contribute less as off-farm activities share grows (Timmer, 1988). The same argue that, the rural communities become more dependent on off-farm activities of which majority are depend on natural resources. For example, WRI *et al.* (2005) argue that, most rural industries such as '*local processing of agriculture or fishing products, crafts production, and ecotourism—will themselves be indirectly dependent on natural resources.*' This justifies natural resources management as a competitive land use.

The role of non-timber forest products (NTFP) in biodiversity conservation was affirmed by Ninan (2006) in a study on the economics of NTFP to the tribals living in and around Nagarhole national park in India that, they had a positive attitude to biodiversity conservation emphasising on livelihoods and ecosystem services. They consequently refused a relocation package strengthening the argument by Gibson (1999) that, as

resources become more important to livelihoods, dependence is not reduced by insecure or lack of tenure rights.

Ninan (2006) further crosschecked on the financial economics between those who depended on the environmental goods with those of a nearby community in coffee plantation activities, the results indicated the tribals benefited more when costs were factored in. These arguments are in line with a broader debate that, satisfactory maintenance of natural biodiversity requires a way of sustaining the household economy (Ostrom and Nagendra, 2006).

2.7 Institutions in wildlife management

There is a wide variation in the definition of institution by practitioners and therefore institutions mean different things, to different people under different situations. This section defines and outlines types and roles of institutions in wildlife management.

2.7.1 The concept of institution and organization

Institutions and organizations are at times used interchangeably but they actually differ as not all institutions have organizational structures. Despite complexities inherent in wildlife as mobile and a good of international interest, two broad categories (culturally and politically influenced) of resources management institutions are identified at local level (Zenger *et al.,* 2002). The culturally influenced are the customary controls comprising the norms, routines, customs and responsibilities important in resources management based on implicit understanding. On the other hand, the politically influenced institutions embrace the rules and regulations which are readily available in written documents and officially sanctioned through formal processes.

Organizations have a hierarchical structure which defines roles along the line to achieve desired behaviour constrained by rules and procedures. North (1990) defines organizations as a 'group with some common purpose with specified structures of rule constraints to achieve a specified objective'. The same further argue that, organizations are the players while the institutions are the rules of the game. In a WMA, the political influenced institution has an organization structure tailored for the management of wildlife as stipulated in the WMA regulations, 2002 and the revused edition of 2005.

The values inherent in wildlife resources and its contribution to local community livelihoods and food security, evidenced by empirical studies, for example by Vaughan *et al.* (2003) is perhaps the major impetus behind the systems thinking in conservation with decentralized management as the basic approach. Ribot (2004) argue that, appropriate decentralization provides a room for the voices of the poor to be heard.

However, the major challenge in managing a mobile resource of local, national, regional and international interest lies in finding the appropriate institutional arrangement to address all these aspects and yet be accountable to the local community. This study is of the opinion that, this challenge may be minimised if a wildlife management institution is envisioned as an entity constituted by rules and regulations constrained within the local, national laws and international treaties and structured into an organization of users with politically elected leaders inline with the local administrative authority.

2.7.2 Types of institutions

Most literature identifies institutions into formal and informal categories or externally and internally sponsored dependent on how they formed. The two are many times considered together as they are difficult to separate in practice.

2.7.2.1 Formal institutions

These are institutions with a political background based on consensus agreements between actors. Zenger, *et al.* (2002) defined formal institutions as rules that are readily observable through written documents or rules that are determined and executed through formal positions, such as authority or ownership. These institutions are externally sponsored when created with external assistance of for example government agencies and non governmental organizations (NGOs).

This category includes all the institutions that are not rooted in the community but represents the formal established system that is governed by the state. The village natural resources committees (VNRC), NGOs, donor agencies, village council (VC), all types of village development committees, all rules and regulations that govern the management and utilization of natural resources. The centrally instituted policies, laws and regulations that govern access and use of the natural resources are also listed here.

2.7.2.2 Informal institutions

Informal institutions have a cultural background and depend on cultural values and norms of a specific society to regulate behaviour and therefore internally sponsored. They are generated over time and space in order to understand and cope with prevailing agro-ecological and socio-economic environments (Appleton *et al.*, 2000). The informal institutions are also referred to as indigenous or traditional, commonly not accessible through written documents or necessarily sanctioned through formal positions. Examples of informal institutions include the customary controls (norms, routines, customs and responsibilities) on resources management (Zenger *et al.*, 2002).

2.7.3 Linking institutions and organizations

North (1990) considers organizations to be players while institutions constitute rules of the game. In this way organizations can be looked at as the agents of institutional change. However it is argued by Bandaragoda (2000) that some actors preoccupied with organizational development tend to neglect the importance of the rules of the game to the effectiveness of their organizations. The fact that society and their priorities change, institutions are also not static as contended by Kajembe *et al.* (2004) and Appleton *et al.* (2000) and this registers the importance of institutions in organizational performance.

2.7.4 The functioning of institutions

Banking on the definitions of institutions, institutions are continuously generated/created and reformed through a systematic process of observation, experimentations and adaptations, and therefore continuously changing (Appleton *et al.*, 2000). Institutions therefore play a role of reducing uncertainties in human activities evolving as the users alter them to suit available choices (North, 1990; Appleton *et al.*, 2000).

2.7.4.1 Institutions and management performance

The effects of institutions to management performance can be interpreted when there is a base for reference. However, institutions being rules of the game (North, 1990) the actors matter in management performance (Bandaragoda, 2000). North (1995) is of the opinion that institutions are the necessary framework and performance improves as the transactional costs (technology, production and exchange) are reduced.

2.7.4.2 Institutions and their effectiveness

In this? we observe on how the institutions produce the desired or intended results. It is therefore a measure of the operative nature of the desired interactions against if the

specific institutions did not exist. This matches the earlier contention by Appleton *et al.* (2000) that, continuous observations and adaptation are what define robustness of an institution. Although informal institutions have been marginalized and they can not decide on management issues, existing empirical studies evidence the supremacy of informal institutions in natural resources management schemes (Shemwetta *et al.*, 2004; Banana *et al.*, 2004). It is argued that, informal institutions are more effective in conflict resolutions when compared to formal institutions. Banana *et al.* (2004) suggest the merger of the two may perhaps enhance their effectiveness in management of the common property resources. Moreover, Kajembe *et al.* (2004) are of the opinion that, in some cases the informal have reduced the effectiveness of the formal institutions. As argued by Zenger *et al.* (2001), it is broadly agreed that, formal and informal institutions are interdependent governance mechanisms in that the use of one mechanism can either promote (complement) or undermine (substitute for) the use of the other.

2.7.4.3 Management performance of nested institutions

Community actions operate under nested systems of different layers of institutions. Each layer is specific for a specified target and in general there are necessary layers that operate together to effect the desired objectives which most literature refer to as institutional framework. For effective performance, the institutions need to be nested in different layers in the hierarchy of governance (Kisoza *et al.*, 2004). The same further suggests horizontal linkage to allow access to key resources.

2.7.4.4 The role of institutions in wildlife management

Institutions are formed to constrain human behaviour and actions in resources use due to resources scarcity. Therefore the physical environment, climate and the human aspect determine the state of the environment which is an important habitat for wildlife. Taking

wildlife as a habitat good (Damm, 2002), the role of institutions is seen predominantly in determining the human wildlife relations in the environment in an attempt to maximize social and environmental benefits. In common property literature, institutions define procedures for collective action which favours some interests and outcomes over others thereby controlling and managing the common property resources (North, 1990; Ostrom, 1990).

Empirical studies have proved that communities have developed sustainable management systems for using fisheries and wildlife resources. Ostrom (1990), in a survey on successful common pool resources institutions documented conditions necessary for development of durable self-organized and managed common pool resources (CPR) institutions (Appendix 6). Anderies *et al.* (2003) argue that, the Ostrom (1990) design principles form an important base for developing specific design principles for specified social-ecological systems. Design principles increases confidence required in generation of robust institutions. The suggestion is quite plausible as it takes care of the inherent ecological and social variations across geographical locations. In a study by Agrawal and Chhatre (2006), it was revealed that, the influence of biophysical factors matter in social-cultural conditions and resources governance.

Furthermore, Meinzen-Dick *et al.* (2006) contend that, group as well as individual tenure security is an important feature in the success of collective action. The same further mention three important requirements of individual security in a group as:

(1) clear and enforced rules for access, use and management of the resources;

(2) clarity and certainty about the membership in the group; and

(3) effective enforcement and conflict resolution mechanisms'.

CHAPTER THREE

3 MATERIALS AND METHODS

3.1 Study area

3.1.1 Location, size and administration

This Pawaga-idodi pilot WMA is located in the southern part of Lunda Mkwambi Game Controlled Area (GCA) in Pawaga and Idodi divisions of Iringa Rural District Council (IDC) and falls between latitudes 6.9^0 to 8.0^0 and longitudes 34.8^0 to 35.7^0 E. It spreads in 5 wards; Mahuninga, Idodi, Mlowa, Itunundu and Ilolo Mpya and formed by 21 member villages with one inter-village association (MBOMIPA association) for the management of wildlife. It forms part of a much larger ecosystem '*Rungwa-Ruaha Ecosystem.*' To the west and northwest it abuts the Ruaha National Park (RNP); Usangu Game Reserve (UGR) to the southwest and the Lunda Mkwambi North GCA to the northern side. The remaining portions of the member village are found on the east and northeast (Fig.3).

The total member village lands is 404 600 hectare of which 77 665 hectares has been set out for the WMA. The six study villages comprise 24.45% equivalent to 102 979 hectares of which 30.97% equivalent to 31 881 hectares has been dedicated to wildlife management under the WMA concept as indicated in the village land use plans prepared by the IDC (2005a, b, c, d, e, f).

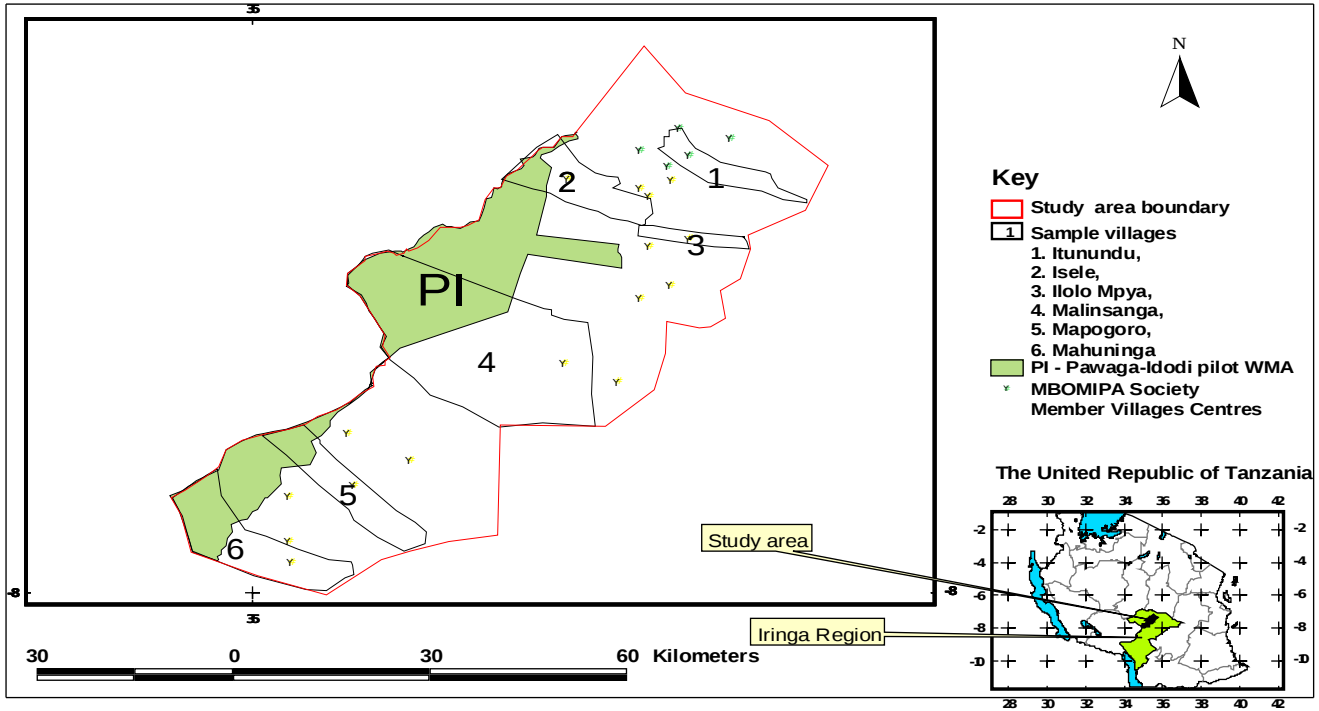

Figure 3: The study area map

Source: Tanzania map from FAO-Africover (2002); pWMA map from MBOMIPA (2006a,b) and Village maps from IDC (2005a, b, c, d, e, f).

3.1.2 Demography and ethnicity

The 2002 census data indicated a total human population of 43 810 individuals in 10 203 households with an annual growth rate of 2.7% (NBS, 2005). However when compared to the 1999 census data (36 850 people in 6 572 households) the indicated population growth was 42%. The six study villages recorded a total of 14 668 people which is equivalent to 6.02% of the total human population (243 623 people). The original ethnic groups to inhabit the villages of Idodi and Pawaga Divisions were the Hehe and Gogo (MNRT, 2003c). However, recent years have seen an influx of many other groups with the villages in Idodi Division being more heterogeneous.

3.1.3 Accessibility

Pawaga and Idodi divisions can be reached from Iringa town by all weather roads, via Kiwele village or Kalenga. Other roads: Madibira-Tungamalenga, Rungwa-Ruaha National Park to Tungamalenga and Dododma to Lunda via Pawaga are seasonal. The area is covered by a good telephone network.

3.1.4 Climate

The wet season is mainly between November and May with rainfalls varying from the southern highlands towards the northern areas around Mtera dam. Recodes indicate the southern highlands receive an annual average of between 750 and 1000 millimetres and drops gradually towards the northern areas, around Mtera dam which records an average of 500 millimetres annually (MNRT, 1998). The same further reported high temperatures all year round which reaches 44ºC in the dry season. Day temperatures are recorded to be quite hot in the dry season with relatively cool nights. Likewise, humidity in the dry season is relatively low with an increasing trend in evapotranspiration potential over the past decade records reaching 3260 millimetres per annum as indicated in SWECO (1985), cited by MBOMIPA (2006b).

3.1.5 Water and hydrology

The area is rich in drainage network and forms catchments to major drainage lines including Rufiji, the Great Ruaha and the little Ruaha rivers. Other major rivers include Tungamalenga, Mahuninga, Kitanewa and Idodi rivers. Except for the great Ruaha, the rivers flow all year round and provide water for irrigation, fishing and domestic use. The great Ruaha is reported to flow seasonally over the past few years (MNRT, 1998). Ground water is reported to be rarely used as only a few shallow wells have been drilled in few villages.

3.1.6 Topography, geology and soils

The land is generally flat especially in the north and central parts and most of it located in the rift valley. The southern and eastern parts are hilly with undulating landscape, inselbergs are common (MNRT, 1998). Major geological rocks on the western portion gneiss and granite while the southern and central parts are dominated by precambrian gneiss of Dodoman and Usagaran types (MNRT, 1998). Granite is found in scattered clusters from north to south with intermixed red brown lateritic and mbuga soils. In general, the soils are red brown lateritic of loam, silt, sand and gravel. Due to deforestation and overgrazing, some portions have been susceptible to erosion resulting into shallow and degraded soils. On the low lying areas there are black alluvial soils.

3.1.7 Important vegetation communities and wildlife

The vegetation ranges from *Acacia* bushlands/woodlands to Miombo woodlands with interspersed riparian vegetation, bushland and thickets. Some of the areas are open grasslands (MNRT, 1998). *Acacia-Combretum* bushlands/woodlans are mainly found on valley flows and level areas or mbuga with clustered bushes of *Combretum*. The Miombo are mainly of *Brachystegia* on the higher altitudes representing the climax vegetation

(crown cover 50%) and on the low altitudes on well drained deep sandy soils at the base of the hills where the average trees cover is 10 to 20%. The Riparian vegetation range from moist closed forest, open woodlands and bush types. The steep escarpments and some low lying areas are dominated by *Acacia-Combretum* bushes. Scrublands are dominated by *Acacia derepanolobium, A. kirkii* and *A. nigrescens.* The thickets are mainly of *Dalbergia arbutifolia*.

This vegetation types and the rich drainage system forms most appropriate habitat for wildlife as a dry season resort for wildlife from the adjacent PAs. Current records indicate identified wildlife species to include 64 mammals, 38 fish, over 500 birds.

3.1.8 Wildlife conservation efforts

According to Walsh (2000), the main objectives of the initiative aimed to 'establish an effective and sustainable wildlife management system under the community authority and responsibility'. MBOMIPA project and now the local community association was an initiative of Danish Fund for International Development (DFID) support pull-out as an independent community wing of the Ruaha Ecosystem and Wildlife Management Project (REWMP) that ended in 1996. Currently the local community is enjoying logistical and technical support from Wildlife Conservation Services – Rungwa Ruaha living landscape Project (WCS-RRP) from year 2004 with an objective of finalising the work initiated by DFID with reference to the WMA regulations.

3.1.9 Economic activities

Over 85% of the residents in Pawaga and Idodi Divisions are peasant farmers while the rest are not directly dependent on agricultural income sources. Few inhabitants are dependent on livestock and some are agro-pastoralists (MNRT, 1998). The same report

poverty proportion of the population to be over 75% i.e. earning less than one United States Dollar (USD).

3.2 Data collection

A combination of tools were used in both qualitative (informal) and quantitative (formal) data collection techniques in two phases. According to Marsland *et al.* (2001), the two survey techniques complement each other and strengthens the analysis by facilitates additional insight in particular issues while providing a reliable check to the information collected (triangulation).

3.2.1 Research design and sample size

Cross sectional research design was used to facilitate data collected at a single point in time. Babbie (2007) consider the design suitable for the description as well as determination of relationship between variables and allows valid information if one is limited with time. Multistage stratified random sampling design was used in selecting the sample villages, sub-villages, and households for the formal interview to spread the sample size across the study area. According to Kothari (2004), this sampling design merits the importance of facilitation of enquires over a large geographical area at a reasonable cost though the partial units and sequential clusters.

Decision on the sample size is important in research as it determines the analysis technique and desired precision. Kothari (2004) consider that, although costs play an important role, variability in the population under study is a major determinant factor. High variance in a population under study requires a large samples size to achieve desired precision. On the analysis technique, Pallant (2005) argue that, in some cases the number

of independent variables is determined by the sample size, for example in logistic regression, the rule of thumb is one variable to ten units in the sample (1:10).

Six (6) villages which is equivalent to 29% of the study area villages were selected for the study. One village for each of the 5 wards was selected randomly from the ward register and the sixth village from the Itunundu ward register. The selection of two villages for the Itunundu ward was to match its large population size which account to about 40% of the total households in the study area (MNRT, 2003c). The total number of households in the six villages was found to be 3 768 (July 2006 village counts) of which 187 households equivalent to 5% were reached in this study (Table 1). The head of the household was the basic analytical unit in the study to capture the importance of the head in decision making matters.

Table 1: Distribution of sample size in the study area

Ward	Village	Population July 2006	Total HH	Sample size (HH)	Sample size (%)
Ilolo Mpya	Ilolo Mpya	850	238	12	5.0
Itunundu	Itunundu	3600	650	35	5.4
Itunundu	Isele	2892	570	30	5.3
Idodi	Mapogoro	2798	520	27	5.2
Mlowa	Malinzanga	5824	1035	44	4.3
Mahuninga	Mahuninga	2764	755	39	5.2
Total		18728	3768	187	5.0

HH – Household

3.2.2 Phase one methods

This phase involved a preliminary study where a Participatory Rural Appraisal (PRA) exercise, secondary data collection, questionnaire pre-testing, and formal and informal discussions were undertaken.

3.2.2.1 Participatory rural appraisal

The PRA exercise in Itunundu and Mapogoro villages represented the rest in Pawaga and Idodi divisions respectively. Main tools used included resources mapping, Venn diagrams, and matrix scoring, annual/seasonal and daily calendars. The visual techniques in PRA encourage people to get involved as they are participatory in nature and allow exploration of perception of the disadvantaged group (Conroy, 2002). The PRA group in a village included representatives of the youth (male and female) below 40 years of age, men and women representatives aged 40 years and above, influential persons in the village and village leaders. Prior to implementation of each tool, the participants were given a brief on its application and ethics required.

(a) Resources mapping

Resources mapping explored resources availability cover change for situations in the 1970s and current (2006) respectively. Two groups were used and presentations were discussed, queried on some entries or omissions and after the discussions consensus maps were redrawn.

(b) Annual/seasonal and daily calendars

The calendar explored temporal basic economic activities, labour use and distribution and access to resources. The PRA group was divided into three groups; women, men and a mixed group. The women and men groups each prepared daily calendars for both women and men in the wet and dry seasons while the mixed group prepared the annual/seasonal calendar. Presented and consensus reached on each subject.

(c) Matrix scoring and ranking

The purpose of the matrix scoring was to analyse the roles and relative importance of the economic activities that were revealed by annual and daily calendars. At first identified activities were listed and agreed on, and then scoring was confidential to each participant. Each participant scored to three main roles for each activity and then scores on the importance of each activity of highest priority was undertaken.

(d) Venn diagrams

Venn diagrams were used to explore the functioning of existing institutions and asserting their legitimacy and or efficacy. The participants listed the existing institutions side by side with all existing activities in the village. Circular rings of varying sizes were used to rate the functional importance of each institution.

3.2.2.2 Secondary data

Topographic maps, village land use survey maps and document, progress and scientific studies reports were obtained from the Wildlife Division, Iringa District Council, MBOMIPA project and association, and WCS-RRP in Iringa. The MBOMIPA website (MBOMIPA, 2003) also provided useful information.

3.2.2.3 Questionnaire pre-testing

Pre-tested was conducted to iron out ambiguities to improve clarity important in reliability of collected information as suggested by Mwita (2002). Two research assistants earmarked for assistance in the formal survey in each village under study were familiarised with the questionnaire and survey techniques.

3.2.2.4 Formal and informal discussions

Information on natural resources availability and their uses, vision and commitment of the various stakeholders in conservation, implementation process, and problems faced and general observation on the way forward was collected. A checklist (Appendix 1) was used to guide discussions with key informants in which 36 persons were reached.

3.2.3 Phase two methods

In this phase both categorical and quantitative information on household characteristics and asserts, land use patterns, labour requirements and utilization, access/availability and utilization of natural resources (wildlife, timber and non timber forest products), awareness and opinion on the WMA concept, institutions, economic activities, household income, and role played in wildlife management was collected. Methods used were household questionnaire survey and participants observations.

