The Opportunities & Constraints for a Sustainable Life with Wildlife

- A Case Study of the People & Buffalo in Wami-Mbiki, Tanzania

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Abstract

This study evaluates ‘Community Based Management of Wildlife’ (CBMW) to reveal its potential as a sustainable development scheme in practice. This is done from an interdisciplinary angle and with a context specific evaluation of ‘Wami-Mbiki Community Based Natural Resource Protection and Utilisation Project’ (WMP) in Tanzania. The focus is primarily on incentives for and comprehension of WMP among the people in the area and on factors affecting the wildlife population dynamics with special attention on African Buffalo. Interviews, questionnaires, fieldtrips and biological modelling represent the qualitative and quantitative research carried out at a field study at Wami-Mbiki to reveal opportunities and constraints for WMP.

The interviews show that the people generally have strong incentives for participation and good comprehension of WMP and that WMP is well targeted for the people. Simultaneously differences are found between the communities, needs have been substituted with wants and there is a time delay before wildlife utilisation can start. Currently a few factors can limit wildlife population growth and harvesting of small populations can be problematic. The overall conclusion of the field study is that WMP has the potential to represent a sustainable development scheme, but to succeed opportunities must be used constructively and constraints be diminished. To ensure sustainable development follows up on the indicators should be carried out on a regular basis. For CBMW in general to succeed, CBMW should not only identify under what conditions it does work, but also understand in which conditions it is set-up and working.
1 Introduction

‘Many environmental and development indicators for Africa point towards a continuing downward spiral’ (UNCTAD, 1995).

Sub-Saharan Africa is faced with the realities of a human population of around 590 million people, and the region has the world’s highest population growth rate of 3.2 % annually. Additionally, the region has the highest percentage of people living under the international poverty line\(^1\) indicating the problems of mass poverty in Africa. The region has been left behind in the global economy; it continues to be burdened by high debt repayments, and the economies are characterised by being small and fragile (ASaS, 2000).

The increase in the human population and their poverty adds to the conflict over land, environmental pressure and degradation. Through deforestation and soil degradation vast areas have been turned into virtual wastelands during the last 20 years (ASaS, 2000; UNCTAD, 1995). The loss of biological diversity\(^2\) is increasing and ecological functions are thereby disappearing (Skonhoft & Solstad, 1998). Biological diversity is often said to be the earth’s life supporting capacity, and is important, as a complete interlinked system of functions (Miller, 2000). The species, which have attracted special international interest, are the African wildlife species. These are threatened not only within protected areas, but also in areas without protection due to the degradation and need for land (ASaS, 2000; Skonhoft & Solstad, 1998). As UNCTAD (1995) stated: ‘In many marginal rural areas growing numbers of poor people inevitably have to degrade the environment a little more each day just to make ends meet’ and it can be difficult to argue why natural resources should be protected, when people are starving and suffering from malnutrition. Nevertheless, deteriorating present natural resources greatly jeopardises the livelihood of the generations to come. Without proper management of the natural resources, which are still left, and steadily growing poverty and human population, the downward spiral will continue in the future.

To escape from these present realities and halt the downward spiral a sustainable development is necessary. A sustainable development is defined according to the Brundtland Report as a: ‘Development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ (WCED, 1987). This concept and definition of sustainable development has been subject to different interpretations and has been highly criticised, but as Elliot (1998) claims: ‘In whatever way these principles...are understood they have to be put into practice’. It is a necessity, that the African countries - and developing countries in general - deal with the interrelated problems of fast human population growth, resource and environmental degradation, development of their societies, and can manage to integrate these issues to change the present patterns. But, at the same time ‘As the world’s poorest region...Africa faces a tough battle in blending environmental and development concerns’ (UNCTAD, 1995).

\(^1\) The international poverty line is defined as having less than 1 US$ (900 Tanzanian Shilling (TSH)) per day per person (World Bank, 2002).
\(^2\) Biological diversity is understood as genetic and species diversity and it refers to the variety of those and not the number of individuals within a species. Biological diversity also accounts for the diversity of ecosystems (Begon et al., 1996).
1.1 Community Based Management of Wildlife

One approach, which has adopted the concept of sustainable development and blends environmental and developmental concerns, is the ‘Community Based Management of Wildlife’ also called ‘Integrated Conservation and Development Projects’ (Caro, 1999; Songorwa et al., 2000). The approach, which will be referred to as CBMW, was developed in the 1980’s primarily as a result of the African governments less successful preservation of wildlife and their prohibitive wildlife laws. This had created an antagonism between wildlife conservation and community development (Severre, 2000; Songorwa et al., 2000). As Songorwa et al. (2000) express, ‘Rural people were intimidated, harassed, beaten, jailed and even shot and killed in the name of wildlife protection’. It was realized that the previous top-down approach kept communities from living their traditional lifestyles and resulted in negative attitudes towards wildlife. At the same time, it did not compensate or benefit them in any way even though, they were the ones living with wildlife.

CBMW seeks to change the previous approach to wildlife conservation by being a multifunctional bottom-up approach, and its main arguments can be divided into socio-political, biological and economical strands (IIED, 1994). These are: The communities will be empowered by participating in managing the conservation of the area and in their own development; The communities will be empowered by having the property rights of the wildlife-endowed area; Wildlife viewed, as renewable resources, will allow for utilisation as long as the biological sustainability is not compromised; Realising the true total economic value (TEV) of biological diversity and wildlife this will be reflected through the economic market value; TEV and the economic gain from utilisation of the biological resources will pay for the conservation and increase the communities’ livelihood; The economic gain will be high enough to make alternative land uses unattractive, for example agriculture (Hulme & Murphee, 1999; Songorwa et al., 2000; IIED, 1994).