3.2.3.1 Household questionnaire survey

Structured questionnaire with both closed and open ended questions (Appendix 2) was administered to 187 persons as indicated above (Table 1). A multistage systematic sampling method as indicated in section 3.2.1 above, was used at village level to systematically allocate sample size equivalent to 5% of each sub-village resident households. At sub-village level respondents were selected randomly from the sub-village register. The questionnaire wa s translated into Kiswahili to easy understanding by the field assistants.As indicated in section 3.2.2.3 above, two field assistants in each of the sample villages, assisted the researcher in the household questionnaire survey.

3.2.3.2 Participant observations

Through this technique, information on access and use of resources, and the existing legal framework at village level was collected. Conroy (2002) argues that, the method allows the researcher to be part of the situation studied thereby facilitating collection of information that could not be collected by other methods.

3.3 Data analysis

Both qualitative and quantitative methods for data analysis were used. Qualitative data analysis methods included PRA analysis, content analysis and structural-functional analysis. Quantitative data analysis method included descriptive and inferential statistics.

3.3.1 Content and structural-functional analysis

Content and structural functional analyses were used to analyse information from key informants, participants' observations and secondary data. The findings from the qualitative data analysis were used together with quantitative data to triangulate and boost understanding on factors influencing WMA management.

3.3.1.1 Content analysis

This technique was used to analyse attitude of the local community towards impacts of the WMA regulations on resource use in the proposed WMA in order to link their perceptions and the WMA concept. The information was broken down to the smallest units of information and organised into a systematic manner as suggested by Kothari (2004). The results were used to develop themes and tendencies to ascertaining certain values and attitudes of the respondents.

3.3.1.2 Structural-functional analysis

The method was used to link revealed obvious facts on the functioning of the existing local institutions, their performance and effectiveness to concealed facts in relation to the existing situations. According to Matsaert (2002), the technique is important in explaining the way social facts relate to each other in the society and the manner in which such facts relate to the physical environment.

3.3.2 PRA data analysis

The exercise analysed information on resources distribution and availability, social economic activities (roles, preference and incomes accrued), institutions and labour distribution. The information was summarised, analysed in collaboration with the local community and results were communicated back for verification.

3.3.3 Questionnaire data analysis and statistical analysis packages

Responses from household questionnaires were systematically organized and wherever applicable open ended responses were categorized and transformed to numerical codes enable further analysis as suggested by Babbie (2007). The Statistical Package for Social Sciences for Windows (SPSS 11.5) was used for the analyses. Contingency tables were used to determine the level of homogeneity/variations among the villages with respect to probabilities of the responses. The Pearson's chi-squire test of goodness of fit was adopted as suggested by Pallant (2005). One way ANOVA was used to assess differences in population data in the six study villages observed in 2002 (NBS, 2005) and those of this study (July 2006). According to Kothari (2004) ANOVA allows significant analysis amongst means obtained from different samples at the same time.

3.3.4 Analysis of the influence of socioeconomic and institutional factors

Binary logistic multiple regression model was used to capture its ability that disregards linearity in data as suggested by Hair *et al.* (2005). The binary dependent variable was adoption and operationalisation of the WMA concept with a value of one (1) for positive responses and zero (0) otherwise.

Quantitatively, the relationship between the occurrence and its dependency on several variables can be expressed as:

$$P = \frac{1}{1 + e^{-z_i}} = \frac{e^{z_i}}{1 + e^{z_i}} \quad \text{.....} \quad \text{..(1)}$$

Where:

p = is the probability of an event occurring. In the present situation, the p is the estimated probability of adoption and implementation of the WMA concept.

e = the natural logarithm which is 2.718.

z_i = the i^{th} observed values (scores) of the binary dependent variable representing a linear combination of independent variable underlying adoption and implementation of a sustainable wildlife management in the study area.

On the other hand the probability of an event not occurring {P(no event)}, in this case, the probability of not adopting and implementation of a sustainable wildlife management can be expressed as:

$$P(noevent) = 1 - P(event) = 1 - e^{z_i} / 1 + e^{z_i} \quad \text{.....(2)}$$

Logistic regression uses the logit function in calculating the probability in the form of:

$$Logit(P) = In\left(P / 1 - P\right) = z \quad \text{.....}$$

(3)

The probability (P) is constrained between 0 and 1 on an S-shaped curve and 'z' is the linear combination of all the predictors. The log odds (Logits) of the outcome are modelled as a linear function of the independent variables (X_1 to X_k) in prediction of the phenomenon. It follows that, logistic multiple regression models involve fitting the data in an equation of the form:

$$Z = \beta_0 + \beta_1 X_{1ij} + ... + \beta_k X_{kij} \quad \text{.....}$$

(4)

Where;

β_0 = is the intercept of the model i.e. the constant term of the model when the effect of the independent variables is held at zero.

β_1 - β_k = are independent variable coefficients showing the marginal effects of the unit change in the explanatory variables on the dependent variable. The marginal effects (positive or negative) were used in developing prediction equations on adoption and implementation of WMA.

ij = 1, 2, 3……N (Total number of respondents) = sample size i.e. 187 for the purpose of the study).

k = Total number of independent variables (k = 16)

X_1 to X_k were the explanatory variables (age, awareness, resources degradation, dependence to the resources, user right, trust to existing institutional framework, common understanding, immigration, existence of institution to manage, education level, and costs to organize, duration of stay and prediction of future availability of the resources).

The independent variables included in the model were:-

X_1 = Age of respondent in years. It is hypothesized that aged villagers are more of conservators and have greater respect to nature due to accumulated experiences.

X_2 = Formal education level. It is hypothesised that household heads with higher education level will easily understand, grasp new technologies at easy and effectively participate in decision making influencing the household adoption rate.

X_3 = Duration of residence of respondent in years. The longer a person stays in one locality his/her familiarisation with the environment leads to accumulated interests and respects to nature due to experiences and adopts a low discount rate to the environmental resources enhancing initiatives for conservation.

X_4 = Awareness of the WMA concept. Increased awareness consequently increases the perception of the world around and leads into attitude change and appropriate action towards development in conservation influencing the household adoption rate.

X_5 = Future availability of the resources. A resource that is highly predictable is easy to understand allowing quick actions by the users to avoid losses that may accompany open access situations influencing the household participation in self-organization.

X_6 = Perception of resources degradation. Perception of resources degradation enhances conservation to avoid presumed adverse situations in case the resources are depleted.

X_8 = ability to manage. Demonstrated ability to mediate adverse situations, experience and robustness of the respective common property institutions is important in enhancing conservation.

X_9 = Dependence to the resources. The higher the dependence the more likely a household or community will respect nature and therefore use environmental resources in the most appropriate way possible consequently enhancing adoption to conservation initiatives.

X_{10} = Perceived costs to organize. The size of the common property resources determines the costs to organize with successful situations in areas where the perceived costs are manageable.

X_{11} = Perceived user rights. Having user rights increases the autonomy of a community over the common property resources consequently increasing their commitment which reduces organization cost through trust thereby enhancing adoption rate.

X_{12} = Trust. The trust of one another to keep promise and agreements reached reduces costs in monitoring thereby increasing benefits which enhances self-organization important in adoption and conservation.

X_{13} = Common understanding. Common understanding enhances the possibility of agreements to common strategies for the sustainable management of resources.

X_{14} = Immigration. Perception of increase in human population creates fear of increases in the rate of resources depletion motivate institutional action to mediate the situation which is a positive action to self-organisation and conservation.

X_{15} = Perceived existence of a benefit sharing mechanism. The perception by users of the existence of the existence of a benefit sharing mechanism and enhances the users awareness on the package involved. This is an important measure of cost effectiveness and efficacy of their decision in adoption of conservation initiatives.

3.3.4.1 Model chi-square (χ^2) test

Model χ^2 was used to fit the logistic multiple regression model. It measures how well the independent variables influence the outcome (dependent variable). The value of the -2log likelihood (-2LL) indicates the model fit. The regression coefficients determines the direction of the effect on p(z=1) for relevant X_{is} but its magnitude depends on all the X_{is} (Hair *et al.*, 2005). By testing that all the regression coefficients are zero except the constant, model χ^2 therefore measures the improvement in fit that the independent variables make compared to the null model (i.e. initial model with the constant only). Apart from the significance of χ^2 and the model improvement, Neglkerke R Square was used to assess the model fit as suggested by Negelkerke (1991).

3.3.4.2 Test for multicollinearity

Multiple correlation analysis was used to test for multicollinearity as suggested by Kothari (2004), and Tabachnick and Fidell (2006). According to Tabachnick and Fidell (2006), bivariate correlation between variables in multivariate analysis is common and values up to 0.7 can be tolerated. For values above 0.7, one of the variables should be omitted or the two used to form a composite.

3.3.4.3 Likelihood ratio (difference) test

Likelihood ratio (difference) test was used to test the importance of the individual variables. The test involved comparing the -2LL between the full model (with all the predictors) with a nested model (with reduced predictor of interest) by use of the χ^2 tables as suggested by Hair *et al.* (2005) and Pallant (2005). A non-significant likelihood ratio (difference) test indicates no difference between the full and the reduced models therefore the predictor can be regarded as zero (0) justifying its omission to have a more parsimonious model that works just as well.

3.3.4.4 The hypothesis tested and interpretation of results

The null hypothesis ($\beta=0$) was tested for significance against the alternative hypothesis ($\beta \neq 0$). Implying that, either the regression coefficients are zero or not therefore explaining the relationship between the predictors and dependent variables. Proper interpretation of the results involved observing the behaviour of the following:

- Wald statistic to see whether the influence of a particular independent variable is statistically significant. Likelihood ratio (Chi-square difference) test to ascertain the relative importance of individual model parameters.
- Sign of the effect of the regression coefficient (β) to see whether a unit increase in the independent variable increased or decreased the probability of success.

Crosstabulation to ascertain the interpretation of the odds ratio in relation to the variable coding employed.

- The odds ratio $\{Exp(\beta)\}$ to see the effect size per unit increase in X_i on the odds of success in adoption and operationalisation of the WMA concept.

CHAPTER FOUR

4 RESULTS AND DISCUSSIONS

4.1 Socio-economic characteristics of the local resources users

Socio-economic characteristics of the local community can negatively or positively affect the overall conservation efforts. This section gives an overview of the socio-economic characteristics of the local community in the study area and then model 15 selected predictor variables for their effect in predicting adoption and operationalisation of the WMA concept in the Pawaga-Idodi pWMA. Findings on social and economic aspects of the local community are summarised under changes in human populations, resources tenure and economic activities.

4.1.1 Human population changes

The 2002 human population census in the six study villages indicated a total of 14 668 individuals (NBS, 2005). In this study, relying on updated village data (July 2006) records, the total human population was found to be 18 720 individuals as summarized in Table 2. This indicates an average population change of 27.68% in a period of four years. The highest change (82.01%) was recorded in Ilolo Mpya (a new village) while the lowest (12%) was recorded in Isele village. According to MNRT (2003c), pasture and fertile soils rich in drainage system with high potential for irrigated farming are the main pull factors for the population influx. Technically however, the area being a PA which allows anthropological activities made it possible for uncontrolled settlements. Perhaps such situations allow inappropriate human activities raising the concern of conservationist as evidenced by for example Songorwa (2004), Kidegesho *et al.* (2006) and Madulu (2004, 2005) in studies on the commons in Tanzania. Migrant livestock keepers from Shinyanga, Tabora, Arusha, Mara, Mwanza and Manyara regions pass through or settle in the area as

earlier evidenced by Sosovele and Ngwale (2002). The same further argued that, the migrations had increasingly impacted on the land cover with subsequent changes in the rainfall pattern and duration evidenced by dropping annual trends (1996-2000) in rainfall amounts in the whole Ruaha catchment area.

Table 2: Human population change 2002 to 2006

Study village	2002 Human census data	Survey field data 2006	Difference (2002 – 2006 data)	Population change (2002-2006) in percent
Ilolo Mpya	467	850	383	82.01
Itunundu	2 841	3 600	759	26.72
Isele	2 570	2 892	322	12.53
Mapogoro	2 336	2 798	462	19.78
Malinzanga	4 288	5 824	1 536	35.82
Mahuninga	2 166	2 764	598	27.61
Total	14 668	18 728	4 060	27.68

ANOVA test for significant difference confirmed that the two populations data (2002 census and 2006 survey data) were statistically significant at $P<0.01$ when compared through the villages in the study area (Table 3). The results concur with earlier findings in the same area by Williams (2005) who revealed an increasing trend in household inequalities, competition and conflicts over access to land resources. The significant population change and variation among the villages within four years concur with the concern of Songorwa (2004) on high population build-up at the bounds of PAs. It further signifies an increasing rate at which the environmental resources are being accessed and suffering from the effects of open access situations. (Borrini-Feyerabend *et al,*1997; Madulu, 2005).

Table 3: The results of ANOVA test for significant changes in population data

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Villages	20 043 839	5	4 008 768.0	12.80484	0.003737	4.387374
Within Villages	1 878 399	6	313 066.5			
Total	21 922 238	11				

Existences of such a dilemma in population dynamics undermines conservation efforts and calls for urgent action to rescue the situation by incorporating the human dimension and concur with suggestions by Songorwa (2004) and Handerson (2005). It is renowned that, the human dimension is not factored into wildlife conservation strategies in the same manner as wildlife resources is not factored in rural development strategies. Kideghesho *et al.* (2006) suggestion for a multisectoral approach to resolve the habitat loss is indeed plausible in view of the complexity of the problem.

4.1.2 Resources tenure

Land tenure in the study area is predominantly customary. The results (Table 4) indicate that, 84.4% of the respondents manage land acquired either through government allocation, inheritance or by buying from other villagers while the rest (15.6%) hire, borrow for free or share cropping land. The variations in means of land acquisition were found to be statistically significant at $P<0.001$ implying that, land values and market vary within and among the villages.

The results approximate those indicated by a socio-economic survey undertaken in the land use planning exercise in the same villages by the IDC (2005a, b, c, d, e, f) showing an average of 85.43% of the village residents owned land while the rest hire land for crop cultivation. The villagers have not yet accessed customary titles but the approved land use plans have increased tenure security (URT, 1999).

However an assessment on land user right (Table 5) indicated majority (52.9%) manage less that 1.83ha of which 10.8% have less than 0.61ha. Only 5.9% manage land above 7.7ha of which 4.9% are found in Isele village alone. Despite the small size, land holding

were found to vary across the village ($P<0.001$) implying overall inequalities (Williams, 2005) and high dependence to environmental resources for satisfaction of households' livelihoods needs concurring with WRI *et al.* (2005) and Narain *et al.* (2005).

Narain *et al.* (2005), in a study on rural household dependence on common pool resources in Jhabua District in India revealed that, common pool resources contribute significantly to household income. The same defined household dependence as the income fraction derived from the common pool resources. It is renowned that, high dependence motivates users' interest, respect to nature and a sense of future interdependence therein motivating collective action and enhances sustainable resources conservation initiatives (WRI *et al.*, 2005).

Table 4: Distribution of land acquisition systems in the study village

Acquisition system	Count within total	Village of respondent						**Total N=186***
		Ilolo/M n=12	Itunundu n=35	Isele n=30	Mapogoro n=27	Malinzanga n=44	Mahuninga n=38*	
Village Government allocation	% of total	3.2	4.8	10.8	11.8	5.9	4.8	41.4
Inheritance	% of total	2.2	5.4	3.8	1.6%	6.5	7.5	26.9
Hired on annual payment	% of total	0.5	4.3	0.5	0.5	3.8	1.1	10.8
Bought land	% of total	0.5	2.2	1.1	0.0	5.4	7.0	16.1
Borrowed	% of total	0.0	1.6	0.0	0.5	1.6	.0	3.8
Shared cropping	% of total	0.0	0.5	.0	0.0	0.5	.0	1.1
Total	% of total	6.5	18.8	16.1	14.5	23.7	20.4	100.0

Key: χ^2 = 62.941; df = 25; significant at P<0.001; * indicates one missing (new employee has not acquired land)

Table 5: Household land ownership in the study villages

land ownership categories (ha)	Count within total	Village of respondent						Total
		Ilolo/M n=12	Itunundu n=35	Isele n=30	Mapogoro n=27	Malinzanga n=44	Mahuninga n=38*	N=186*
0.20 – 0.61	% of total	2.2	4.8	1.1	0.5	1.1	1.1	10.8
0.62 – 1.02	% of total	2.2	6.5	0.5	2.7	3.8	3.8	19.4
1.03 – 1.42	% of total	0.5	4.3	2.7	5.4	3.8	4.8	21.5
1.43 – 1.83	% of total	0.5	1.6	0.5	2.2	2.7	2.7	10.2
1.84 - 4.05	% of total	1.1	0.0	4.8	3.8	9.7	7.0	26.3
4.06 – 7.69	% of total	0.0	1.6	1.6	0.0	2.2	0.5	5.9
7.70 – 15.79	% of total	0.0	0.0	3.8	0.0	0.0	0.5	4.3
15.80+	% of total	0.0	0.0	1.1	0.0	0.5	0.0	1.6
Total	% of total	6.5	18.8	16.1	14.5	23.7	20.4	100.0

Key: χ^2 = 90.905; df = 35; significant at P<0.001; * indicates one missing (new employee has not acquired land)

Analysis on priority setting in land use indicates that, land set aside for communal purposes is well above 50% of total village lands. Table 6 summarises extracts from the approved village land use plans by IDC (2005a, b, c, d, e, f). The guidelines for village land use planning process maintain that, the local community are not coerced to adopt or adapt to land uses that do not capture their interests, the process is participatory in nature and practice (URT, 1999). Such outcomes indicate the importance of communal land use to the community concurring with Ostrom (1990) and need to be harnessed into rural planning as a major stride in resource conservation since the mindset exist. The approach will facilitate conservation objectives as the welfare of the local community is enhanced.

Table 6: Lands set aside for communal use in the six study villages

Village	Total land area (ha)	Type of communal land use and size (ha) set aside with respective percent of total in bracket				
		WMA	Village Forest	Grazing	Utilization forest	Forest reserve
Malinzanga	44 021.00	16 841.00 (31.29)	NA	7 225.60 (14.48)	739.20 (1.68)	15 450.35 (35.12)
Mapogoro	11 119.00	3 464.00 (31.15)	NA	732.04 (6.58)	402.50 (3.62)	89.96 (0.81)
Mahuninga	28 701.00	10 314.00 (35.94)	NA	1 524.00 (5.31)	1 372.10 (4.78)	9 560.89 (33.31)
Isele	11 007.00	1 272.00 (16.1)	NA	4 324.86 (39.3)	543.10 (4.9)	NA
Ilolo Mpya	2 897.00	NA	*	1 966.58* (67.89)	NA	77.70 (2.68)
Itunundu	5 234.00	NA	*	2 380.00* (45.47)	NA	960.00 (18.34)

Key: * indicates the same land serves for the indicated purpose in the specified village
NA – not applicable in the specified village land

The study further found that, the local community access wildlife resources through permits and licences concurring with the suggestion by Ostrom (1990, 1992). The gazettement of the WMA and authorized association (AA) (URT, 2007a) has increased tenure rights over wildlife resources and opened a new chapter in wildlife based business opportunities concurring with Emerton (2001) observations on incentives.

In general the increased tenure security as discussed above concurs with the observations of WRI *et al*. (2005) and enhances willingness and ability to invest time and resources to sustainably expand their environmental income. It is further indicated that secure tenure doubles investments in the resources base and therefore attracting a low discount rate important for future face value of the resources.

4.1.3 Economic activities

The results (Table 7) indicate the local community are either crop farmers (45.5%) or mix crop farming and livestock keeping (54.0%) households. The resident farmers are renowned to keep a few livestock which are either stall-fed for pigs and improved breeds of goats and cattle, and in some instances tethered for goats but mainly free ranging for livestock.

These observations concur with those of the National Planning Commission (PC and IDC, 1997) which describe the Iringa District economy to be based on agriculture (crop and livestock) practiced by 95% of the population who are based in the rural areas.

Table 7: Distribution of main occupation by village of respondent

Main occupation	Description	Village of respondent						Total N=187
		Ilolo/M n=12	Itunundu n=35	Isele n=30	Mapogoro n=27	Malinzanga n=44	Mahuninga n=39	
Crop farming	% within Village of respondent	66.7	42.9	23.3	29.6	59.1	53.8	45.5
	% of Total	4.3	8.0	3.7	4.3	13.9	11.2	45.5
Mixed (crop and livestock)	% within Village of respondent	33.3	57.1	76.7	70.4	40.9	43.6	54.0
	% of Total	2.1	10.7	12.3	10.2	9.6	9.1	54.0
Paid employment	% within Village of respondent	0.0	0.0	0.0	0.0	0.0	2.6	0.5
	% of Total	0.0	0.0	0.0	0.0	0.0	0.5	0.5
Total	% within Village of respondent	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	% of Total	6.4	18.7	16.0	14.4	23.5	20.9	100.0

Key: χ^2 = 19.345, df = 10, significant at P<0.05

The results were also found to have significant variations ($P<0.05$) in basic economic activities. This implies that although the local community are predominantly agriculture based (99.5%) and participating in the MBOMIPA association as partners, they differ in what they consider as the main sources of income across the study villages. This realisation is important in the sustainability of a common property regime. It is argued that, the managing institution is informed and henceforth mediates the situation in an attempt to avoid social ecological losses and sustain the common property (Varughese and Ostrom, 2001). The study further identified sixteen (16) off-farm activities (Table 8) undertaken by 103 households (55.1% of the respondents).

Table 8: Distribution between off-farm activities in the study area

Off-farm activity	Response between off-farm activities	
	Count	Percent of total (N=103)
Vegetable farming	12	11.7
Child day care services	1	1.0
Traditional healer	1	1.0
Local brew making and/or sell	23	22.3
Paid employment (civil & casual)	18	17.5
Small business (brick, farm letting, fuelwood, hair plaiting	23	22.3
Livestock business	1	1.0
Service provision (milling, butcher, shop, bar, kiosk)	8	7.8
Carpentry	8	7.8
Masonry	5	4.9
Fishing and beekeeping	3	2.9
Total	103	100.0

These results (Table 8) imply that, majority of the villagers are busy all year round since off-farm activities occupy the dry season recess. The commonest activities indicated include small business (22.5%, local brew making and sell (22.3%), and paid employment (11.7%).

Comparing the sources of household income (Table 9), crop farming contributes 62.4% while livestock contributed only 9.4% of the total income. These findings score the contention that; livestock is kept as a bank or for prestige. Unless there is a major incidence, livestock is not sold for cash inputs. However the contribution of the ecosystem services and goods such as the relief gained by a household through coverage of otherwise household costs by the wildlife revenue and those from non timber forest products were not factored in are they were not the scope of this research and requires a separate study.

An analysis on the distribution of income sources across the villages was undertaken and the results (Table 9) indicated the overall cash income significantly ($P<0.001$) vary among the participating villages. Except for the off-farm sources of which fishing and beeking was not factored in (not significant at $P<0.05$), crop and livestock sells significantly differ across the village.

Table 9: Distribution within income sources (2005/06) in the study area

Income Category (TAS '000')	Description	Income source: Crop yield sells	Livestock sells	Off-farm sources	Overall total
4 - 49	Count within income source	20	11	13	11
	% of total within income source	10.8	26.2	12.7	5.9
50 - 99	Count within income source	26	9	16	15
	% of total within income source	14.1	21.4	15.7	8.0
100 - 199	Count within income source	31	9	18	20
	% of total within income source	16.8	21.4	17.6	10.7
200 - 499	Count within income source	58	3	35	56
	% of total within income source	31.4	7.1	34.3	29.9
500 - 999	Count within income source	29	8	13	46
	% of total within income source	15.7	19.0	12.7	24.6
1000 – 1 499	Count within income source	9	0	1	16
	% of total within income source	4.9	0.0	1.0	8.6
1 500 – 1 999	Count within income source	3	1	4	6
	% of total within income source	1.6	2.4	3.9	3.2
2 000+	Count within income source	9	1	2	17
	% of total within income source	4.9	2.4	2.0	9.1
Total	Count within income source	185	42	102	187
	% of total within income source	100.0	100.0	100.0	100.0
	% of source within total income	62.4	9.4	28.2	100.0

Key: Crop sells - χ^2 = 126.632, df = 35, significant at P<0.001;
Livestock sells - χ^2 = 45.197, df = 30, significant at P<0.05;
Off-farm sources χ^2 = 29.792, df = 35, not significant at P<0.05; and
Overall incomes - χ^2 = 93.679, df = 35, significant at P<0.001

On top of the differences, the gap in cash incomes is very high as shown in Table 10, with a minimum of TAS 20 000.00 and maximum of TAS 6 660 000.00 per year.

Table 10: Household cash income averages (2005/06) in the study area

Description	Household cash income averages			
	Crop yield sells	Livestock sells	Off-farm sources	Total cash income
Respondents	186	42	102	187
Mean	463 806.45	308 964.28	382 284.31	739 237.96
Minimum	0.00	4 000.00	6 000.00	20 000.00
Maximum	5 700 000.00	2 200 000.00	3 654 000.00	6 660 000.00
Total sum	86 268 000.00	12 976 500.00	38 993 000.00	138 237 500.00
% of source within total income	62.4	9.4	28.2	100.0%

(Conversion ratio: TAS 1 280.00 is equivalent to 1 US Dollar)

Despite such a low minimum figure, only 12.9% leave below the national basic needs poverty line (2000/01 survey) set at TAS 262.00 (URT, 2005) against the national average of 36%. It is however indicated that, about (44.5%) earn less than TAS 557.76 per day. This amount is less than half a US dollar a day and probably explains why the local community value the communal lands as exemplified in the land use plans (IDC, 2005a, b, c, d, e, f).

The predominant inequalities in incomes is an indication of a low social level which is normally associated with a high level of dependence to the natural resources within their proximity as it will be discussed later. In such situations, the poor communities tend to consider the importance of their livelihoods thereby forgetting their heterogeneity maximising on the importance of the ecosystem services and livelihoods and therefore biodiversity conservation concurring with Ostrom (2001). It is also evidenced by La Ferrara (2002) that inequalities in income deceases the rural poor participation in user groups for resources in open access while it increases their participation in restricted resources uses.

In another study in India by Narain *et al*. (2005), on the assessment of rural community access to CPR indicated a 'U' shaped graph implying as for the poor, even the most rich are unlikely to participate. Ostrom (2001) suggest the functional and organization aspects of the community are more important when considering collective action. This builds on the importance of improved resources tenure in the development of the rural poor and therefore supported by other scholars such as Shyamsundar *et al.* (2005), Ostrom and Nagendra (2006) and Meinzen-Dick *et al.* (2006). Such an approach is therefore positive to conservation initiatives as the common pool resources becomes a common property resources administered by a common property regime.

The main livelihood activities were assessed for reasons of being undertaken (financial income, food production and other services) in a matrix scoring in the PRA exercise; the aggregate results (Table 11) indicated financial income to have scored the highest (16 points). However in priority ranking, food production ranked highest, perhaps; indicating different criteria may have different weights in the minds of the participants. .

Table 11: Results of the ranking of main uses of selected economic activities (main and Off-farm)

Activity	Crop farming	Business	Livestock husbandry	Building of houses	Beekeeping	Conservation of wildlife and forest resources	Total	Priority rating
Financial income	**	***	***	***	***	**	16	2
Food requirements	***	*	**	**	*	*	10	1
Other important benefits.	*	**	*	*	**	***	10	3

Key: *weight accredited equal to a score of one unit of importance

The findings are in congruency with the WRI *et al.* (2005) report, that food is an immediate concern of the rural community and accounts to major expenses of the poor household budget.

Conservation activities scored highest for provisioning of other services implying ecosystem services and goods matter in the local community livelihood capturing the contention by Timmer (1988) that community dependence and its contribution grows with time if appropriately managed. The findings build up on the importance of dependence to environmental services and goods in motivating conservation as evidenced by Ninan (2006) who concluded that, there is positive attitude to conservation if access and benefit are perceived from natural resources. Capturing such rare conservation opportunities is important to sustain conservation and enhance rural development thereby avoiding conflicting situations. Ostrom and Nagendra (2006) are also of the opinion that, sustainable management of the commons is possible when the local community maintain autonomy and their livelihood needs are satisfied.

4.1.4 The developed prediction model

Binary logistic multiple regression analysis was carried out to assess the significance of fifteen selected independent variables in predicting the dependent variable (adoption and operationalisation of the WMA concept) (Pallant, 2005; Hair *et al.*, 2005). Model chi-square (χ^2) test was used to fit the equation (Appendix 7).

4.1.4.1 Test for individual model parameters

Likelihood ratio (χ^2 difference) test was undertaken to test individual model parameters for relative importance in predicting the dependent to assist in refining the prediction

model. The results (Appendix 8) indicated formal education, future availability of resources, duration of stay and costs were non-significant at P<0.05. The variables were therefore dropped on the basis that, the likelihood ratio (Model χ^2) test indicated non-significance at P<0.05 and when tested for relative importance by use of likelihood ratio (χ^2 difference) test they were yet not significant at P<0.05 thus unrepresentative and can not be interpreted.

According to Hair *et al.* (2005) the likelihood ratio (χ^2 difference) test, provides the basis for justification to retain non-significant independent variables following results of model χ^2 test. Test result indicating non-significant χ^2 value, indicates the predictor can be regarded as zero (0) and therefore dropped from the model to have a more parsimonious model that works just as well.

4.1.4.2 Test for multicollinearity

Correlation analysis was undertaken and the correlation matrix for the independent variables (Appendix 9) indicated the highest bivariate correlation to be between common understanding and awareness (R=0.480). This value is well below 0.7 and therefore can be tolerated according to Tabachnick and Fidell (2006). Moreover its corresponding R^2 is 23.04% which is quite far from 100%.

4.1.4.3 Significance test

The final logistic multiple regression model consist of eleven (11) predictors as summarised in Table 12. The model is therefore, log odds (adoption and operationalisation of the WMA concept) = (β for constant x constant) + (β for age x age) +

(β for awareness x awareness) + (β resources degradation x resources degradation) + (β for dependence x dependence) + (β for user right x user right) + (β for trust x trust) + (β for common understanding x common understanding) + (β for immigration x immigration) + (β for existence of institution x existence of institution).

The model summary indicates a χ^2 value of 153.932 with 11 degrees of freedom, model parameters predicted correctly at 92.0% and significantly at P<0.001 indicating a good model fit (Hair *et al.*, 2005; Pallant, 2005). The -2LL is 63.226 indicating a high fit between the model data. Whereas the Negelkerke statistic (Nagelkerke R square) is 0.817 suggesting that the variables in the model accounts to about 81.7% of the observed variation in the dependent variable under study (Negelkerke, 1991). The Hosmer lemeshow goodness of fit test in a P-value of 0.981 denoting good model fit. The results (Table 12) show that, except for perception of having user right, the rest are positive to adoption and operationalisation of the WMA concept and there is no zero value for any of the logits (β).

Table 12: Binary logistic multiple regression results

Variables in the equation	β	S.E.	Wald	df	Sig.	Exp(β)
Existence of a local institution to manage	2.063	.772	7.136	1	.008**	7.868
Perception of existence of benefit sharing mechanism	2.143	.945	5.135	1	.023*	8.522
Common understanding	2.113	1.073	3.879	1	.049*	8.277
Trust to the existing local institution	2.297	.812	8.007	1	.005**	9.949
Dependence to the resources	2.426	.773	9.844	1	.002**	11.319
Awareness	2.056	.769	7.157	1	.007**	7.816
Perception of the ability to manage	1.726	.873	3.907	1	.048*	5.620
Perception of existence of immigration	1.768	.780	5.133	1	.023*	5.860
Perception of having a user right	-2.153	1.021	4.447	1	.035*	.116
Perception of existence of resources degradation	1.997	.809	6.092	1	.014*	7.368
Age of the respondent	.081	.031	6.976	1	.008**	1.085
Constant	-12.213	2.858	18.261	1	.000***	.000

Key:

(a) Model summary:

- Model Overall percentage = 92.0%
- \Model Chi-Square = 153.932 with 11 degrees of freedom
- -2 Log likelihood = 63.226
- Negelkerke R Square = 0.817
- Model significance = P<0.001

(b) Table features:

* = indicates significant at P<0.05 level of significance;
** = indicates significant at P<0.01 level of significance
*** = indicates significant at P<0.001 level of significance;
ns = indicates not significant at P<0.05 level of significance;
β = logistic coefficient, also called the logit coefficients or unstandardaized logit coefficients.
S.E. = standard error of the estimate;
Wald = Wald statistic is the squared ratio of the regression coefficient (β) of a particular independent variable to its standard error $\left(\beta/SE\right)^2$.
df = degrees of freedom;
Exp(β) = exponentiated coefficient also called the odds ratio indicates the effect size of individual independent variables in the model.

4.1.5 Interpretation of the prediction model results

In this interpretation success vindicates adoption and operationalisation of the WMA concept which is equated to one (1) in the prediction model equations. The odds ratio which is the natural logarithm raised to the power of the logit of a specified predictor is

used to easy interpretation. The results are then inferred to community level and all the predictors operate as a group none should be considered sufficient by itself.

4.1.5.1 Awareness of the WMA concept

The positive coefficient of awareness of the WMA concept (Table 12) implies that, an increase in one individual in the member villages in awareness of the WMA concept significantly ($P<0.01$) increases the probability of the community to adopt and operationalise the WMA concept by a factor of 7.816. The findings are in line with the argument by Walsh (2000) that, some villagers have undergone trainings workshops and seminars in natural resources enterprises, conservation education and study visits.

The results concur with suggestions by Kinyashi (2006) that, awareness increases perception of the world around and lead into attitude change and appropriate action. This has been exemplified by several scholars such as the findings by Jalan *et al*. (2003) that, awareness such as schooling and exposure to mass media significantly influenced demand for a better environmental quality. It follows therefore; effective community participation in wildlife management depends on increased awareness in knowledge from various disciplines and appreciation of natural laws and their appropriate application.

4.1.5.2 Perception of resources degradation

The results (Table 12) indicated resources degradation was significant ($P<0.05$) implying that an increase in one individual in the number villages perceiving the threat of degradation increases the probability of the community in adoption and operationalisation of the WMA concept by a factor of 7.368. Existence of resources degradation was further substantiated by the results of the PRA exercise which confirmed a change of land cover and resources extents over the past 30 years in their villages (Appendix 10).

The results concur with findings of several other scholarly studies indicating that, threats to the resources base such as degradation motivate the community (resources users) into a collective action instigating institutional changes to avoid social losses associated with open access situations as argued by Ostrom (1990, 1992, 1999). Therefore there is no direct link between resources degradation and depletion of resources. The MBOMIPA association for example has plans to diversify the WMA intervention in an attempt tot boost revenue sources necessary for appropriate actions to conter resources degradation and therefore concurring with Damm (2002) on investments to produce wildlife and restore habitats

4.1.5.3 Perception of immigration

The regression results (Table 12) show that, an increase of individuals in member villages perceiving existence of persons entering the village threatens the wellbeing of the resources which significantly ($P<0.05$) increases the community success by a factor of 5.860. The participating villages have undertaken land use planning as a measure of exercising control over the land resources as provided for in the Village Land Act number 5 of 1999 (URT, 1999). The District Lands, Natural Resources and Environment Officer (Hante, J. Personal communication, 2006) confirmed that some villages can now issue customary titles. Tungamalenga village is given as an example, has established a village land registry and issues customary land titles to its residents.

These findings concur with the contention by social scientists who argue that the local community institutional setup mediates the effects of human migrations (Varughese and Ostrom, 2001) thereby enhancing conservation measures to avoid social losses.

4.1.5.4 Ability to manage

MBOMIPA association has proved its ability to manage the resources as indicated by majority of the respondents. An increase of one individual in the number villages perceiving themselves and/or their villages ability to manage the WMA significantly ($P<0.05$) increases the probability of the community in adoption and operationalisation of the WMA concept by a factor of 5.620 (Table 12).

The approach propound the argument by Mayaka (2002) who is of the opinion that, success of common property regimes requires grassroots institutions that are congruent with wildlife sustainable use, but also contribute significantly to local development. The results also support several other empirical studies of for example Ostrom (1990, 1992, 1999) and Andersson and Agrawal (2006) on the commons suggesting that, local communities surpasses and probably is a better alternative to state and private when considering sustainable management of the common property resources.

4.1.5.5 User right to wildlife resources

Despite the local community access to a wildlife hunting quota on annual basis, the assessment on its effectiveness in influencing success in the adoption and operationalisation of the WMA concept turned negative. The negative results (Table 12) show that, an increase in one individual in the member villages perceiving a denied access to use right of the wildlife resources in the WMA significantly ($P<0.05$) reduces the probability of the community adoption and operationalisation of the WMA concept by a factor of 0.116.

The study further found the extended user right (mainly hunting quota) to be limited, lending itself to suspicion over the government intention in regard to devolution of user

right. The local communities are not sure of their entitlement as pioneers in the operationlisation of the WMA regulations. Fischer *et al.* (2005) is of the opinion that awareness on the mechanism is more important that the package itself. The results are further supported by findings of Nelson (2006) who in a literature survey on community-based projects concluded that, the user right offered by WMA is weak. Nelsons (2006) argument supports the opinion of the WRI *et al.* (2005) that when local communities are charged with management they are entrusted with duties that are circumscribed in scope while the state retain the lucrative right to assess wildlife hunting fees.

4.1.5.6 Existence of an institution to manage

An increase in the one individual of the member villages perception of having an institution to manage their WMA significantly ($P<0.01$) increases the community probability to adopt and operationalise the WMA concept by a factor of 7.868. Formation of an institution is a demonstration of collective action. According to Beard (2006), the feeling of future interdependence motivates collective action.

The study concurs with Ostrom (1990) findings of existence of institutions that manage common pool resources thereby turning it into common property resources. It is argued that, institutions arise when users operating independently generate scarce resources units of which the total net benefit is lower than as if the user coordinated their strategies and efforts while the resources become more important. Local institutions are renowned to have a moderating effect on the relationship between socio-economic inequalities and ecological sustainability (Andersson and Agrawal, 2006). Such developments facilitate effective monitoring important in ensuring rule compliance by users and protection from poaching by outsiders (Ghate and Nagendra, 2005; Ostrom and Nagendra, 2006).

4.1.5.7 Trust to the existing local institution

An increase in one individuals in the members villages who trust the local institution for wildlife management significantly (P<0.01) increases the community probability to adopt and operationalise the WMA concept by a factor of 9.949 (Table 12). The accorded trust demonstrates the value attached to the annual financial contribution to the communal village government budget (wildlife revenue account for approximated two thirds) of the communal budget) (Walsh, 2000). Other benefits include infrastructure development brought through wildlife management initiatives supervised by the existing institution (MBOMIPA).

The results agree with findings of several researchers (Ostrom, 1992; Jones, 2004; Hill and O'hara, 2005) who assert that, good reputation builds trust, a form of social capital and fundamental assessment of entering cooperation. Trust grows, enable people to put aside differences in asset endowment and allow the creation of roles important for collective action.

4.1.5.8 Dependence on the wildlife resources

Dependence is defined by the fraction of the household income derived from the resources as argued by Narain *et al.* (2005). Existence of a local institution to manage the common property resources and the demonstrated trust signifies the importance of the resources to the community. The results in Table 12 indicate the wildlife resources are important to livelihoods thus significantly (P<0.01) favouring self-organization. The results imply that, an increase in one individual in the member villages who perceives the importance of the resources to livelihood needs increases the community probability in the adoption and operationalisation of the WMA concept by a factor of 11.319.

The results are supported by earlier findings of for example the study in Kenya by Mburu (2002) which revealed that, dependence on wildlife resources, in terms of derived benefits, is an important incentive to landowners' participation in conservation. Other findings on the motivation to conservation resulting from felt dependence indicated that, communities can initiate and organize to avoid adverse outcomes as resources becomes scarce and more important to their livelihood strategies (Ostrom, 1999; Ninan, 2006; Beard, 2006).

4.1.5.9 Benefit sharing mechanism

The positive results indicate a demonstrated appreciation of the wildlife contribution to the village communal budgets (two thirds) which indirectly relieves the household burden on contributions to village social economic development initiatives. The results in Table 12 indicate that an increase in an individual in perceiving existence of a benefit sharing mechanism significantly ($P<0.05$) increases the community probability to adopt and operationalise the WMA concept by a factor of 8.522.

The results of this study compare favorably to the findings of for example, Fischer *et al.* (2005) and Nelson (2006) who consider the incentive package to be important and specifically awareness of the mechanism used. Awareness of existence of a benefit sharing mechanism therefore substantially influences attitudes and actions to effect sustainable resources management However, existing incentive package is not yet legally supported lending it to be delicate and may affect the adoption process.

4.1.5.10 Age of the respondent

Ageing of individuals in the member villages is associated with wisdom and experience of the environment and therefore an increase in one year from the mean age of 43 years significant ($P<0.01$) increases the probability of the community to adopt and

operationalise the WMA concept by a facto of 1.085 (Table 12). It is however noted that, despite the importance of age in explaining adoption and operationalisation of the WMA concept, the effect of awareness on conservation issues (indicated by Welsh, 2000 and DFID, 2003) to the youth matters in the youth decision making. It implies that although majority of the respondents (73,8%) are in their teen ages (21-49 years) with very few (8.6%) having resided in their villages of residence for 50 years and above (Table 13), the response was positive (Table 12).

The results support earlier findings indicating that, older generations having gained experience on the importance of environmental services and goods in meeting their basic livelihood needs including subsistence and food security have better conservation ethics and attitudes (Kajembe and Mwihomeke, 2001). They also support findings by Jalan *et al.* (2003) that increased awareness enhances conservation demand and decision making.

4.1.5.11 Common understanding

Common vision over the wildlife resources enhances collective action. The results in Table 12 indicate that common understanding is significant ($P<0.05$) indicating that an increase of an individual in the member villages perceiving a common vision with the rest of the group increases the probability for the community in adoption and operationalisation of the WMA concept by a factor of 8.277. The results are supported by Beard (2006), findings that, community cohesion, stable social relationships and adherence to social hierarchy are basic tenets for initiation of collective action.

4.1.6 Decision on the hypothesis tested

The results of the regression coefficients (β) (Table 12) indicate a non-zero value ($\beta \neq 0$) implying that socioeconomic and institutional factors have a significant influence on

adoption and operationalisation of the WMA concept. Model χ^2 test results was found to be significant (P<0.001) and predicted correctly at 92%. Accordingly, it implies that there is a difference between the null model (without consideration of the predictors) and the model of interest (with consideration of the predictors) and therefore the predictors matter in predicting the dependent variable (Pallant, 2005; Hair *et al.*, 2005). Based on these observations, the null hypothesis is rejected in favour of the alternative hypothesis at 5% level of significance. The model can therefore be used to predict adoption and operationalisation of the WMA concept at 92% confidence limits. However, as suggested by Babbie (2007), it is important to repeat the study to fine tune the results in an attempt to reduce inaccuracies and overgeneralization.

4.2 Status, constraints and opportunities in implementing the WMA concept

The WMA and MBOMIPA association is now officially gazetted by the government notice (GN) No. 57 of 9 March 2007 (URT, 2007a). This section provides the current legal framework, opportunities and constraints facing the management of the Pawaga-Idodi pWMA.

4.2.1 Legal framework

Despite the lack of a full wildlife resources user right, authorization of the CBO to manage wildlife on village lands is by itself an incentive to conservation as argued by Emerton (2001). The AA can now apply for a wildlife resources user-right with reference to the approved resources management zone plan (MBOMIPA, 2006b). Accesses to other resources such as trees, bees and fishes require adherence to the respective written laws (MNRT, 2005). On the issue of land resources, the Local Government (District Authorities) Act No. 7 of 1982 gives legal powers to the village assembly (VA) to devise

and implement necessary bye-laws (URT, 1982). The Joint Village Land Management Committee created by the Village Land Act of 1999 and Village Land Regulations of 2002 (WAMM, 2002) is empowered to manage the joint land while abiding to the Local government (District Authorities) Act No. 7 of 1982.

The approach by URT (1982) concurs with scholarly advice by Ostrom and Nagendra (2006) suggesting that, rules made by the users enhances the chances that, the users will follow and monitor others. In the process it enhances social gains while reducing organization costs as trust to one another is improved (Hill and O'Hara (2005).

4.2.2 Existing opportunities

The existence of policy and legal framework provides an opportunity to factor in the wildlife aspect in rural development strategies in an attempt to achieve equilibrium in the economic equation of wildlife suggested by Emerton (2001). The specific opportunities are summarised in this section.

4.2.2.1 Existence of resources values of national and international significance

The geographical location of the area is a predisposing factor for other resources significances. According to MBOMIPA (2006b) resources significances include but not limited to:

- A rich drainage network system making the area a dry season refuge to wildlife from the adjacent PAs that are significant at national and international level.
- Beautiful vegetation mosaic rich in diverse and natural scenic beauties which provide scientific and recreational amenities at national and international level.

- Diversity of a wide range of invertebrates (particularly insects and spiders), fishes, amphibians, reptiles, birds and mammals of both national and international significance.
- Southernmost recorded internationally renowned range of the Sand boa (*Eryx colubrinus*) and an extension of the range for the Turner's fat-toed gecko (*Pachydactylus turneri)* placing value to naturalists and the WMA on the world map.
- Variety of cultures, traditions and 'ngomas', a tourist attraction important at national and international level.

The pWMA is therefore well placed to capture the growing tourist industry. An analysis of the tourist visits numbers and days spent in the Ruaha national park (RNP) for a period of ten years (1996 to 2005) indicate a progressive upward trend despite some insignificant fluctuations in a few years. Fig. 4 shows the visitors trend graph in the ten year period (1996 to2005).

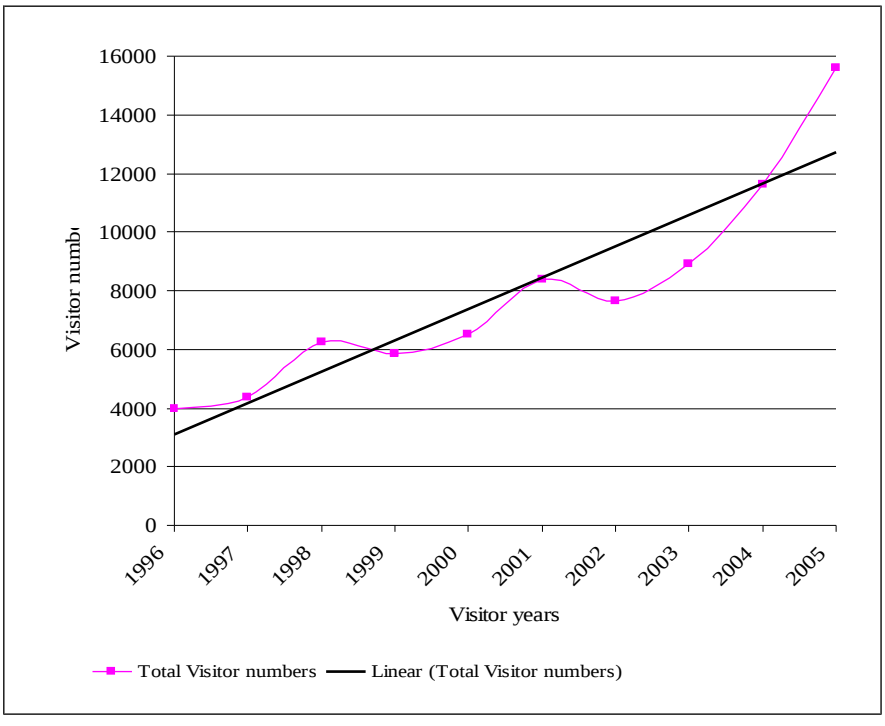

Figure 4: Visitor trends in Ruaha national park over 10 years period (1996 to 2005)

Source: Analysed from Ruaha national park visitor data (RNP, 2006)

The available data indicate that in 1996, the total number of visitors was 3968 while in 2005 they were 15 600 as shown in Fig. 5 (RNP, 2006) which is a change of 393.15%. This growth translates into an annual average of 29.32% with an increasing trend in the last four years.

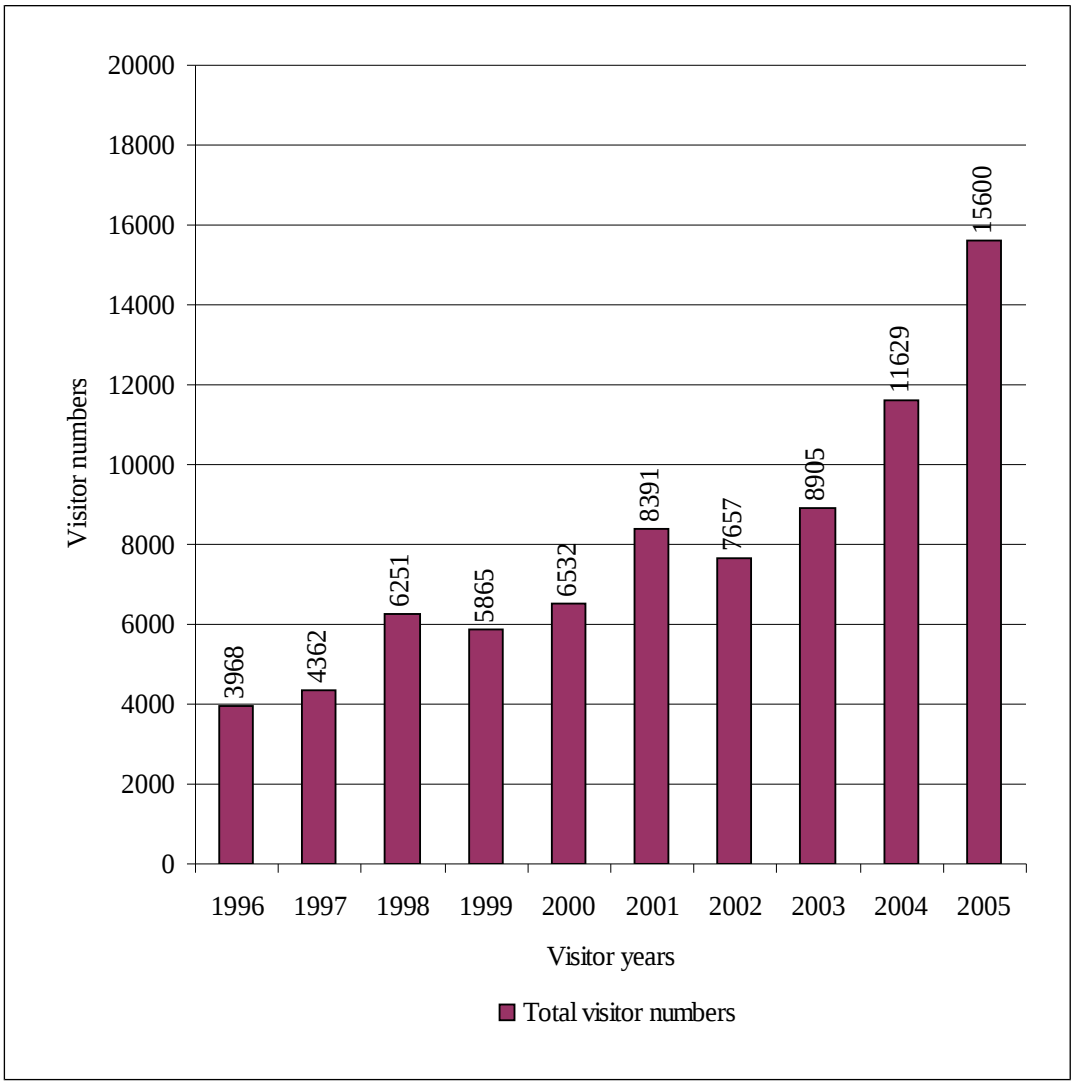

Figure 5: Visitor numbers in Ruaha national park over 10 years period (1996 to 2005)

Source: Analysed from Ruaha national park visitor data (RNP, 2006)

The upward trend in the number of visitors coforms with a national survey conducted in 2001 to 2005 that indicated a growth in the number of international visitors with localised

variations (URT, 2007b). The national survey indicated that, visitor numbers increased from 501 669 recorded in 2000 to 612 754 recorded in 2005 (22.14% change). Consequently, the tourism sector contribution to total exports of goods and services increased from US $ 615 million to US $ 824 million (33.98%) in the period of 2001 to 2005 respectively (URT, 2007b).

A further analysis of the visitors' citizenship, records in RNP visitor statistics indicates that, in 1996 non-citizen visitors accounted for 56% while 44% were citizen visitors. However, by 2005, non-citizen visitors reached 74% of all visitors in the RNP (Fig.6).

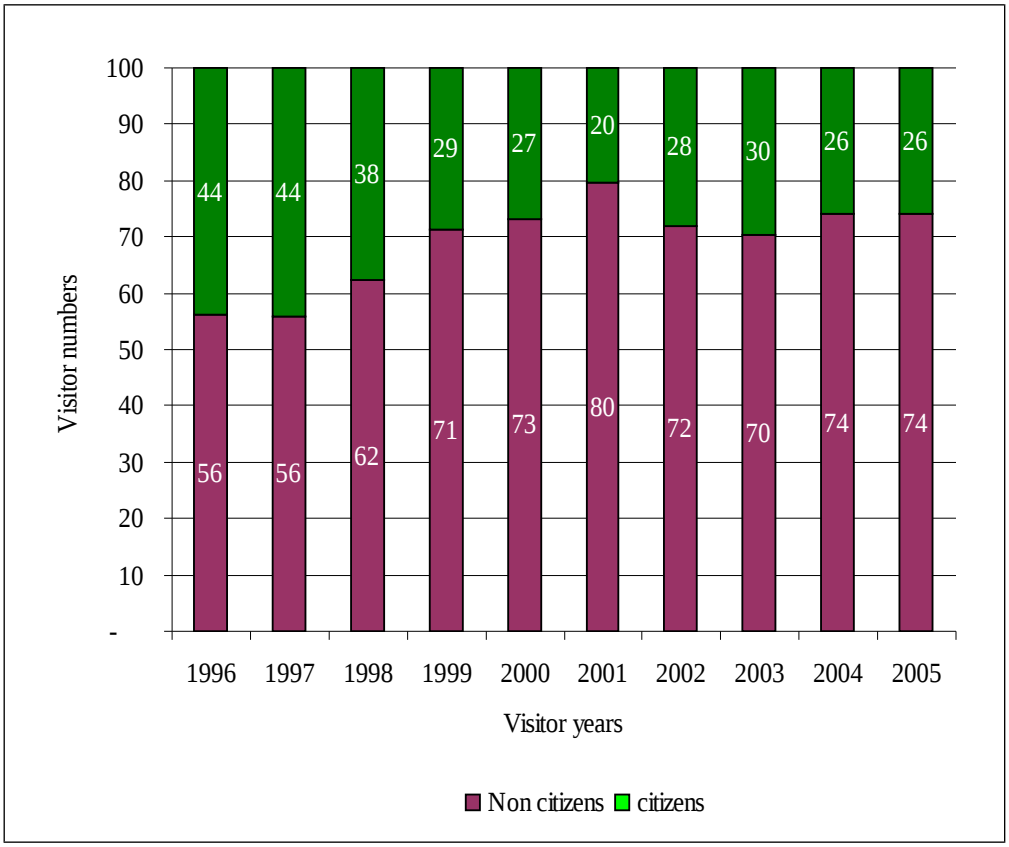

Figure 6: Percent of non-citizen against citizen visitors in Ruaha national park over 10 years period (1996 to 2005)

Source: Analysed from Ruaha National Park visitor data (RNP, 2006)

The visitor day/night spent in the RNP indicate a steady rise from 2494 days/nights spent in 1996 to 24 893 days nights spent in 2005, approximately 1000% chsnge in the ten years (Fig. 7). Statistics indicate a higher percent (40%) in average annual increases for non-citizens against citizen visitors (35%).

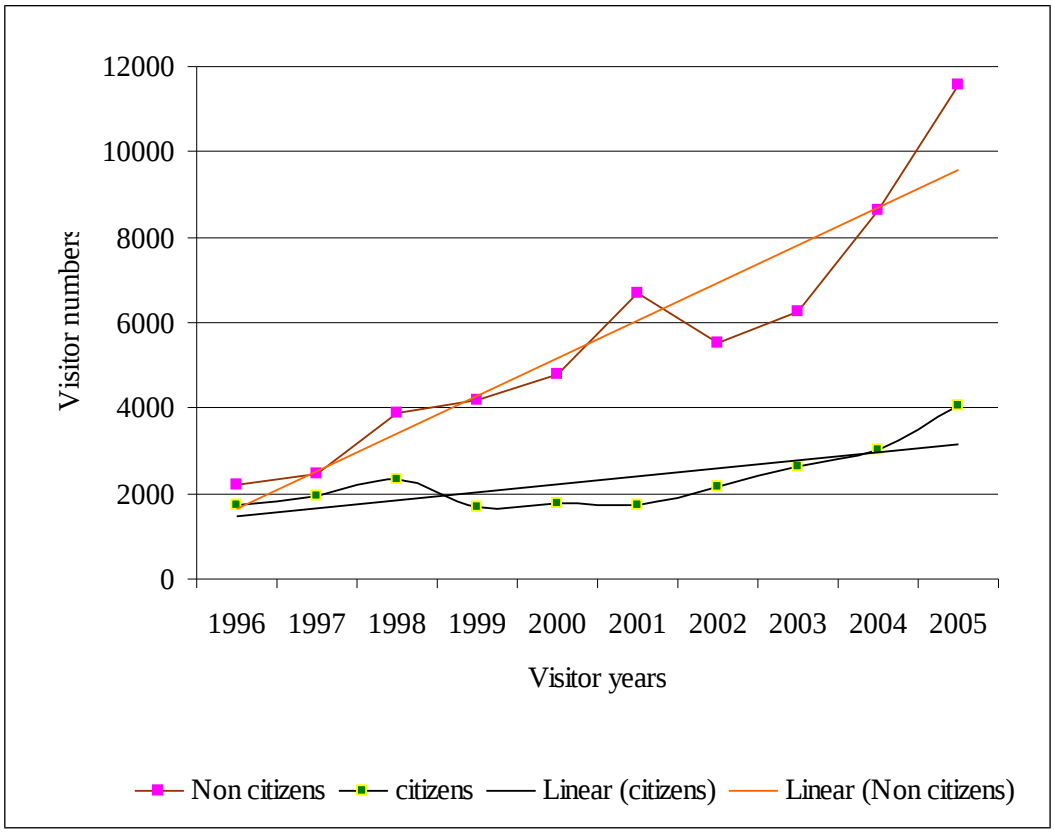

Figure 7: Trend in visitor days/nights spent in RNP over 10 years period (1996 to 2005)

Source: Analysed from Ruaha national park visitor data (RNP, 2006)

Despite the higher increases in number of visitor days spent by non-citizens, the average stay per visitor is approximately the same for citizens and non-citizens. In both cases, despite annual fluctuations, days spent per visit rose from an average of 0.6 days in 1996 to approximately 1.6 days per visit in 2005 (Fig. 8).

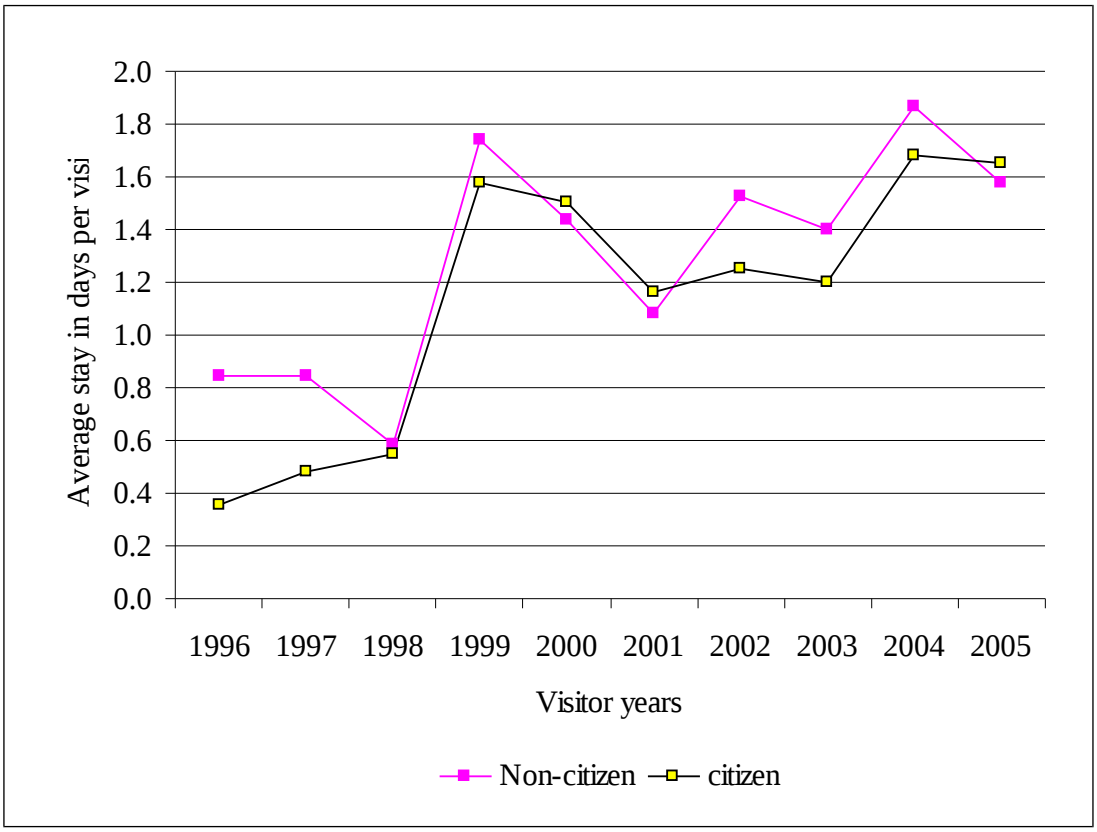

Figure 8: Average stay per visit by citizenship over 10 years period (1996 to 2005)

Source: Analysed from Ruaha national park visitor data (RNP, 2006)

The knowledge of these opportunities by the MBOMIPA association perhaps prompted their adoption of a resources management zone plan emphasizing on non consumptive tourism such as photography, cultural and ecotourism as indicated in MBOMIPA (2006a, b).

The existing resources significance indicate that, perhaps wildlife management is the best option and may be a competitive form of land use in the Pawaga-Idodi rangelands Empirical researches of for example WRI *et al.* (2005) revealed that, agriculture is not necessarily the best land use in areas significant for wildlife management. It is argued that, given the appropriate tenure, wildlife management may prove to have better returns (WRI *et al.,* 2005) when adopted in areas of high wildlife based significance. Awareness

of these facts by the community enhances adoption of conservation as it is human nature to strive for profit maximisation.

4.2.2.2 Improved resources tenure

The completion and of village land use planning (IDC, 2005a, b, c, d, e, f) in accordance to the requirements of the Village Land Act No. 5 of 1999 (URT, 1999) and their subsequent approval has elevated the VA land tenure rights. This and the increased tenure over wildlife resources (URT, 2007a) has substantially increased tenure security which is an incentive to resources conservation.

These findings concurs with Mburu (2002) argument that, secure land ownership motivates land owners participation in wildlife conservation. The state of tenure security therefore matter on the way resources are used, motivating or de-motivating conservation initiatives. Evidence indicates secure land tenure rights is associated with cooperation among land owners in access to resources (BurnSilver and Mwangi, 2007).

4.2.3 Constraints

Constraints here are identified as all situations that limit, restrict or inhibit in any manner the appropriate operationalisation of the WMA concept in the Pawaga-Idodi pWMA. Constraints identified include zone plan, revenue, benefit sharing and power struggle.

4.2.3.1 Constrained resources management zone plan

The resources management zone plan is contained by the WMA regulations pilot phase requirements. The two noted constraints include:

(a) a reduction of some of the resource significant areas originally described as ‘Zone 5 – Specially conserved Village Land’. Zone 5 was a collection of village lands declared

by fourteen (14) of the twenty one (21) member villages to be specially conserved lands for non-consumptive tourism (MBOMIPA, 2006a).

(b) removal of two villages (Kitisi and Magombwe) to abide to the pilot phase as contained in the fourth schedule of the WMA regulations (MNRT, 2005).

This study revealed that, perhaps a plausible explanation is a break in communication between the two major actors (the local community and the government). The community may have misinterpreted the government query and decided to remove the questioned zone and villages as if that was the cheapest approach for their application to be approved. It was not easy to get a straight forward answer to the response but it perhaps indicates the government and the community are not in the same footing in the understanding of the intentions of the of the WMA concept concurring with Jütting *et al.* (2005). Further suggestions indicate that; empowerment is a key factor for effective participation (Kinyashi, 2006; Fetterman, 2005; Jütting *et al.*, 2005). This study is of the opinion that, strengthening the empowerment process will increase the capacity of the local community to understand their stake in new innovations. This is more important when externally sponsored institutions like the AAs are to be formed to facilitate implementation as suggested by Jütting *et al.* (2005).

4.2.3.2 Inadequate revenue and revenues sources

Despite stability in the hunting quota over several years, the source is inadequate to facilitate conservation activities in the Pawaga-Idodi pWMA. The seemingly increases in revenues from TAS 22 012 000.00 to 38 994 124.00 in the 2002/03 and 2005/06 seasons respectively is accounted for by increases in disposal prices and perhaps the reduced value of the Tanzania shilling (Fig.9).

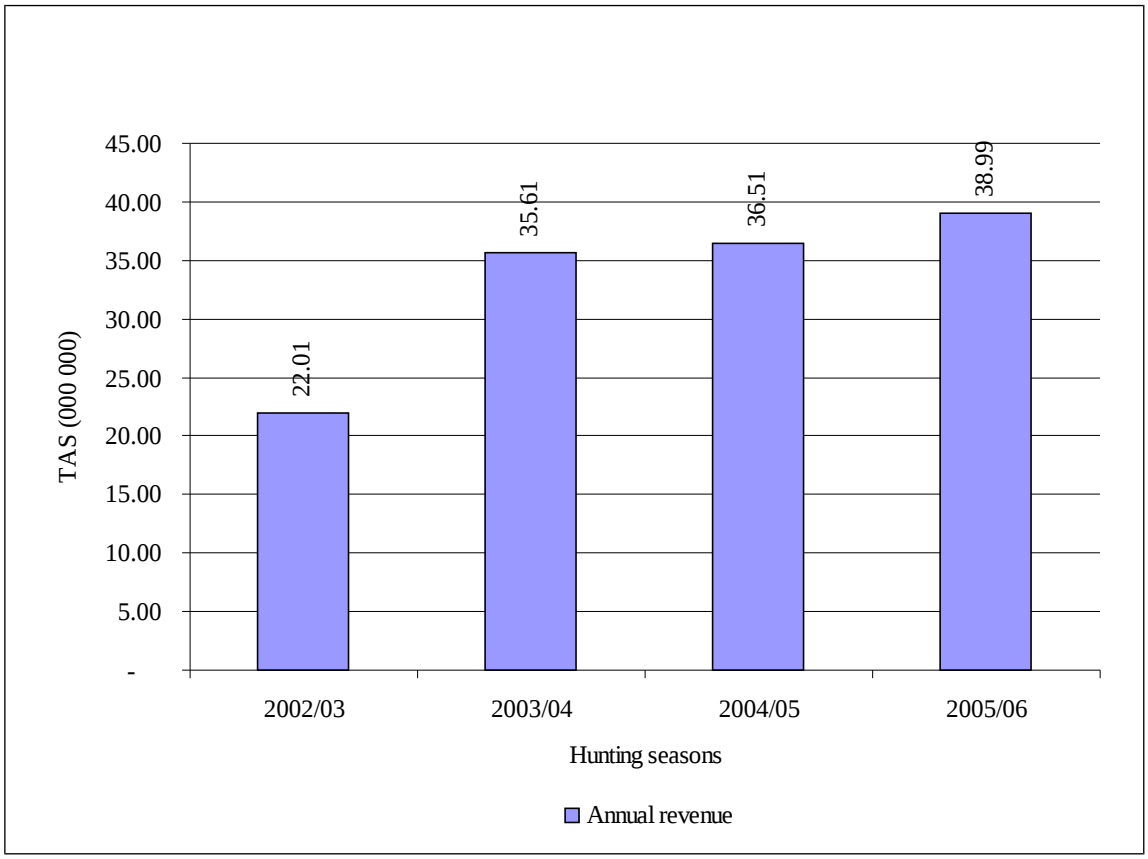

Figure 9: Trends in hunting quota revenues for 1992/03 to 2005/06 hunting seasons

Source: Analysis from MBOMIPA revenue data

Walsh (2000) reported surveillance activity as the largest single expenditure item. This is also confirmed by the association secretary who indicated that, despite of support from WCS-RRP and WD, TAS 1 200 000.00 from the association accounts is spent to facilitate surveillance activities alone (Kisangaji, J. personal communication, 2006).

The findings concur with the argument by Mabugu and Mugoya (2001) that, AAs will be financially constrained in the initial years and external support is inevitable. In such situations, adherence to formal processes is difficult and experiences show that, communities contest and transform them to suit their interests (Gibson, 1999) which may dent the WMA concept.

Forceful entrepreneurial measures are necessary if the concept is to survive and deliver to expectations. However, care should be taken to ensure appropriate economic analysis is undertaken to understand the economic and ecological tradeoffs involved. Sanchirico and Mumby (2007) argue that, a bio-economic model factoring in, the biological resources, the inherent economics, geophysical processes and ecological functions gives an insight on the management costs and benefits at various levels.

4.2.3.3 Unclear benefit sharing scheme

Despite that the internal benefit sharing system in WMA is explicit in the WMA regulations (MNRT, 2005), it is not clear how such benefits will reach the AA. Realising this, the Director of Wildlife continues to extend usufruct rights through a hunting quota to the association which is also permitted to utilize all the revenue to facilitate its management obligations. Although this approach has succeeded to lure political support and commitment by the community, lack of legal support weakens it.

Expert advice of for example Campbell *et al.* (2007) from experience over a long examination of a CBC project in Costa Rica, concluded that a success in CBC is very much based on the durability and flexibility of the incentive, legal and administrative structures. Furthermore, Fischer *et al.* (2005) and Nelson (2006) are of the opinion that, community awareness on the modality and size of the benefit and cost sharing is considered more important than the share itself.

In a survey on benefits and costs sharing in Tanzania natural resources sector, Kessy *et al.* (2005), are of the opinion that, the impact of the role played by the national treasury in

collection and allocation of financial resources are among the key bottlenecks in the success of collaborative natural resources management in the country. As for Fischer *et al.* (2005) and Campbell *et al.* (2007), they consider information on the inherent tradeoffs and existing benefits will input into drawing consensus agreements between the government and prospective users. The action is expected to smoothen and re-orient implementation in the natural resources sub-sectors.

4.2.3.4 Power struggle at village level

There exist persistent complaints by the village chairpersons that, their village representative in the AA do not feedback association issues to their village councils (VC) as expected. The findings confirm earlier concern by Walsh (2000) and DFID (2003) on noted conflicts between Village Natural Resources Committees (VNRCs), VCs and Village Game Scouts (VGSs) mainly on roles and resources. Nelson *et al.* (2006) consider the situation difficult and needing reconsideration on the institutional design to increase downward accountability.

This study considers that, in a WMA the AA in Pawaga-Idodi manages resources beyond village boundaries but is required to report to the VC. It is also observed that, the Village Land Act defines the village boundary and institute the VC as the trustee on behalf of the VA which has overall mandate over village land. On top of that, the Village Land Regulations 2002 (WAMM, 2002) elaborate on the role of a Joint Land Management Committee, formed to manage joint village land use decisions. This committee is not acknowledged by the WMA regulations as for example the VNRC and the AA which are all defined by the WPT.

Findings from this study show that, the Village Land Regulations of 2002 (WAMM, 2002) requires several villages planning for a joint land use management to draw a memorandum in which the joint management strategies are streamlined. A Joint Village Land Committee is formed to oversee the interest of the respective villages by meeting once in every three months while the strategies are reviewed every three years. In practice for example in the Pawaga-Idodi pWMA, such a committee does not exist. For land disputes management, the legal mechanism is established from village to court of appeal, with the village and ward councils assuming the role of land courts in that respect (URT, 2002b). Invariably the WMA regulations are silent on accountability when management is beyond single village boundaries.

This is probably the locus of the problem and its resolution may probably require consideration of the political establishment of WMA at village and inter-village levels. Best results may be expected when the inter-village committee like the AA is construed with the Local Government (District Authorities) Act of 1982. Expectation for participating villages to lease the WMA to the AA is not effected legally putting the WMA at stake and the AA leaders on crossroads.

Moreover, establishment of a community-based wildlife management is a political process and such scuffles are expected especially when the process is harried up for example in order to match implementation to strict timeframes. Expert advice from empirical studies indicate that, enough time is required for observations, process flexibility and space for adaptations to suit the desired objectives (Campbell *et al.*, 2007; Nelson, 2007). Space in time allows a built up on accountability which Ribot (2002) consider central to any decentralization process as it addresses the heterogeneity dilemma in community.

4.3 Functioning and appropriateness of the existing local institutional framework

The functioning and appropriateness of the existing institution was assessed by examining the legal framework, and the types and roles of the existing institutions. Both aspects were rated in respect to adoption and implementation of the WMA concept.

4.3.1 Types and roles of local institutions in management of wildlife resources

Both informal and formal institutions for natural resources management existed with the informal complementing the formal institutions.

4.3.1.1 Internally sponsored institutions

The council of elders was found to be the main internally sponsored institution reported by majority of the respondents as the traditional system particularly concerned with management of areas or resources considered to be sacred. The findings concur with the contentions by Berkes *et al.* (2003) and Kajembe *et al.* (2004) that, the colonial and national administration has marginalized the legitimacy of the traditional institutions but has not been able to replace them. In some locations these institutions are more active than the formal institutions. Despite these facts, an assessment on age and duration of stay indicated that, majority (73.8%) are in their teen ages (21 to 49 years) with only 8.6% having stayed in their respective villages for more than 50 years (Table 13). Such situations reduce the strength of the informal institutions. It is argued that, apart from the prerequisite cultural background, robust informal institutions are generated over time and space (Appeleton *et al.*, 2000; Ostrom, 1992; Berkes *et al.*, 2003).

Table 13: A categorical summary of age and duration of stay

Group category (years)	Distribution of respondents by group categories			
	Count and percent in age category		Count and percent in duration of stay category	
	Count	Percent	Count	Percent

0-10	-		16	8.6
11-20	-		20	10.7
21-30	32	17.1	47	25.1
31-49	106	56.7	88	47.1
50+	49	26.2	16	8.6
Total	187	100	187	100

On ethnicity, it is shown (Table 14) that, 17 tribes were among those who responded in the formal survey with the Hehe tribe accounting for 56.7% of the total respondents. Despite this cultural heterogeneity, the council of elders is responsible in mediating conflicts over the vision and utilization of resources. It is particularly stronger over resources outside the area set aside for conservation (forest reserve and/or WMA). When more than one ethnic group is concerned in a conflict the elders of the two groups meet to compromise on the resolution.

Table 14: Ethnic composition of the respondents

Ethnic group	Count	Percent
Hehe	106	56.7
Bena	30	16.0
Gogo	15	8.0
Sangu	13	7.0
Nyamwezi	5	2.7
Kinga	4	2.1
Sukuma	2	1.1
Maasai	2	1.1
Kimbu	2	1.1
Muha	1	0.5
Mwanji	1	0.5
Pare	1	0.5
Rangi	1	0.5
Kuyu	1	0.5
Kablu	1	0.5
Dengereko	1	0.5
Sagala	1	0.5
Total	187	100.0

It is noted that, the Hehe culture is predominant and amidst such a heterogeneous ethnicity and cultural background, some important cultures for natural resources management still exist (Table 15). For example; a python is considered a sacred snake and a water guarder.

Pythons are therefore not killed without a major reason. This study however found that, pythons are currently being killed by livestock keepers in revenge to livestock killed by the snake in search of food.

Culturally important hills serve as high biodiversity areas and entry is regulated by the elders. The spiritual believes and sacred controls deter the local community from tempering with sacred places. These findings concur with the contention by Gombya-Ssembajjwe (1997), cited by Banana *et al.* (2004) that, cultural norms and rules that emphasise spiritual non-consumptive effects prevent overuse of forest resources and ensure conservation of biological diversity.

Table 15: Important cultures in conservation

S/N	Culture	Description	Remarks
1	Restrict killing of big snakes	Pythons are not killed and for example at Nyamatosi there is a snake which guards the water source.	If the snake is killed, the water will dry out. This serves to preserve water sources
2	Spiritual/ worship/ Ritual activities	(i) Several places used by the elders are mentioned including, mountains (Kigali, Kitanewa, Kinyapili-Chambulila, Idelemule, Kipungagulu, Changusi). caves (Nolangwa) and other places where traditional rituals are conducted.	No one is allowed to enter these areas without the permission of the elders and therefore serve biodiversity conservation interests.
		(ii) Ritual activities for requesting mercy from the spirits of the dead conducted at mountain Changusu. It is believed that, a group of the Changusi clan in their annual rituals were lost in the forest of that mountain and never came back.	Cattle, goat, and sheep are used for the ritual. The residents believe rain comes after such rituals which are conducted in years when rain has delayed.

4.3.1.2 Externally sponsored institutions

Unlike internally sponsored institutions, twelve were found as summarized in Appendix 11. MBOMIPA was the main institution dealing with wildlife management with a total of 210 village scouts (10 per village) who work under the village natural resources committees. The MBOMIPA council draw three members democratically nominated by

the VAs to form the association leadership (MBOMIPA, 2001). In this setting the village representatives are supposed to feedback the VCs and consequently the VAs who have mandate over village land and resources; invariably this is not implemented as discussed above (4.2.3.4). This may amount to a system suffocation and kill the image of the association both internally and externally especially now when the wildlife contribution to village communal budget is dropping (example of the 2006/07 hunting season – drop from approximately TAS 1 000 000.00 to 600 000.00).

This study considers this delicate situation to what Nelson *et al.* (2006) and Nelson (2006) consider weakening of the downward accountability in the WMA concept. It is perhaps important for MBOMIPA association and the government to consider the matter. Evident from field researches have indicted that, when conflicts are solved immediately as they occur, the organization (here in AA) stands a higher chances for genuine empowerment and increases effectiveness (Hall, 2002).

In a further analysis on the role of the association, findings (Table 16) indicated that, majority of the respondents (87.0%) consider anti-poaching to be the main activity of the association followed by administration of the wildlife revenues (46.2%). Surveillance activities are largely supported by the government (Wildlife Division – anti-poaching unit Iringa and UGR, and RNP) in joint patrols and WCS-RRP on logistic support. The association VGS maintain a continuous surveillance in a two week shift round accompanied with IDC Game Scouts with government scouts join in for joint patrols or reinforcement. Consolidation of actual cost of project activities is therefore not possible under such circumstances delimiting a measure of cost-effectiveness of the WMA activities. The findings contradict scholarly advice that, success in CPR depends largely on the users' perception of the efficacy of their actions (Hill and O'hara, 2005).

Table 16: Priority distribution of the MBOMIPA activities

MBOMIPA activities	Priority one	number	Priority two	number	Priority three	number
	Count	Percent	Count	Percent	Count	Percent
Arresting poachers (water, forest, wildlife)	10	5.9	17	10.9	3	2.8
Conducting CBO meetings	NA	NA	1	0.6	1	0.9
Anti-poaching and protecting of natural resources and environment.	147	87	46	29.5	40	36.7
Administration of wildlife revenues	10	5.9	72	46.2	38	34.9
Hunting quota management	1	0.6	12	7.7	21	19.3
Conservation education	1	0.6	8	5.1	6	5.5
Total within priority	169	100	156	100	109	100
Percent of all respondents	187	90	187	83	187	58

4.3.2 The appropriateness of the existing legal framework

Analysis of the legal aspects in tenure and decision making, access to extension services, membership and leadership was undertaken to explain the appropriateness of existing legal framework in the operationalisation of the WMA concept in the management of the Pawaga-Idodi pWMA.

4.3.2.1 Legal aspects on resources tenure and decision making

The Joint Agreement between the member villages and the constitution of MBOMIPA association mandates the MBOMIPA association leaders to manage the pWMA. The WMA regulations put it right that the managing institution (AA) reports to the VC, the legal authority as per Local Government (District Authorities) Act No. 7 of 1982. However the circumstances by which the AA reports to the individual VCs are not clearly stipulated in the WMA regulations and guidelines. It is also not clearly indicated, on the issue of who is asked to report to the VC, can it be the village representatives or any of the three statutory committees of the AA?

This study consider the AA and the VC in practice are two different entities each claiming supremacy (one a manager of wildlife and the other a land manager) while the WMA regulations consider the VC supreme to AA. It is a fact that AA is formed by the member villages (in the case of Pawaga-Idodi pWMA) and therefore its area of operation exceeds administrative boundary of any individual village member. This situates the AA somewhere above village level requiring a land manager at its level to ensure accountability. Perhaps the joint land management committee could take the position but its practicability is yet to be explored.

In such a political setup, conflicts in decision making are eminent and perhaps this is what Nelson *et al.* (2006) consider internal disagreements in the operationalisation of the WMA concept in Tanzania with specific mention to Burunge pilot WMA. This study considers that, disregard of the landowner role (in this case VA) in all aspects of resources tenure rights reduces accountability concurring with Nelson (2006) and Nelson *et al.* (2006). Empirical studies have shown that, reduced common vision (Beard, 2006) and reduced trust to one another (Jones, 2004) increases organization costs as the users contest and modify the formal processes to suit their interests as suggested by Gibson (1999). Kajembe *et al.* (2004) argue that, in some instances formal institutions have been rendered ineffective. It is perhaps important to reconsider the political setup in a WMA to enhance collective action and accountability.

4.3.2.2 Access to extension and advisory services

Institutionalizing the advisory services into a district committee ensures a multidisplinary approach in the operationalisation process. This concurs with scholarly findings (Williamson, 2003; Ostrom and Nagendra, 2006) that multisectoral approach is important in success of a common property management. However, the current system does not

allow the District Coordinator's (District Game Officer - DGO) to actively participate in decision making other than in the normal facilitation and monitoring as the main government role URT (1998; MNRT, 2003b). The WMA regulations realise the importance of monitoring in enhancing success of the WMA innovation, however despite the existence of WMA monitoring plan (MNRT, 2004), a tailored WMA extension package to operationalise it does not exist. An extension package specifies the delivery of the monitoring and evaluation activity at various levels and the reporting mechanism.

Blom *et al.* (2004) argue that, knowledge, particularly on human-wildlife relations, is important in attempts to sustain wildlife populations while enhancing rural development. Others for example, Noss (2004) suggests for information networking whereas; Luoga *et al.* (2005) suggest the need for government agencies to acknowledge traditional knowledge; Berkes (2006) suggests that, the use of a multi-lens approach with the community as partners may enhance integration of conservation and rural development. Such approaches may remove weaknesses which for example Nelson *et al.* (2006) in a study on the WMA concept consider to be limited awareness and internal disagreements to be among its major stumbling blocks.

4.3.2.3 Membership and leadership aspects

Awareness of the existence of the MBOMIPA association (Table 17), membership and trust to the association (Table 18) was used to measure its acceptance. Results indicate awareness significantly ($P<0.001$) vary across the member villages. It is however indicated (Table 17) that, the association is well known to majority of the villagers (89.3%) with minor discrepancies in Malinzanga, Mapogoro and Itunundu villages perhaps due to short stay and/or the level of participation of respondents.

Table 17: Awareness of the existence of MBOMIPA association

Existence of MBOMIPA	Description	Village of respondent						Total N=187
		Ilolo/M n=12	Itunundu n=35	Isele n=30	Mapogoro N=27	Malinzanga n=44	Mahuninga n=39	
Aware	Count	12	31	30	22	33	39	167
	% within village of respondent	100.0	88.6	100.0	81.5	75.0	100.0	89.3
	% of Total	6.4	16.6	16.0	11.8	17.6	20.9	89.3
Not aware	Count	0	4	0	5	11	0	20
	% within Village of respondent	0.0	11.4	.0	18.5	25.0	0.0	10.7
	% of Total	0.0	2.1	0.0	2.7	5.9	0.0	10.7
Total	Count	12	35	30	27	44	39	187
	% within village of respondent	100.0	100.0	100.0	100.0%	100.0	100.0	100.0
	% of Total	6.4	18.7	16.0	14.4%	23.5	20.9	100.0

Key: χ^2 **= 20.877; df = 5; Significant at P<0.001**

Assessments on perception of membership indicated a significant variation (P<0.001) and value judgment (P<0.01) but there was no significant variation on trust at P<0.05 across the villages (Table 18).

Table 18: Perceived members and value judgment of MBOMIPA association

Value judgment of MBOMIPA association		
Value judgment.	Count	Percent
Important.	161	86.1
Not important.	5	2.7
Do not know.	21	11.2
Total.	187	100.00
Trust rating of MBOMIPA association		
Trust rating.	Count	Percent
Trust.	138	73.8
No trust	49	26.2
Total	187	100.00
Perception of members of MBOMIPA association		
Perceived members	Count	Percent
All villagers of the member villages.	103	55.1
Village government.	18	9.6
Villages of Pawaga and Idodi divisions.	24	12.8
Villages bordering Ruaha National Park.	3	1.6
Do not know who the members are.	39	20.9
Total	187	100.00

Key: Membership - χ^2 = 156.167; df = 30; significant at P<0.001.
Value judgement - χ^2 = 25.288; df = 10; Significant at P<0.01.
Trust - χ^2 = 10.844; df = 5; Not significant at P<0.05.

The results in Table 18 indicate that, on top of a wide awareness (89.3%) shown in Table 17, there is also a high rating of the importance of the association to the local community undertakings (86.1%) and trust (73.8%). Despite these impressive assessments in importance and trust by the local community to their association indicated in Table 17, only a small portion (12.8%) could interpret the membership description as contained in the association constitution.

The low percent on the awareness on who are actually the members are not surprising since the constitution does not place the same weight shown in membership in its consideration for the election of association leaders. More still the institution being externally sponsored required capacity building to the lowest level (at least household) level to attract effective participation and concur with Fetterman (2005); Nelson *et al.*, (2006) and Nelson (2006) . The concern by DFID (2003) on the low MBOMIPA association's capacity at household level is herein registered. The effect of this dilemma is vivid in the selection of the central committee members which does not respect membership status as contained in the association constitution (MBOMIPA, 2001). It therefore does not guard against the monopoly of some village representative and therefore few members in the association leadership.

Secondly, the selection/appointment of board members from persons outside the members (villages), lend itself to possibilities of personalised interest and probably later hijacked association control. It is neither clear nor indicated anywhere in the constitution for the need and usefulness of the decision. It could concur with the suggestion by Ostrom (1999) if their origin was within the member villages (users) or at least reasons for their appointments are indicated in the constitution. Ostrom (1999) suggests that, users possessing more substantial economic and political assets may enhance the probability of success in organizing if they are willing to commit their assets.

These findings therefore contradict scholarly advice (Ostrom, 1992; Appeleton *et al.*, 2000; Berkes *et al.*, 2003) in the development of a robust institution. It is also argued that, when decisions are made by users rather than externally sponsored persons, there is a high likelihood for the users to comply (Ghate and Nagendra, 2005; Ostrom and Nagandra, 2006) concurring with the need for empowerment suggested by Fetteman (2005) and

Nelson (2006). Moreover, Anderson *et al.* (2006) suggest key principles that enhance contribution to environmental economics and empowerment.to be:

(a) improving the recognition of the role of natural resources in economic growth,

(b) better distribution of resources rights,

(c) ensuring natural resources markets work,

(d) redefining the role of science and technology, and

(e) the associated planning and institutions.

Thirdly, despite the dire need of finance and expertise in the first years as evidenced by (Mabugu and Mugoya, 2001), admitting external persons for the trusteeship does not guarantee access to expert advice and/or financial inputs.

CHAPTER FIVE

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Adoption of the WMA concept in Tanzania is an implementation of the gradual paradigm shift in the international conservation agenda. It also conforms to the National Strategies of Growth and Poverty Reduction (NSGPR) which stresses on removal of barriers hindering communities access and benefit from wildlife resources in her attempts to reduce income poverty.

This study examined the socio-economic and institutional dimensions of WMA in order to understand the people – wildlife relations in a WMA. The study revealed that, the local community conservation decisions are shaped by several factors and draw the following concluding remarks:

i. The economic base is faced with frequent human population migrations associated with livestock keeping and crop farming in search of fertile pastures and farmland implying high rates in resources use. Results indicate an annual average of 6.92% which is well above the District annual average of 2.7% and significantly ($P<0.01$) vary across the villages.

ii. Customary land tenure is the basic right over land resources, however 52.9% own less than 1.7ha of which only 42.1% own more than 0.6ha, an indication of a growing land market and dependence over natural resources base. The results indicated significant variations in acquisition system ($P<0.001$) and land ownership ($P<0.001$), a demonstration of the inherent heterogeneity and possible inequalities in access to resources across the study villages.

iii. Overall income sources, crop farming, Livestock husbandry were found to have significant variations in magnitude and contribution to household income across the villages. Overall income ($P<0.001$) with 44.5% earning below TAS 557.76 per day, crop farming at $P<0.001$ and contributing on average 62.4%, and livestock husbandry at $P<0.05$ and contributing 9.4% signifying the notion that livestock is held as bank and prestige. Off-farm income was not significant at $P<0.05$ and contributed 28.2% of household income indicating the growing importance of this activity to livelihood needs.

iv. On average, more than 50% of village land is committed to communal land uses in some form, demonstrating a sense of interdependence to one another, and dependence to ecosystem services and goods, clearly indicating the importance of the communal property regime to the local community in the study area.

v. The geographical location and wildlife significances place the WMA on the national and international conservation map. Findings indicate, despite the lack/delay of a full legal wildlife resources user right, the improved tenure rights (land and wildlife) are important in the development of wildlife based interventions.

vi. Both formal and informal institutions for wildlife management exist. Despite that, the Hehe tradition is dominant with some cultures important in the preservation of biodiversity especially on specified mountain ecosystems and some specific animals.

vii. The MBOMIPA association, the AA, is the formal institution entrusted with the management of wildlife at inter-village level. It is however faced with financial, low awareness, low capacity and administrative problems.

Findings further indicated only 12.8% are aware of who are members of their association clearly indicating the political structure is not understood and justifies for the political struggle over resource management.

viii. With consideration to the challenges facing the management of wildlife, a wildlife management institution need to be an entity constituted by rules and regulations constrained within the local, national laws and international treaties and structured into an organization of users with politically elected leaders inline with the local administrative authority.

ix. An analysis on factors influencing adoption and operationalisaion of the WMA concept indicated that, the factors likely to significantly ($P<0.01$) enhance success in adoption and operationalisation of the WMA concept; include increased awareness, and perception of existence of an institutional framework, trust, aging and dependence to the wildlife resources. Other factors significant at $P<0.05$, included, perception immigration and resources degradation, common understanding, ability to manage and existence of a benefit sharing mechanism. On the other hand perception of a limited user-right significantly ($P<0.05$) reduces the chances of success. The overall model results were significant at $P<0.001$ implying that, socio-economic and institutional factors influence decisions on the WMA concept and the prediction model can be used at 92% confidence level.

In reference to these results, the study concludes that, adoption and operationalisation of the WMA concept in Pawaga-Idodi pWMA is hampered by uncertainty on wildlife tenure rights, unclear institutional setup at village and inter-village level, and low awareness in envisioning community role in wildlife management.

5.2 Recommendations

Based on the study results and the preceding discussion, the following recommendations are drawn:

i. MBOMIPA association village governments should ensure rule enforcement and compliance to safeguard the recently completed land use planning in their villages.

ii. Success in wildlife conservation and specifically CBC requires a common vision of all the actors. This scores the importance of capacity building to enhance empowerment and reduce transaction cost justifying the development and implementation of a tailored extension package for the WMA concept.

iii. Institutionalisation of the WMA concept on village land requires express acknowledgement of the legitimacy of the VC and VA otherwise the WMA area should be leased to the AA who will hold and manage the communal property as trustees.

iv. MBOMIPA should use the opportunity provided by the pilot phase to enter into deliberate entrepreneurial activities in wildlife based business while the government process the user-right and the benefit sharing mechanism.

v. The WMA process should be allowed enough time to evolve with the appropriate political flexibility to avoid eminent scuffles and failures while revitalizing the traditional systems by allowing their integration with the externally created institutions.

vi. There is an urgent need for an encompassing definition of wildlife management institution to capture the interests of the local

community as well as the national, regional and international levels. In this respect then, understanding the regional and international factors affecting local wildlife managing institutions will enhance the performance of these local institutions.

vii. People are risk averse and therefore keen in weighing out tradeoffs against assumed benefits. It is therefore imperative to develop and implement a clear benefit sharing mechanism involving the immediate stakeholders.

viii. The prediction model was developed from a cross-section research design, it is important to repeat the study preferably by use of a diagonal research design to fine tune the results in an attempt to reduce inaccuracies and overgeneralization.

In general, the study recommends appropriate attention to the institutional framework at village and inter-village level, benefit sharing and a tailored extension package.

REFERENCES

Agrawal, A and Chhatre, A (2006). Explaining Success on the Commons: Community Forest Governance in the Indian Himalaya. *World Development Journal* 34(1):149-166.

Agrawal, A. and Gibson, C. C. (1999). Enchantment and Disenchantment: The Role of Community in Natural Resource Conservation. *World Development Journal* 27(4):629-649.

Anderies, J. M., Janssen, M. A. and Ostrom, E.. (August 2003). Design Principles for Robustness of Institutions in Social-Ecological Systems. *Presented at Joining the Northern Commons: Lessons for the World, Lessons from the World*, Anchorage, 17-21 August 2003. [http://dlc.dlib.indiana.edu/archive/00001190/00/Ostrom,Elinor.pdf] site visited on 9/9/2007.

Anderson, J., Benjamin C, Campbell, B. and Tiveali, D. (2006). Forestry Poverty and Equity in Africa: A New Perspective on Policy and Practice. *International Forestry, Review Journal* 8(1):44-53.

Andersson, K. P., and Agrawal, A. (June 2006). Equity, Institutions, and the Environment: Socioeconomic Aspects of Local Forest Governance. *Paper presented at 2006 Conferece on Survival of the Commons: Mounting Challenges and New Realities, the Eleventh Conference of the International Association for the Study of Common Propert.,* 19-23 June 2006 Bali, Indonesia. . [http://dlc.dlib.indiana.edu/archive/00001818/00/agrawal_arun_equity_and_environment5.pdf] site visited on 23/5/2007.

Appleton H., Fernandez .M. E., Hill C. L.M. and Quiroz, C. (2000). Claiming and using indigenous knowledge In: *People and Forests: Communities, Institutions, and Governance* (*Edited by Gibson, C. C., McKean, M. A. and Ostrom, E.)*, Cambridge, Mass.: MIT Press. 26pp.

Aslin, H. J. and Bennett, D. H. (2005). Two Tool Boxes for Wildlife Management? *Human Dimensions of Wildlife Journal* 10(2):95-107

Babbie, E. R. (2007). *The Basics of Social Research. Fourth Edition.* Thomson Wadsworth. 576pp.

Baldus, R. D. (1994). The Selous Conservation Programme. In: *People and Wildlife. Experiences from Tanzania. (Edited by Baldus, R. D.).* Selous Conservation Programme Discussion Paper no. 16, Dar es Salaam. pp.5-7.

Banana, A. Y., Gambya-Ssembujjwe, W and Bahati, J. (2004). Legal Recognition of Customary Forests in Uganda. In: *Institutions, Incentives and conflict in Forest Managemet: A Perspective. Proceedings of the International Forestry Research and Institutions (IFRI) East African Regional Conference. (Edited by Shemwetta et.al.).* 12-13 January 2004, Moshi, Tanzania. 132-144pp.

Bandaragoda, D. J. (2000*). A framework for institutional analysis for water resources management in river basin context*. IWMI. Working paper 5. 55pp.

Bandyopadhyay, S., Humavindu, M., Shyamsundar, P. and Wang, L. (June 2004). Do Households Gain from Community-Based Natural Resource Management? An Evaluation of Community Conservancies in Namibia. World Bank, Policy Research Working Paper 3337 June 2004. Washington, DC. [http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2004/07/23/000112742_20040723114704/additional/102502322_20041117174004.pdf] site visited on 23/5/2007.

Barrow, E. and Murphree, M. (2001). Community Conservation: From Concept to Practice. In: *African Wildlife and Livelihoods: The Promise and Performance of Community Conservation (Edited by Hulme, D. and Murphree, M.).* James Currey, Oxford and Heinemann, New Hampshire, pp.24-37.

Beard, V. A. (2006). Collective Action and Community-driven Development in Rural and Urban Indonesia. *Journal of Urban Studies* 43(9):1451-1468

Bell, R.M. (1950) The Maji-Maji Rebellion in the Liwale District. In: *Tanganyika Notes and Records.* United Republic of Tanzania, Government Printers, Dar es Salaam. 28:338-357

Berkes, F. (2004). Rethinking community-based conservation. *Conservation Biology Journal* 18:621-630.

Berkes, F. (June 2006). The Problematique of Community-Based Conservation in a Multi-Level World. *Paper presented at 2006 Conferece on Survival of the Commons: Mounting Challenges and New Realities, the Eleventh Conference of the International Association for the Study of Common Property.* , 19-23, June 2006 Bali, Indonesia. [http://dlc.dlib.indiana.edu/archive/00001845/00/Berkes_fikret_problematique.pdf] site visited on 20/3/2007.

Berkes, F., J. Colding and C. Folke (Eds.) (2003). *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change*. Cambridge University Press, Cambridge UK. 393pp.

Blaikie, P. (2006). Is small really beautiful? Community-based natural resource management in Malawi and Botswana. *World Development Journal* 34(11):1942-1957.

Blom, A., Van Zalinge R., Mbea E., Heitkönig, I. M. A. and Prins, H. H. T. (2004). Human impact on wildlife populations within protected Central African forest. *African Journal of Ecology* 34:23-31.

Boote, D. N., and Beile, P. (2005). Scholars before researchers: On the centrality of the dissertation literature review in research preparation. *Educational Researcher Journal* 34(6):3-15.

Borrini-Feyerabend, G. (1996). Collaborative Management of Protected Areas: Tailoring the Approach to the Context. In: *Issues in Social Policy*, *(Edited by Borrini-Feyerabend, G.)*. IUCN, Gland, Switzerland. pp.28–36.

Borrini-Feyerabend, G., Shobirin, A. de. and Ness, G. (1997). Population dynamics and Conservation. In: *Beyond Fences: Seeking Social Sustainability in Conservation (Edited by Borrini-Feyerabend, G.)*, IUCN, Gland (Switzerland). Volume 2 Section 4.4. [http://www.iucn.org/themes/spg/Files/beyond_fences/bf_section4_2.html#4.4] site visited on 28/7/2007.

Bruce, J. (2004). Strengthening Property Rights for the Poor. In: *Collective Action and Property Rights for Sustainable Development. (Edited by Meinzen-Dick, R. and Di Gregorio, M.).* Washington, DC. International Food Policy Research Institute. pp.33-34.

BurnSilver, S. and Mwangi, E. (June 2007). Beyond Group Ranch Subdivision: Collective Action for Livestock Mobility, Ecological Viability, and Livelihoods. (Series: CAPRi Working Paper No. 66). (Working Paper). [http://www.capri.cgiar.org/pdf/capriwp66.pdf] site visited on 21/7/2007.

Bwalya, S. M. (2003). Understanding Community-Based Wildlife Governance in Southern Africa: A Case Study from Zambia. *African Journal of Environmental Assessment and Management* 7:41-60.

Campbell, L. M. (1998). Use them or lose them? The consumptive use of marine turtle eggs at Ostional, Costa Rica. *Environmental Conservation Journal* 25(4):305-319.

Campbell, L. M. (2000). Human need in rural developing areas: perceptions of wildlife conservation experts. *The Canadian Geographer Journal* 44(2):167-181.

Campbell, L. M., Haalboom B. J. and Trow, J. (2007). Sustainability of community-based conservation: sea turtle egg harvesting in Ostional (Costa Rica) ten years later. *Environmental Conservation Journal* 34(2):122-131.

Cernea, M. M. (2005). Studying the Culture of Agri-Culture: The Uphill Battle for Social Research in CGIAR1. C*ulture and Agriculture Journa* 27(2):73–87.

Conroy, C. (2002). *PRA tools used for research into common pool resources: Socio-economic Methodologies for Natural Resources Research. Best Practice Guidelines*. Natural Resources Institute, University of Greenwich, Chatham, UK. 20pp.

Damm, G. (2002). *The Conservation Game: Saving Africa's Biodiversity First Edition 2002*. Safari Club Interantional Africa Chapter, Rivonia, South Africa. 297pp.

DFID (Danish Fund for International Development) (2001). Wildlife and Poverty Study. Livestock and Wildlife Advisory Group, DFID's Rural Livelihoods Department, Consultancy report. 111pp.

DFID (Danish Fund for International Development) (2003). MBOMIPA: From Project to Association and from Conservation to Poverty Reduction, MBOMIPA Project Final Report. 63pp.

Dietz, T., Ostrom E. and Stern, P. (2003). "The Struggle to Govern the Commons." *Science Journal* 302(12):1907-1912.

Dzingirai, V. (2003) CAMPFIRE is not for Ndebele Migrants: the Impact of Excluding Outsiders from CAMPFIRE in the Zambezi Valley, Zimbabwe. *Journal of Southern African Studies*. 29(2):445 – 459.

Emerton, L. (2001). The nature of benefits and the benefits of nature: why wildlife conservation has not economically benefited communities in Africa. In: *African Wildlife and Livelihoods: The Promise and Performance of Community Conservation (Edited by Hulme, D. and Murphree, M.).* James Currey, Oxford. . pp.208-226.

FAO (Food and Agriculture Organization of the United Nations) (2002). *Land Tenure and Rural Development. FAO Land Tenure Studies No. 3.* Rome: FAO. [ftp://ftp.fao.org/docrep/fao/005/y4307E/y4307E00.pdf]. site visited on 24/7/2007.

Fernandes, D. (May 2006). More Eyes Watching Community-based Management of the Arapaima (Arapaima gigas) in Central Guyana. *Paper presented at 2006 Conference on Survival of the Commons: Mounting Challenges and New Realities, the Eleventh Conference of the International Association for the Study of Common Property.* 19-23 June 2006. Bali, Indonesia, [http://dlc.dlib.indiana.edu/archive/00001894/00/Fernandes_Damian.pdf] site visited on 23/5/2007.

Fetterman, D. M (2005). *A window into the heart and soul of empowerment evaluation; Looking through the lens of empowerment evaluation principles:* The Guilford Press. 234pp.

Fischer, C., Muchapondwa E., and Sterner, T. (March 2005). Bioeconomic Model of Community Incentives for Wildlife Management Before and After CAMPFIRE. dp-05-06, Resources For the Future. [http://www.rff.org/rff/Documents/RFF-DP-05-06.pdf] site visited on 7/7/2006.

Ghate, R. and Nagendra, H. (2005) Role of Monitoring in Institutional Performance: Forest Management in Maharashtra, India. *Conservation and Society Journal* 3(2):509–532.

Gibson, C. (1999) *Politicians and Poachers: the political economy of wildlife policy in Africa*, Cambridge University Press. 262pp.

Hair, J. F., Anderson R. E., Black W. C., Babin, B. J. and Tathan, R. L. (2005). *Multivariate Data Analysis. Sixth Edition.* Prentice_Hall International, US. 928pp.

Hall, R. H. (2002): *Organizations: structures, processes and outcomes, Eighth Edition,* Prentice Hall Iric, India. 59pp.

Handerson, D. (2005). Action Research as a Strategy for Advancing Community-Based Natural Resources Management. In: *Participatory Research and Development for Sustainable Agriculture and Natural Resources Management: A Sourcebook*

Volume 1: Understanding Participatory Research and Development (Edited by Gonsalves, et al.). Liguna Phillippies and International Development Research Centre, Ottawa Canada. pp235-240.

Haule, K. S., Johnsen, F. H. and Maganga, S. L. S. (2002). Striving for sustainable wildlife management: the case of Kilombero Game Controlled Area, Tanzania. *Journal of Environmental Management* 66:31- 42.

Hill, C. A. and O'Hara, E. A. (December 2005). A Cognitive Theory of Trust. Minnesota Legal Studies Research Paper No. 05-51. SSRN Electronic Paper Collection: [http://ssrn.com/abstract=869423] site visited on 26/7/2007.

Hulme, D. and Infield, M. (2001). Community conservation, reciprocity and park-people relationships: Lake Mburo National Park, Uganda. In: *African wildlife and livelihoods: The promise and performance of community conservation (Edited by Hulme, D. and Murphree, M.).* James Curry Ltd., Oxford, UK. pp.106-130.

Hulme, D. and Murphree, M. (Eds.) (2001). *African Wildlife & Livelihoods: The Promise and Performance of Community Conservation.* James Curry Ltd., Oxford, UK. 344pp.

IDC (Iringa District Council) (2004). *Boundary Adjudication, Surveying and Preparation of Land Use Plans for 19 Villages under MBOMIPA Association.* IDC, Iringa. 7pp.

IDC (Iringa District Council) (2005a). *Ilolo Mpya Village Land Use Plan 2005 to 20015.* USAID (WWF for a living planet) Tanzania and IDC, Iringa. 23pp.

IDC (Iringa District Council) (2005b*). Itunundu Village Land Use Plan 2005 to 20015.* USAID (WWF for a living planet) Tanzania and IDC, Iringa. 24pp.

IDC (Iringa District Council) (2005c). *Isele Village Land Use Plan 2005 to 20015.* USAID (WWF for a living planet) Tanzania and IDC, Iringa. 22pp.

IDC (Iringa District Council) (2005d). *Mapogoro Village Land Use Plan 2005 to 20015.* USAID (WWF for a living planet) Tanzania and IDC, Iringa. 24pp.

IDC (Iringa District Council) (2005e). *Malinzanga Village Land Use Plan 2005 to 20015.* USAID (WWF for a living planet) Tanzania and IDC, Iringa. 25pp.

IDC (Iringa District Council) (2005f). *Mahuninga Village Land Use Plan 2005 to 20015.* USAID (WWF for a living planet) Tanzania and IDC, Iringa. 23pp.

Ipara; H. I., Akonga, J. J. and Akama, J. S. (2005). The tenure factor in wildlife conservation. *International Journal of Environmental Studies* 62(6):643 – 653.

Jalan, J., Somarathan, E. and Saraswata, C. (September 2003). Awareness and the Demand for Environmental Quality: Drinking Water in Urban India. *BREAD Working Paper No. 049.* [http://www.cid.harvard.edu/bread/papers/working/049.pdf] site visited on 13/5/2007.

Jones, B. T. B. and Murphree, M. W. (2004). Community-based natural resource management as a conservation mechanism: lessons and directions. In: *Parks in Transition –Biodiversity, Rural Development and the Bottom Line (Edited by Child. B.)*. Earthscan, London, pp.63-103.

Jones, E. C. (2004). Wealth-based trust and the development of collective action. *World Development Journal* 32(4):691-711.

Jones, S. (2006). A political ecology of wildlife conservation in Africa. *Review of African Political Economy Journal* 33(109):483-495.

Jütting, J., Corsi E., Kaufmann C., McDonnell I., Osterrieder H, Pinaud N., Wegner L. (2005). What Makes Decentralisation in Developing Countries Pro-Poor? *European Journal of Development Research* 17(4):626-648.

Kajembe, G. C, and Mwihomeke, S.T. (2001). *Participatory Management of Natural Resources - The Role of local knowledge and practices in management of natural resources of miombo woodlands, Consultancy Report.* Ministry of Natural Resources and Tourism. Dar es Salaam. 74pp.

Kajembe, G. C, Shemweta D. T. K., Luoga E. J., and Nduwamungu J. (2004). Incentives for sustainable forest management in Tanzania. In: *Institutions, incentives and conflicts in forest management: a perspective .Proceeding of the IFRI East African Regional conference (Edited by Shemweta, D. T. K, et al.).* 12–13 January 2004. Moshi. 80-92pp.

Kessy, J. F., Kajembe G. C., Mfunda, I. M. and Mgoo, J. S. (2005). *Benefit and Cost Sharing Mechanism in Collaborative Natural Resources Management in Tanzania: Sectoral Experiences and Considerations for Harmonization, Draft Consultancy Report June 20*05. Ministry of Natural Resources and Tourism, Tanzania, 26pp.

Kideghesho, J. R., Nyahongo J. W, Hassan1c S. N., Tarimo, T. C and Mbije1e, N. E. (2006). Factors and Ecological Impacts of Wildlife Habitat Destruction in the Serengeti Ecosystem in Northern Tanzania. *African Journal of Environment Assessment and Management* 11:917-32.

Kideghesho, J. R., Røskaft E., Kaltenborn, B. P. and Tarimo, T. C. (2005). 'Serengeti shall not die': Can the ambition be sustained? *International Journal of Biodiversity Science and Management* 1:150-166.

Kinyashi, G. F. (April 2006). Towards Genuine Participation for The Poor: Critical Analysis of Village Travel and Transport Project (VTTP) Morogoro. [http://www.tzonline.org/pdf/towardsgenuineparticipationforthepoor.pdf] site visited on 27/3/2007.

Kisoza, L. J. A., Kajembe, G. C. and Monela, G. C. (2004). Natural Resources Use Conflicts in Kilosa District, Morogoro Region, Tanzania. In: *Institutions, Incentives and Conflicts in Forest Management: A Perspective. Proceedings of*

the IFRI East African Regional Conference. (Edited by Shemweta, D. T. K., et al.) 12-13 January 2004. Moshi, Tanzania. 108-123pp.

Kothari, C. R. (2004). *Methods & Techniques, Second edition. Research Methodology.* New Age International (p) Ltd Publishers, New Delhi. 401pp.

La Ferrara, E. (2002). Inequality and group participation: theory and evidence from rural Tanzania. Elsevier, *Journal of Public Economics* 85(2):235-273.

Leader-Williams, N., Kayera, J. A. and Overton, G. L. (Eds.) (1995). *Community Based Conservation in Tanzania: Planning and Assessment for Wildlife Management.* Proceedings of Wildlife Division Workshop, Ministry of Natural Resources and Tourism, Dar es Salaam, Tanzania, February 1994. 214pp.

Luoga, E. J., Witkeweski, E. T. F. and Balkwill, K. (2005). Land Cover and Use Change in Relation to the Institutional Framework and Tenure of Land and Resources in Eastern Tanzania Miombo Woodlands. *Journal of Environment, Development and Sustainability* 7:71-93.

Mabugu, R. and Mugoya, P. (2001) Financing, Revenue-Sharing, and Taxation Issues in Wildlife Management Areas. *Report Prepared for Wildlife Division, Ministry of Natural Resources and Tourism and USAID/Tanzania:* [http://rmportal.net/tools/environmental-policy-and-institutional-strengthening-epiq-iqc/epiq-environmental-policy-and-institutional-strengthening-cd-vol-1/epiq-cd-1-tech-area-biodiversity-conservation/111269.pdf/view] site visited on 31/8/2006.

Madulu, N. F. (2004). Assessment of Linkages Between Population Dynamics and Environmental Change in Tanzania. *African Journal of Environment Assessment and Management* 9:88-102.

Madulu, N. F. (2005). Impacts of Population Pressure and Poverty Alleviation Strategies on Common Property Resource Availability in Rural Tanzania. *African Journal of Environment Assessment and Management* 10:26-49.

Mangel, M., Hofman R. J., Norse, E. A. and Twiss, J. R. (1993). Sustainability and ecological research. *Ecological applications Journal* 3:573-575.

Marsland, N., Wilson I., Abeyasekera, S. and Kleih, U. (2001). Combining quantitative (formal) and qualitative (informal) survey methods. Socioeconomic Methodologies for Natural Resources Research. Best Practice Guidelines. Natural Resources Institute, University of Greenwich, Chatham, UK. 24pp.

Matsaert, H. (2002). Institutional analysis in natural resources research. Socioeconomic Methodologies for Natural Resources Research. Best Practice Guidelines. Natural Resources Institute, University of Greenwich, Chatham, UK. 24pp.

Maxwell, J. A. (2006). Literature Reviews of, and for, Educational Research: A Commentary on Boote and Beile's "Scholars Before Researchers". *Educational Researcher Journal*. 35(9):28–31.

Mayaka, T. B. (2002). Wildlife Co-Management in the Benoue National Park-Complex, Cameroon: A Bumpy Road to Institutional Development. *World Development Journal* 30(11):2001-2016.

MBOMIPA (Matumizi Bora ya Malihai Idodi na Pawaga) (2001). *Katiba ya Asasi ya Matumizi Bora ya Malihai Idodi na Pawaga.* MBOMIPA, Iringa. 27pp.

MBOMIPA (Matumizi Bora ya Malihai Idodi na Pawaga) (April 2003). MBOMIPA Project Guidelines (MPG) and Workshop Reports (MWR). [http://www.mbomipa.info/] site visited on 11/12/2006.

MBOMIPA (Matumizi Bora ya Malihai Idodi na Pawaga) (2006a). *Lunda-Mkwambi Proposed Wildlife Management Area: Resources Management Zone Plan.* WCS Rungwa Ruaha Program, Tanzania and MBOMIPA, Iringa. 46pp.

MBOMIPA (Matumizi Bora ya Malihai Idodi na Pawaga) (2006b). *Pawaga-Idodi Proposed Wildlife Management Area: Resources Management Zone Plan.* WCS Rungwa Ruaha Program, Tanzania and MBOMIPA, Iringa. 41pp.

Mburu, J. (June 2002). Factors Influencing Landowners' Participation in Wildlife Co-Management in Kenya. *Paper presented at the Ninth Conference of the International Association for the Study of Common Property, the Commons in an Age of Globalisation*, Victoria Falls, Zimbabwe, 17-21 June 2002. Digital Library of the Commons. [http://dlc.dlib.indiana.edu/archive/00000866/00/mburuj010402.pdf] site visited on the 19/6/2007.

Mbwilo, A. J. T. (2002). The Role of Local Institutions in Rgulating Resources Use and Conflict Management: The case of Usangu Plains, Mbarali District, Tanzania. Dissertation for Award of MSc. Degree at the Sokoine University of Agriculture, Morogoro, Tanzania. 134pp.

McNeely J. A. (1998). *Economics and Biological Diversity: Developing and Using Economic Incentives to Conserve Biological Resources.* IUCN, Gland, Switzerland.. 76pp.

Meinzen-Dick, R., Knox, A., Place, F. and Swallow, B. (Eds). (2002). *Innovation in Natural Resource Management: The Role of Property Rights and Collective Action in Developing Countries.* Washington DC: International Food Policy Research Institute. 328pp.

Meinzen-dick, R., Mwangi, E. and Dohrn S. (May 2006). Securing the Commons. Policy Brief Number 4 - may 2006. CGIAR Systemwide Program on Collective Action and Property Rights (CAPRi). [http://www.capri.cgiar.org/pdf/polbrief_04.pdf] site visited on 21/7/2007.

MNRT (Ministry of Natural Resources and Tourism) (1998). *Survey of the Vegetation Communities and Utilization of Woody Plant Species in MBOMIPA Project Area.* Ministry of Natural Resources and Tourism, Dar es Salaam, Tanzania. 68pp.

MNRT (Ministry of Natural Resources and Tourism) (2002). *The Wildlife Conservation (Wildlife Management Areas), Regulations 2002.* MNRT. Government Printers, Dar es Salaam, Tanzania. 63pp.

MNRT (Ministry of Natural Resources and Tourism) (2003a). *Wildlife Conservation (Wildlife Management Areas) Regulations, 2002 inauguration workshop.* Proceedings of Wildlife Division Workshop, Dar es Salaam, Tanzania. 24 January 2003. 315pp.

MNRT (Ministry of Natural Resources and Tourism) (2003b). *Medium Term Strategic Plan 2003 – 2006.* MNRT, Dar es Salaam, Tanzania. 80pp.

MNRT (Ministry of Natural Resources and Tourism) (2003c). *Baseline Survey of the Eastern Wildlife Management Areas, Volume II: Idodi-Pawaga pWMA. (Consultancy Report by Mung'ong'o, C. C., Mwakaje A. and Kijazi A.).* MNRT, Dar es Salaam, Tanzania. 88pp.

MNRT (Ministry of Natural Resources and Tourism) (2004). *Indicators and Monitoring Plans for Wildlife Management Areas in Tanzania. (Consultancy Report by Kessy, J. F., Mvungi A. K. and Runyoro V.).* MNRT, USAID Tanzania, WWF Tanzania, Dar es Salaam, Tanzania. 138pp.

MNRT (Ministry of Natural Resources and Tourism) (2005). *The Wildlife Conservation (Wildlife Management Areas), Regulations 2005.* MNRT, Government Printers, Dar es Salaam, Tanzania. 63pp.

Murphree, M. W. (2002). Protected areas and the commons. *Common Property Resource Digest* 60:1-3.

Mwambo, J. S. (2000). The role of local knowledge and organizations in sustainable conservation of biodiversity: a case study of Udzungwa Mountains, Tanzania. Dissertation for Award of MSc. Degree at Sokoine University of Agriculture, Morogoro, Tanzania. 126pp.

Mwita, N. (2002). Selecting tools and methods for data collection. Training manual for monitoring and evaluation course. MS Training Centre for Development Co-operation (MS TCDC), Usa River, Arusha, Tanzania. 49pp.

Nagelkerke, N. J. D. (1991). A note on a general definition of the coefficient of determination. *Biometrika Journal* 78(3):691-692.

Narain, U., Gupta, S. and Veld, K. (May 2005). Poverty and the Environment: Exploring the Relationship between Household Incomes, Private Assets, and Natural Assets. Resources for the Future May 2005 Discussion Paper 05-18. Washington, D.C. [http://www.cgdev.org/doc/event%20docs/NarainPoverty%20and%20the %20Environment.pdf] site visited on 9/7/2007.

NBS (National Bureau of Statistics) (2005). *2002 Population and Housing Census. Village and Street Statistics, Age and Sex Distribution, Iringa Region, volume VII. Central Census Office,* NBS, President's Office, Planning and Privatization. Government Printers, Dar es Salaam, Tanzania. 156pp.

Nelson, F. (December 2006). Patronage or Participation? Understanding the Failure and Success of Community-based Natural Resources Management Reforms in Sub-Saharan Africa. [http://deepblue.lib.umich.edu/bitstream/2027.42/48787/1/Patronage%20and %20Participation.pdf]. site visited on 23/7/2007.

Nelson, F. (July 2007). Emergent or illusory? Community wildlife management in Tanzania. IIED, Issue paper no. 146. Russell Press, Nottingham, UK [www.iied.org/NR/drylands/projects/Supportingpastoralcivilsociety-EAfrica.htm] site visited on 2/8/2007.

Nelson, F., Sulle E, and Ndoipo P. (August 2006). Wildlife Management Areas in Tanzania: *A Status Report and Interim Evaluation*. Report to the Tanzania Natural Resource Forum, Arusha. [http://www.tnrf.org/downloads/Occasional %20Papers/Wildlife%20Management%20Areas%20in%20Tanzania%20TNRF %20Report.pdf] site visited on 31/7/2007.

Neumann, R. P. (2001). Africa's **'Last Wilderness': Reordering Space for Political and Economic Control in Colonial Tanzania.** *Africa: Journal of the International African Institute*, 71(4):641-665.

Ninan, K. N. (November 2006). Non Timber Forest Products and Biodiversity conservation- A Study of Tribals in a Protected Area in India.. *Paper presented at the 2006 Berlin Conference on the Human dimensions of Global Environment Change: Resource Policies: Effectiveness, Efficiency, and Equity, Berlin, 17-18 November 2006* [http://web.fu-berlin.de/ffu/akumwelt/bc2006/papers/Ninan_Non_Timber.pdf] site visited on 26/7/2007.

North, D. C. (1990). Institutions, Institutional Change and Economic performance Cambridge. Cambridge University Press. 28pp.

North, D. C. (1995). The new institutional economics and third world economics. In *The new institutional economics and third world development. London*. *(Edited by Haris J., Hunter, J. and Lewis, C.M.).* Routledge, London. pp17-26.

Noss, R. F. (2004). Conservation Targets and Information Needs for Regional Conservation Planning. University of Central Florida Department of Biology and the Wildlands Project Orlando, USA. *Natural Areas Journal* 24(3):223–231.

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action. Political economy of institutions and decisions*. ISBN: 0521405998, Cambridge University Press, New York USA. 298pp.

Ostrom, E. (1992). The rudiments of a theory of the origins, survival, and performance of common-property institutions. In: *Making the commons work: theory, practice, and policy (Edited by Bromley, D.W., Feeny, D., McKean, M., Peters, P., Gilles, J., Oakerson, R., Runge, C.F. and Thomson, J.).* ICS Press, Oakland, CA. pp293-318.

Ostrom, E. (2003). How Types of Goods and Property Rights Jointly Affect Collective Action. *Journal of Theoretical Politics* 15(3):239-270.

Ostrom, E. (February 1999). Self-Governance and Forest Resources. CIFOR, Occasional Paper No. 20, ISSN 0854-9818, February 1999.

[http://www.cifor.cgiar.org/publications/pdf_files/OccPapers/OP-20.pdf] site visited on 26/7/2006.

Ostrom, E. and Nagendra H. (2006). Insights on linking forests, trees, and people from the air, on the ground, and in the laboratory. PNAS 103(51):19224-19231.

Pallant, J. (2005). *SPSS survival manual (Second edition). A step by step guide to data analysis using SPSS for Windows (Version 12).* Bell and Bain Ltd., Glasgow. 318pp.

PC and IDC (Planning Commision and Iringa District Council) (1997). *Iringa District Socio-Economic Profile*. PC, Dar es Salaam and IDC, Iringa. Government Printers, Dar es Salaam. 121pp.

Redford, K. H. and Sanderson, S. E. (2000). Extracting humans from nature. *Conservation Biology Journal* 14:1362-1364.

Ribot, J. C. (December 2002). African Decentralization: Local Actors, Powers and Accountability. Democracy, Governance and Human Rights Paper No. 8. Code: PP-DGHR-8, ISSN: 1020-8186, Geneva: United Nations Research Institute for Social Development Programme on Democracy, Governance and Human Rights, and International Development Research Centre. [http://pdf.wri.org/ref/ribot_02_african_decentralization.pdf] site visited on 19/6/2007.

Ribot, J. C. (2004). *Waiting for Democracy: The Politics of Choice in Natural Resource Decentralization (Edited by Schultz, M. and Yaghmour, E.).* Washington, DC: ISBN 1-56973-564-6 World Resources Institute (WRI). 154pp.

RNP (Ruaha National Park) (2006). *Ruaha National Park – Visitor statistics 1996-2005.* RNP, Iringa. 1pp.

Sanchirico J. N. and Mumby, P. (2007). Economics, Habitats, and Biological Populations: Finding the Right Value. In: *Special Edition: Putting a Value on Nature's*

Services (Edited by Day, F. and Beam, S.). Resources for the Future Press, Washington DC. Spring 2007 Issue Number 165:11-13. [http//:www.rff.org] site visited on 14/8/2007.

Sanchirico, J. N. and Siikamäki, J. (2007). Natural Resource Economics Conservation of and Policy in the 21st Century Ecosystem Services. In: *Special Edition: Putting a Value on Nature's Services (Edited by Day, F. and Beam, S.).*. Resources for the Future Press, Washington DC. Spring 2007 Issue Number 165:8-10. [http//:www.rff.org] site visited on 14/8/2007.

Schlager, E., and Ostrom, E. (1992). Property-Rights Regimes and Natural Resources: A Conceptual Analysis. *Land Economics Journal* 68:249-262.

Shayo, D. O. (2003). *Wildlife Management in Rufiji District – a report of a technical backstopping consultancy in four villages. Technical Report No. 32,* Rufiji Environment Management Project (REMP). 130pp.

Shemwetta, D. T. K., Kajembe, G. C., Luoga, E. J. and Mwaipopo, C. S. (2004). The Role of Diverse Institutions in the Rule Conformance and Generation of Conflicts Over Forest in Tanzania. *In: Institutions, Incentives and conflict in Forest Managemet: A Perspective. Proceedings of the International Forestry Research and Institutions (IFRI) East African Regional Conference, (Edited by Shemwetta D. T. K. et al.)*. 12-13 January 2004, Moshi, Tanzania. pp.29-39.

Shyamsundar, P., Araral E. and Weeraratne, S. (May 2005). Devolution of Resource Rights, Poverty, and Natural Resource Management. Poverty, and Natural Resource Management - A Review. Environment Department Series 34114, Paper No. 104, Washington DC: World Bank. 2005. [http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2005/11/10/000090341_20051110144328/Rendered/PDF/341140Resource0rights0EDP0110401public1.pdf] site visited on 23/1/2007.

Songorwa, A. N. (2004). Human Population Increases and Wildlife Conservation in Tanzania: Are the Wildlife Managers Addressing the Problem or Treating

Symptoms?. *African Journal of Environmental Assessment and Management* 9: 49-77.

Songorwa, A. N., Bührs T. and Hghey K. F. D. (2000). Community Based Wildlife Management in East Africa: A Critical Assessment of the Literature. *Natural Resources Journal* 40:603-643.

Songorwa, A.N. (1999). Community-based wildlife management (CWM) in Tanzania: are the communities interested? *World Development Journal* 27:2061-2079.

Sosovele, H. and Ngwale J. J. (March 2002). Socio-Economic root Causes of the Loss of Biodiversity in the Ruaha Catchment Area. Report submitted to WWF- Tanzania [http://assets.panda.org/downloads/rcareportruaha.pdf] site visited on 25/5/2007.

Tabachnick, B. G. and Fidell, L. S. (2006). *Using Multivariate Statistics, Firth Edition*. Allyn and Bacom. 1008pp.

Timmer, P. (1988). Agricultural Transformation. In: *Handbook of Development Economics, Volume 1, (Edited by Chenery, H. and Srinivasan, T.).* Elsevier Science pp.275-332.

UNCED (United Nations Conference on Environment and Development) (August 1992). Report of the UNCED: Annex I Rio Declaration on Environment and Development. Rio de Janeiro, 3-14 June 1992, Brazil. New York, United Nations [http://www.solarnavigator.net/united_nations_agenda_21.htm] site visited on 20/1/2007.

URT (The United Republic of Tanzania) (2005). *National Strategy for Growth and Reduction of Poverty (NSGRP).* URT, Vice President's Office June 2005. 109pp.

URT (United Republic of Tanzania) (1974). *The Wildlife Conservation Act No. 12 of 1974. URT,* Government Printers, Dar es Salaam. 43pp.

URT (United Republic of Tanzania) (1982). *The Local Government (District Authorities) Act, No. 7 of 1982.* Government Printers. Dar es Salaam.

URT (United Republic of Tanzania) (1998). The *Wildlife Policy of Tanzania.* URT. Government Printers, Dar es Salaam. 33pp.

URT (United Republic of Tanzania) (1999). *Village Land Act No. 5 of 1999.* Government Printers, Dar es salaam. 130 pp.

URT (United Republic of Tanzania) (2002a). *The Wildlife Conservation Act Chapter 283 Revised Edition of 2002*. URT, Government Printers, Dar es Salaam. 53pp.

URT (United Republic of Tanzania) (2002b). *The Courts (Land Disputes Settlements) Act No. 2 of 2002.* URT, Government Printers, Dar es Salaam. 26pp.

URT (United Republic of Tanzania) (2007a). *The Wildlife Conservation (Wildlife Management Areas) (Declaration of Authorized Associations) Declaration Order 2007*. Government Notice No. 57 of 9 March 2007, Government Printers, Dar es Salaam. p.90.

URT (United Republic of Tanzania) (2007b). *Tanzania Tourism Sector Survey: The 2005 International Visitors' Exit Survey Report. Bank of Tanzania/Ministry of Natural Resources and Tourism/National Bureau of Statistics/Immigration department/Zanzibar Commission of Tourism, 2006*. Dar es Salaam. 37pp.

Varughese, G., and Ostrom, E. (2001). The contested role of heterogeneity in collective action: Some evidence from community forestry in Nepal. *World Development Journal* 29(5):747–765.

Vaughan, K., Mulonga S., Katjiuna, J. and Branston, N. (October 2003). Cash from Conservation. Torra Community Tastes the Benefits: A Short Survey and Review of the Torra Conservancy Cash Payout to Individual Members. Wildlife Integration for Livelihood Diversification Project (WILD) Working Paper 15. Windhoek, Namibia: Namibia Directorate of Environmental Affairs and United Kingdom Department for International Development. [http://www.met.gov.na/programmes/wild/WILDworkingpapers

13-16/WP%2015%20-%20Torra%20cash%20payouts.pdf] site visited on 24/8/2007.

Walsh, M. T. (2000). The Development of Community Wildlife Management in Tanzania: Lessons from the Ruaha Ecosystem. *Paper presented to the conference on African Wildlife Management in the New Millennium at the College of African Wildlife Management, Mweka, Tanzania. 13-15 December 2000*. [http://www.mbomipa.info/downloads/the_development_of_cwm_in_tz_2000.pd]f] site visited on 13/3/2006.

WAMM (Wizara ya Ardhi na Maendeleo ya Makazi) (2002). *Kanuni za Ardhi ya Vijiji, 2002. WAMM,* Peramiho Printing Press 5/2002. 110pp.

WCS-RRP (Wildlife Conservation society - Rungwa Ruaha Program) (2005). *Budget MBOMIPA Facilitation (depending on budget approval).* WCS-RRP, Iringa. 1pp.

Williams A. (2005). People cascades, land and livelihoods: Farmer and herder land-use relations in the Idodi rangelands, Tanzania. Thesis for Award of PhD Degree at the University College London. 276pp.

Williamson, D. (2003). Community-based wildlife management in Africa: *How rural people can share the economic benefits from wildlife resources.* Unasylva 212, (54):44-45.

World Resources Institute (WRI) in collaboration with United Nations Development Programme, United Nations Environment Programme, and World Bank. (2005). *World Resources 2005: The Wealth of the Poor-Managing Ecosystems to Fight Poverty.* Washington, DC: WRI. 266pp.

Zenger, T. R., Lazzarini, S. G., and Poppo, L. (2002). Informal and formal organization in new institutional economics. In: *The New Institutionalism in Strategic Management (edited by Ingram, P. and Silverman, B. S.).* Elsevier. Science pp.275-303.

APPENDICES

Appendix 1: Check-list for key informants

(a) Checklist for focal point in the Wildlife Division

1 What is the status of WMA concept?

2 Experience in the operationalisation of the WMA process?

3 What are your future plans?

4 What is the status in benefit sharing?

(b) Check-list for officers in-charge in the Game reserve, national park and district staff institutions

1 Main natural resources available,

2 Main uses of available natural resources

3 Existing institutions for regulating resources use and conflicts management in the study area,

4 Natural resources use conflicts and underlying causes,

5 Extension services provided,

6 Are there any perceived external interferences to the management? What are these interferences and their magnitude?

7 How do you rate the commitment of the local community in the implementation of the WMA regulations,

8 Does culture play an important role in the management of wildlife in the study area? [specify the important cultures]

9 Problems faced in provision of extension services,

10 Incentives and disincentives for peoples' participation in wildlife management

11 Main problems faced in administration

(c) Check-list for Village and Ward leaders

1 Main natural resources found in the WMA, national park and game reserve

2 Access to resources found in the WMA

3 Access to resources found in the national park and game reserve

4 Main use of the natural resources that are available

5 Does culture play an important role in the management of wildlife in the study area? [specify the important cultures]

6 Existing local institutions for regulating resources uses and conflicts management,

7 Problems faced in regulating access,

8 Are there any external interferences,

9 Are boundaries to the WMA known to all the members

10 Benefit from the WMA resources and their distribution,

11 Incentive and disincentives for participation in management of natural resources,

12 Main problems faced in administration and action taken

(d) Check-list for officers in-charge in the WWF and WCS NGOs

1 What are the assistances you are proving to the community,

2 What is your opinion on the local community commitment to implementation of the WMA regulations,

3 Are there any perceived problems in implementation?

4 How could perceived problems be rectified

Appendix 2: Household questionnaire

Date of interview ---------- /2006.

Division ---------- **Ward** ----------.

Village ----------.

1.0 Background information

1.1 Respondents name/number----------.

1.2 Sex ---------- i) Male ii) Female.

1.3 Age ----------years.

1.4 Ethnic group (Tribe)----------.

1.5 Religious affiliation ----------.

1.6 Family structure (at present).

1.6.1 Who lives with you here at present:

	Relation to household head*Sex**			Religious affiliation***

* Relation to household head: Do not insert individual names, but insert either **A** – for husband; **B** – for wife; **C** - for son; **D** – for daughter; **E** – for father; **F** – for mother; **G** – for other relatives and **H** – for others **[specify].**

** For sex insert **M** – for male and **F** – for female.

*** For religious affiliation insert **I** – for Christian; **J** – for Moslem and **K** – for others **[specify]**.

1.6.2 Question 1.6.1 continues **[insert for the same]:**

S/N	Relation to household head*	Main occupation**	Education***	Ethnic group(tribe)

* For relation to households copy from above (question 1.6.1)

** For main occupation insert **A** – for crop farming; **B** - for livestock husbandry; **C** – for mixed crop faming and livestock husbandry; **D** – for pastoralism; **E** – for beekeeping; **F** - for paid employment and **G** – for others **[specify]**)

*** Education level (years): Primary 1-7 (example insert P-3 if a person ended in standard three); Form four 1-4 (example insert F4-2 if the respondent ended up inform two); Form six 1-2 (example insert F6-1 if a person ended up in form five); Others **[specify]**.

2.0 Socio-economic activities

2.1 Occupation of head of household **[list three, starting with the most important].**

a) ---------- b) ---------- c)---------- **[see question 1.6.2 for selection list].**

2.2 Total land owned by the household ---------- (acres).

2.3 Tenure system of the above (2.2) mentioned piece of land; a) inherited ------acres; b) village government allocation ---- (acres); c)bought-----acres; d) rented (paid)---- (acres); e)borrowed (free) ----acres; f) share cropped ---- (acres) and g) others ---- acres **[specify] ------. NB:** The total of 2.3 must be equal to 2.2 above.

2.4 Cropping area and cultivated crops in 2005/06 cropping season:

Plot/No or name	Area (acres)	Distance from homestead (Km)	Distance from WMA (Km)	Crops cultivated	Area cultivated in the season

2.5 Crop production in 2004/05 and 2005/06 seasons (including fodder, fruits and trees):

Plot/N or name	Crops (2005/06 season)	Yields (kg) 2005/06 season	Crops (2004/05 season)	Yield (kg) 2004/05	Sold volume (kg) – 2004/05	Sold value (TZS) – 2004/05

2.6 Livestock keeping in 2004/05 season:

Herd/N	Type of l/stock*	Number of l/stock	Place – grazing**	Type of grazing***	Sold number	Sold value (TZS)

* Insert **A** – for cattle; **B** – for goats; **C** – for sheep; **D** – for donkey; **E** – for others **[specify].**

** Insert; **E** – for homestead; **G** – for sub-village grazing; **H** - for village grazing; **I** - for grazing area of other villages; **J** – grazing in protected areas (national parks, game reserves, forest reserves – **[specify]**); **K**– Other areas **[Specify],** ----------**.**

*** For type of grazing, insert **L** -for free grazing; **M** – for tethered grazing; **N** – for stall fed animals and **O** – for other types of grazing **[specify],** ----------**.**

2.7 Other economic activities (off-farm activities)*:

	Activity	Time of the year		Income per month (TZS)

* This is an alternative way to capture household income. It is used to probe further to get expenditure costs as an estimated income for the mentioned job.

2.8 Type of cereals preferred by your household [list three, starting with the most preferred], a) ---------- b) ---------- c) ----------.

2.9 Did you buy the cereals in 2004/05 season;--------- a) yes, b) no. If yes, how much [specify for each of the staple in 2.8 above], a) ------ b) -------- c) -------.

2.10 Do you get unexpected expenses and/or need for subsistence (TZS) ------- (a) yes, (b) no. If yes? How do you get the money? ------- a) borrow money, b) sell animals (livestock), c) sell something else such as,**[mention at most three, start with the commonly sold item]** i) ----------; ii) ----------; iii) ----------.

3.0 Ethnicity and Migration status.

3.1 Migration status of household members:

Household (HH) members	Date of first entry into the village	Reason for decision to settle in the village	Do you plan to move out? [Give reason(s)]
HH head			
Wife/Husband			
Others (specify)			

3.2 Are there people moving into and settling (permanent/temporarily-specify) in the village? ---------- a) yes, b) no. [If yes, go to 3.3].

3.3 When did you last see a new immigrant into the village? ---------- (year)

3.4 What was the ethnic group of the immigrant? ----------.

3.5 What do immigrants visualise as motive/desire to move into the village? [mention at most three reasons, start with the commonly given reason], a) ---------- b) --- ---------- c) ----------.

3.6 Do you and/or the village benefit from immigrants into the village? ---------a) yes, b) no. [If yes go to 3.7].

3.7 Benefits realised by you and/or the village from the immigrants [mention three, starting with the most important], a) ---------- b) ----------c) ----------.

3.8 Are there any problem caused by the people entering the village to the resources in your village? ------- a) yes, b) no. [If yes, mention three problems, stating with the most severe], i) ---------- ii) ---------- iii) ----------.

4.0 Peoples perception of wildlife resources management institutions.

4.1 Are there local institutions for regulating wildlife resources management in the village; --------- a) yes, b) no, [If yes go to 4.2].

4.2 What type of the institutions that exist? -------- a) informal, b) formal, c) both.

4.3 Mention three informal institutions for regulating wildlife management in your village [starting with the most important], a)--------- b) ---------- c) ----------.

4.4 How do the mentioned informal institutions regulate wildlife management? [specify for each], a) ---------- b) ---------- c) ----------.

4.5 Mention three formal institutions for regulating management of the wildlife resources [starting with the most important], a)--------- b) -------- c) ----------.

4.6 How do the formal institutions regulate management of the wildlife resources use [starting with the most important], a) ---------- b) ---------- c) ----------.

4.7 Mention the most effective institution in regulating the management of wildlife resources use: ----------. Give three features that enhance the mentioned institution in regulating the management of wildlife resources. [starting with the most important] a) ---------- b) ---------- c) ----------.

4.8 How do you rate your trust to the most effective institutions? [select from list], ---------- (highly, questionable, better abandoned, others [specify]) Give reason(s) for your judgement:----------.

5.0 Awareness and expectations of the WMA concept.

5.1 Are you aware of the WMA concept ---------- a) yes, b) no. [If yes go to 5.2].

5.2 Mention three expectation the first time you heard of the WMA concept? [start with the most important] a) ---------- b) ---------- c) ----------.

5.3 Have your expectations been met? ----, a) yes, b) no. [If yes go to 5.4 and if no go to 5.6].

5.4 Which expectation(s) were met? ----------.

5.5 Were expectation(s) met enjoyed by others in the village? ---------- a) yes, b) no.

5.6 Which expectations that were not met? ----------.

5.7 Give three reasons that contributed to not meeting the expectations? [start with the most important], a) ---------- b) ---------- c) ----------.

5.8 How large is the area set aside for WMA? [select from list]-------a) large, b) moderate, c) small area.

5.9 Are you and/or the village and/or mentioned institution able to restrict people who are not allowed to enter/access the area and its resources without a village permit? ---- a) yes, b) no. [Give reasons for your judgement?], ----------.

6.0 Participation in WMA activities.

6.1 Do you participate in WMA activities ---------- a) yes, b) no. [If yes go to 6.2 and if no go to 6.4].

6.2 Mention the activities in which you participate,----------

If activities include meetings, mention the committees you were/are involved in:

	Current Position	Current Committee	Active period (date)

6.3 How best do you think you could participate/involved in WMA activities? -------.

6.4 Are there people involved in WMA activities in your village?, ------ a) yes, b) no. [If yes go to 6.5].

6.5 Who are these people? ---------- a) protected area staff (national park, wildlife division), b) private persons, c) fellow village persons, d) District officials (game officers), e) our association [mention], f) others [specify], ----------.

6.6 Mention three roles of those involved in WMA activities [starting with the most important], a)---------- b) ---------- c) ----------.

6.7 Do you benefits from WMA activities? ------ a) yes, b) no. If yes, mention the type of benefits ----------.

6.8 Are the benefits enjoyed by other villagers? ---------- a) yes, b) no.

6.9 How are the benefits shared? [select the commonly used] ---------- a) allocation to village government, b) allocation to individual households, c) others [specify].

6.10 What type of benefits would you wish to get from WMA activities; -------a) cash, and b) social services? [Give reasons for your decision]. ----------.

6.11 Are the benefits enough to cover costs? ---------- a) yes, b) no. [If no go to 6.12].

6.12 How do you cover WMA costs? ---- a) government funding; b) NGOs [specify] support; c) household contributions [amount per year]; d) others [specify] ----.

7.0 Perception of MBOMIPA association.

7.1 Have you heard about MBOMIPA association? -- a) yes, b) no, [If yes go to 7.2].

7.2 Who are the members of the MBOMIPA association? ----------.

7.3 What are the roles of the MBOMIPA association? [mention three, starting with the most important], a) ----------, b) ----------, c) ----------.

7.4 Do you participate in the MBOMIPA association activities? ---------- a) yes, b) no. [If yes, in what roles do/did you participate] ----------.

7.5 Have you been involved in making suggestions or decisions in your roles in MBOMIPA association? ------- a) yes, b) no. [Give a brief explanation to your answer] ----------.

7.6 Do you think MBOMIPA association is important to you and/or your village? ---a) yes, b) no. [Specify] ----------.

7.7 Do you think the MBOMIPA association need improvements? ------ a) yes, b) no. [specify] ----------.

8.0 Incentives and disincentives for participation in wildlife management

8.1 Are there incentives or disincentives for wildlife management in your village? ---- a) incentives, b) disincentives, c) both.

8.2 Mention three incentives motivating you and/or your village to participate in wildlife management? [start with the most important], a) -----, b) -----, c) ----.

8.3 What is the state of the mentioned incentives [select from list indicating the respective incentives] ---------- (improving?; degrading?; stable?).

8.4 Can the state of the incentives be improved/strengthened? ---------- a) yes, b) no [specify] ----------.

8.5 Mention three disincentives constraining you and/or your village to participate in wildlife management? [start with the most important], a) -----, b) -----, c) ----.

8.6 What is the state of the mentioned constraint [select from list indicating the respective incentives] ---------- (increase?, decreasing?; stable?).

8.7 Can the state of the constraint be reduced? ----- a) yes, b) no [specify] ----------.

8.8 What is your future vision on wildlife resources availability? [mention/select from list] --- a) readily available; b) depleted; c) others [specify] ----------.

9.0 Access and utilization of WMA resources.

9.1 Do you and/or your village [specify] have access to wildlife resources products in the WMA? --------- a) yes, b) no. [If yes go to 9.2; If no go to 9.3].

9.2 What is the mode of access to wildlife resources in the WMA? ---- a) free access, b) permits/licence by District Council, c) permits by Village Council, d) permits/licence by Wildlife Division, e) others [specify], ----------.

9.3 Are there people with access to wildlife resources in the WMA? ---a) yes, b) no. [If yes, specify the mode of access, review question 9.2 above]: ----------.

9.4 Are there wildlife products accessed freely, -------a) yes b) no. [If yes go to 9.5].

9.5 Mention three wildlife products accessed freely [start with the readily accessed]:

S/N	Product	Season/time in the year	WMA/outside (specify)	Inherent uses
1				
2				
3				

9.6 Mention three wildlife resources products accessed by permits/licences? [starting with the readily accessed]:

S/N	Products	Permit/licence [specify]	Season/time in year	Inherent uses
1				
2				
3				

9.7 Is there wildlife based business in the WMA? ---- a) yes, b)no. [if yes, go to 9.8].

9.8 Mention three business in the WMA [start with the most profitable]:

S/N	Business	Product sold	Who do the selling	How are benefits shared
1				
2				
3				

9.9 How do people accessing resources in the WMA rate availability?

	Resources	Specify access*	Rating of availability **

* Insert **A** - permit, **B** - licence, **C** - free access).

** Insert **D** - easily available, **E** - difficult to get, **F** - almost impossible to get.

9.10 How do you rate the importance of the wildlife resources to your daily needs? ---a) high, b) low. [Give reason(s)for your judgement] ----------

10.0 Resources users perception of resources degradation

10.1 Do you experience resources degradation problems in your village? ---------- a) yes, b) no. [If yes go to 10.2].

10.2 Where is the resource degradation experienced? [mention/select from list, starting on the areas experiencing highest degradation], ---------- a) farm level, b) water sources, c) WMA area, d) others [specify],----------.

10.3 What are the resources degraded [mention three, starting with the highly degraded resources], a) ---------- b) ---------- c) ----------

10.4 What are the perceived causes of the mentioned resources degradation? [Mention three causes for each (in 10.3 above) starting with the major causes]:

Resource*	Perceived causes**		
	1	2	3

* insert a, b and c to indicated respective resources in 10.3 above
** cause are indicated by in number '1', '2' and '3' indicating importance.

10.5 What criteria do you use to determine the quality of resources? [mention three].

S/N	Criteria	Resources responsible	Condition of the resources*
1			
2			
3			

* indicate whether improving or degrading trends

11.0 Important cultures

11.1 Does your tribe maintain a cultural belief in the management of wildlife? -------- a) yes, b) no. [If yes go to 11.3]

11.2 What are the important cultures for wildlife management? [mention three , starting with the most important] , a)---------- b) ---------- c) ----------.

11.3 Are there other tribes in the village? ------- a) yes, b) no. [If yes go to 11.4]

11.4 How do the tribes relate to each other in respect to natural resources management? [Select from list] -------- a) same vision, b) differ vision.

11.5 In case of differing vision and trust, is there a local mechanism for dealing with conflicting situations? ---------- a) yes, b) no. [Give reasons to support your response], ----------

Appendix 3: Fourth schedule; wildlife management area, pilot wildlife management areas (made under regulation 17)

No	District(s)	Name of the area	Villages involved	
			Total	Name
1	Iringa	Pawaga - Idodi	19	Mahuninga, Makifu, Tungamalenga, Mapogoro, Idodi, Malinzanga, Mafuruto, Nyamahanga, Liganga, Kimande Itunundu, Kinyika, Isele, Kisanga, Magozi, Ilolo Mpya, Mkombilenga, Mboliboli, Mbuyuni.
2	Morogoro	Ukutu	22	Kisaki Stesheni, Gomero, Nyarutanga, Sesenga, Milengwelengwe, Vigolegole, Mngazi, Dakawa, Bwakirachini, Bonye, Mwade, Tulo, Kongwa, Mvuha, Kiganila, Bwilajuu, Bwilachini, Magogoni, Lukulunge, Dala, Kibulumo, Kidunda.
3	Babati	Burunge	6	Sangaiwe, Magara, Mayoka, Minjingu, Mwada, Vilimavitatu
4	Serengeti	Ikona	3	Robanda, Nichoka, Nyakitono.
5	Tarime	Tarime	3	Nata-Mbisso, Mrito, Gibaso.
6	Monduli	Endimet	8	Sinya, Elerai, Olmolog, Ilkwasa, Ngereiyani, Tingatinga, Lerangwa, Kitendeni.
7	Ngorongoro	Loliondo	6	Oloipiri, Arash, Ololosokwani, Soitsambu, Olorien, Losoito.
8	Namtumbo	Songea	7	Mchomoro, Kilimasera, Mterawamwahi, Songambele, Kitanda, Narabacha, Likuyuseka.
9	Tunduru	Tunduru	10	Rahaleo, Mbungulaji, Kajima, Kindamba, Twendembele, Namakungwah, Ndenyend, Hulia, Namwinyu, Darajambili.
10	Liwale	Liwale	9	Mpigamiti, Barikiwa, Chambuko, Mlembwe, Nujombo, Ndapata, Kikulyungu, Kimani, Mirui.
11	Rufiji	Ngarambe-Tapika	2	Ngarambe, Tapika.
12	Urambo	Uyumbu	4	Izimbili, Nsongolo, Izengabatogilwa, Osongwa.
13	Sikonge	Ipole	4	Ipole, Itimule, Msuva, Idekamise.
14	Bagamoyo and Morogoro	Wami-Mbiki	23	Kuuke, Kanga, Dihinda, Namziha, Lukenge, Kidundwe, Kambala, Mkono wa Mara, Maseyu, Gwata-Ujembe, Mwido, Visakazi, Tukamisa, Kaloleni, Kwa-ruhombo, Kwa-msanja, Kifuleta, Pongwe-kiona, Pongwe-Msungura, Kinzagu, Mindu-Tulieni, Makombe, Diozile.
15	Kilosa	Twatwatwa	4	Twatwatwa, Ludewa, Msowelo, Mbwade.
16	Kiteto	Makame	3	Makame, Ndedo, Ilkuishibor

Source: Adapted from MNRT (2002 & 2005)

Appendix 4: Gazetted pilot wildlife management areas

S/N	Government Notice (number and date)	Name of of Community Based Organisation	Name of WMA
1	37 of 31st March 2006	Jumuiya ya Jamii ya Eneo la Hifadhi ya Wanyamapori ya Uyumbu (UWIMA)	Uyumbu
2	37 of 31st March 2006	Jumuiya ya Hifadhi ya Wanyamapori Ipole (JUHIWAI)	Ipole
3	37 of 31st March 2006	Jumuiya ya Hifadhi ya Wanyamapori Burunge (JUHIBU)	Burunge
4	37 of 31st March 2006	Muungano wa Ngarambe na Tapika	Ngarambe/Tapika
5	57 of 9th March 2007	Jumuiya ya Hifadhi ya Wanyamapori Enduimet – Enduimet Society	Enduimet
6	57 of 9th March 2007	Matumizi Bora ya Maliasili Idodi na Pawaga (MBOMIPA)	Pawaga-Idodi
7	57 of 9th March 2007	Jumuiya ya Hifadhi ya Wanyamapori Ikona (JUHIWAIKO)	Ikona
8	86 of 13th April 2007	Jumuiya ya Hifadhi ya Wanyamapori Wami-Mbiki (Wami-Mbiki Society)	Wami-Mbiki

Source: Wildlife Division (2007)

Appendix 5: Progress in operationlisation of the WMA concept up to 31 december 2006

S/N	Name of pWMA	Name of host District	Completion of LUP (villages)	WMA area (KM²)	Establishment of DNRAB	Establishment of CBO	Establishment of CBO Constitution.	CBO registration	Preparation of GMP and/or RZMP	Application for authorization	Gazettement of WMA and AA
1.	Ukutu	Morogoro	22	750	√	√	√	√	√	√	LUP finalized
2.	Ngarambe-Tapika	Rufiji	2	767.22	√	√	√	√	√	√	√
3.	Liwale	Liwale	10	4515	√	√	√	√	√	√	LUP and RZMP not finalized
4.	Tunduru	Tunduru	9	1,391.03	√	√	√	√	√	√	LUP and RZMP not finalized
5.	Songea	Namtumbo	7	2,471.02	√	√	√	√	√	√	LUP and RZMP not finalized
6.	Ipole	Sikonge	4	2,406	√	√	√	√	√	√	√
7.	Uyumbu	Urambo	4	838.7	√	√	√	√	√	√	√
8.	Burunge	Babati	7	616.17	√	√	√	√	√	√	√
9.	Ikona	Serengeti	5	242.3	√	√	√	√	√	√	Awaits official gazettement
10.	Pawaga-Idodi	Iringa	21	776.65	√	√	√	√	√	√	Awaits official gazettement
11	Makami	Kiteto	3	5,372	√	√	√	√	√	X	X
12.	*Loliondo	Ngorongoro	6	0					X	X	X
13.	Enduiment	Longido	8	540	√	√	√	√	√	√	Awaits official gazettement
14.	Tarime	Tarime	2	0	X	√	X	X	X	X	X
15.	Wami-Mbiki	Morogoro Mvomero, Bagamoyo	24	2,400	√	√	√	√	√	√	Awaits authorization and gazettement
16.	*Twatwatwa	Kilosa	4	0	-	-	-	-	-	-	-
Total			138	18,571.09							

- In various stages in the indicated activity close to indicated sign; LUP - Land Use Plan; * -Areas no operationalising the process as advised by District Authorities; √-full achievements; X-not yet implemented; (-) – implementation stopped.

Source: Translate from Wildlife Division Report (HATUA, 2006).

Appendix 6: Conditions exhibited by durable CPR institutions

S/N	Condition	Description
1.	Clearly defined boundaries	Individuals or households with rights to withdraw resource units from the common-pool resource and the boundaries of the common-pool resource itself are clearly defined.
2.	Congruence	a. The distribution of benefits from appropriation rules is roughly proportionate to the costs imposed by provision rules. b. Appropriation rules restricting time, place, technology and/or quantity of resource units are related to local conditions.
3.	Collective-choice arrangements	Most individuals affected by operational rules can participate in modifying operational rules.
4.	Monitoring	Monitors, who actively audit common-pool resource conditions and user behaviour, are accountable to the users and/or are the users themselves.
5.	Graduated sanctions	Users who violate operational rules are likely to receive graduated sanctions (depending on the seriousness and context of the offence) from other users, from officials accountable to these users, or from both.
6.	Conflict-resolution mechanisms	Users and their officials have rapid access to low-cost, local arenas to resolve conflict among users or between users and officials.
7.	Minimal recognition of rights to organise	The rights of users to devise their own institutions are not challenged by external governmental authorities.
For common-pool resources that are part of larger systems:		
8.	Nested enterprises	Appropriation, provision, monitoring, enforcement, conflict resolution and governance activities are organised in multiple layers of nested enterprises.

Source: Adapted from: Ostrom (1990)

Appendix 7: Binary logistic multiple regression full model results

S/No.	Variables in the equation	β	S.E.	Wald	df	Sig.	Exp(β)
1	Existence of a local institution to manage	2.680	.990	7.335	1	.007	14.592
2	Perception of existence of a benefit sharing mechanism	2.389	1.029	5.392	1	.020	10.902
3	Common understanding	2.231	1.172	3.621	1	.057	9.309
4	Trust to the existing local institution	2.583	1.009	6.558	1	.010	13.241
5	Dependence to the resources	2.313	.890	6.754	1	.009	10.106
6	Awareness	2.154	.884	5.940	1	.015	8.615
7	Perception of the ability to manage	2.359	1.068	4.882	1	.027	10.578
8	Age of resondent	.084	.035	5.851	1	.016	1.088
9	Perception of existence of immigration	2.031	.862	5.547	1	.019	7.620
10	Perception of having a user right	-2.866	1.289	4.944	1	.026	.057
11	Perception of existence of resources degradation	2.044	.878	5.421	1	.020	7.722
12	Perception of cost to organize	-.283	.841	.113	1	.736	.753
13	Formal education	1.310	.909	2.076	1	.150	3.708
14	Perception of resources availability	-.882	1.026	.738	1	.390	.414
15	Duration of stay	.026	.035	.551	1	.458	1.026
	Constant	-14.246	3.400	17.553	1	.000	.000

Model summary

Model Overall percentage = 93.0%; Model Chi-Square = 158.669; df = 15;

-2LL= 58.489; Negelkerke R Square = 0.833; Model significance = P<0.001

Appendix 8: Results of the likelihood ratio (χ^2 difference) tests

S/No.	Variable	Calculated χ^2 value	Degrees of freedom	Critical χ^2 value	Decision
1	Existence of a local institution to manage	8.561	1	3.841	Retain
2	Dependence to the resources	7.787	1	3.841	"
3	Trust to the existing local institution	7.765	1	3.841	"
4	Age	7.344	1	3.841	"
5	User right	6.657	1	3.841	"
6	Awareness of the WMA concept	6.460	1	3.841	"
7	Immigration	6.360	1	3.841	"
8	Resources degradation	5.955	1	3.841	"
9	Benefit sharing scheme	5.835	1	3.841	"
10	Ability to manage the resources	5.461	1	3.841	"
11	Common understanding	4.785	1	3.841	"
12	Education level	2.123	1	3.841	Drop
13	Future availability prediction	0.761	1	3.841	"
14	Duration of stay	0.539	1	3.841	"
15	Costs to organize	0.114	1	3.841	"

Appendix 9: Correlation matrix for the independent variables

IV.	A	B	C	D	E	F	G	H	I	J
B	.030									
C	.191	.480								
D	.012	.181	.043							
E	.052	.174	.207	.395						
F	.319	.077	.348	.039	.130					
G	.181	.257	.240	.060	.118	-.044				
H	.259	.302	.251	.197	.309	.228	.288			
I	-.132	-.510	-.394	-.357	-.280	-.127	-.283	-.176		
J	.264	.153	.406	.117	.119	.178	.031	.093	-.269	
K	.265	.220	.306	.322	.317	.095	.213	.204	-.281	.313

A- Existence of a local institution to manage; **B**- Perception of existence of benefit; sharing mechanism; **C** - Common understanding; **D** - Trust to the existing local institution; **E** - Dependence to the resources; **F** – Awareness; **G** - Perception of the ability to manage; H - Perception of existence of immigration; **I** - Perception of having a user right; **J** - Perception of existence of resources degradation; **K** - Age of the respondent.

Appendix 10: Main features/differences - PRA resources mapping in the 1970s and the current situation.

S/N	1970 village resources map	2006 village resources map
1.	Wide spread forest and wildlife resources. In some part the forest was quite dense.	Reduced tree cover and general vegetation cover Under MEMA project several areas were set out for forest conservation. (Preservation and utilization). Land use planning facilitated setting out WMA.
	Several wildlife species existed in large numbers. Lions were however seasonal	Almost all the species (large mammals) that existed in the seventy's still available but in much smaller numbers. Some animals like wild dogs are now difficult to encounter
2.	Hunters spent less time in search for animals	Hunters spend more time in search for animals
3.	High yields per unit area	Low yields per unit area
4.	Main crops included Sugar beats, Cassava, Maize and some Paddy	There has been an increase in the production of paddy and sweet potatoes
5.	Settlements were centralized in small hamlets and farms were small	Expansion of farm areas and an increase in sub-villages
6.	Farming mainly rain fed	Irrigation fed gardens and farms picking up and vegetable farming becoming important sources of household income

Appendix 11: Existing externally sponsored institutions

S/N	Institution name	Stated role
1	Village government	Keeping peace and security, resolving conflicts over resources use, conducting meetings, soliciting support, supervision of village development activities, and communication with district.
2	Primary school	Education services and care for children
3	Christian denominations Churches (Roman Catholics, Anglicans and Lutherans)	Spiritual issues, support to civic groups, health education and services, garage services, milling services, agency and food support, support school fees, farmer education (livestock and crops), provision of improved breeds. Support to sports clubs
4	Moslems Mosques	Spiritual issues, assist in the administration of external supports such as food.
5	Village dispensary	Provision of veterinary services
6	Irrigation group	Training, provision of improved breeds (livestock, chicken, vegetables seeds), water rationing, subsidy to new groups
7	MBOMIPA	Anti-poaching, protection of wildlife and WMA, administration of quota and revenues, conservation education, CBO meetings.
8	Beekeeping group	Training on improved beekeeping techniques, bee products services to villagers,
9	TANAPA	Support conservation education, study visits tot the Ruaha national Park, patrol and protection, social infrastructure development
10	CONCERN	Support beekeeping (technical and logistic), training
11	WWF for living planet	Village land use planning
12	WCS	Logistic and technical support to MBOMIPA, research activities
13	Village natural resources committee	Routine schedule of surveillance activities at village level, supervision of village scouts,

Sources: Survey field data (2006)