In other words, what CBMW is trying to accomplish is, to develop a dependent relationship between biological diversity and the well being of rural people by making the natural resources an important source of income for them. The ‘livelihood will drive the conservation of natural resources rather than simply being compatible with it’ as Salafsky & Wollenberg (2000) phrase it. CBMW has received the status, as the new discourse, within African wildlife conservation and community development. It is now implemented in state conservation agencies, multi and bilateral aid donors, and conservation and development Non Governmental Organisation’s (NGO’s) strategies and actions (Hulme & Murphee, 1999). Different degrees of community participation and strengths of sustainability are found within CBMW, but they all aim at meeting the basic needs of the rural people (Songorwa et al, 2000; Hulme & Murphee, 1999).

Being able to both conserve biological diversity and alleviate poverty appears an ideal opportunity to reverse the present patterns in Africa. Due to this CBMW projects have also been evaluated by a wide range of researchers and research disciplines to reveal its potential as a sustainable development in practise (Zacharia & Kaihula, 2001; Salafsky & Wollenberg, 2000; Walsh, 2000; Songorwa et al., 2000; Roe et al., 2000; Songorwa, 1999; Hulme & Murphee, 1999; Caro, 1999; Gibson & Marks, 1995; Newmark et al., 1994; Kremen et al., 1994; IIED, 1994). From literature on

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3 Renewable resources are biological resources that can regenerate contrary to non-renewable or exhaustible resources (Turner et al., 1994).

4 TEV is expressed as the use and the non-use value of biological diversity. The use value can be divided into direct, indirect and option values and the non-use value represent the existence value (Turner et al., 1994).
the approach, both opportunities and constraints have been identified and whilst some view the constraints as obstacles, others view them as challenges that need more attention.

Some of the most critical views are from Songorwa et al. (2000), who claim that the African governments are not willing to devolve the ownership to local communities; that the local communities do not have the capacities or capabilities to carry out wildlife management; and that the local communities are basically not interested in preserving wildlife, but just interested in increasing their livelihoods; and that wildlife conservation and economic development not are compatible. However as long as the communities are not given the opportunity to manage wildlife these views will prevail. Additionally Hume & Murphee (1999) argue that CBMW exists only because of its positive image and not its accuracy, and as they say: 'What reasonable person could object to community conservation?' Probably not many, as CBMW does have a political correctness associated with it.

Others are more optimistic about CBMW’s potential and argue for the importance of a comprehension of the communities in question (Salafsky & Wollenberg, 2000; Roe et al., 2000; Gibson & Marks, 1995; Newmark et al., 1994). Some argue for the importance of the communities’ perception of the link between their own development and the conservation effort (Salafsky & Wollenberg, 2000). Some claim the importance of ecological monitoring of the ecosystem (Caro, 1999; Kremen et al., 1994) and others put forward capacity building in the communities, institutional set-up and legal issues as the most crucial factors (Zacharia & Kaihula, 2001; Walsh, 2000). The diversity of views on what is essential for CBMW to succeed only illustrates, that the approach is embedded in different strands.

1.2 Objectives & Selected Study Area
Whether the CBMW approach is a success in practise and not just in rhetoric is difficult to generalise and is not a simple task. The conditions and the context in which CBMW projects are set up differ, as does opportunities and constraints. Roe et al. (2000) argue that the question is not whether CBMW works or not, but to identify under what conditions it does work. Because the approach is multifunctional it works on several levels and under a range of site-specific conditions. It is the composition of those conditions, that will influence CBMW’s impact on and its potential as a sustainable development scheme in practise. When evaluating CBMW it is therefore important not just to focus on one dimension or condition. To reveal the different conditions under which a project works the evaluation must be interdisciplinary and context specific.

This study takes an interdisciplinary approach to CBMW and CBMW’s potential as a sustainable development scheme in practise. This study focuses on social conditions with empowerment of the people and on biological conditions with sustainable utilisation of wildlife. Because people and wildlife are the key actors in this approach they will be the heart of the analysis. With the necessity of not only being interdisciplinary, but also context specific in the evaluation of CBMW ‘Wami-Mbiki Community Based Natural Resource Protection and Utilisation Project’ (WMP) set up by a Danish NGO DJ5 in Tanzania has been selected, as a case study. The goal is to identify site-specific social and biological opportunities and constraints, which can indicate its potential as a sustainable development scheme.

Map 1: Tanzania’s location in Africa

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5 The Danish Hunters Association (DJ) has set up the project.
Concerning the people at Wami-Mbiki the purpose of the case study is to identify their incentives for participation in relation to the conditions WMP target. Furthermore the purpose is to identify their comprehension of WMP. The incentives and comprehension are considered to be the driving forces behind participation and for the associated empowerment of the people. Concerning wildlife the purpose is to identify factors affecting the wildlife populations with special attention on the African Buffalo. The factors will affect the sustainable utilisation of buffalo and the potential harvesting level of the species and thereby the economic revenue adding to the peoples livelihood and the conservation effort. The evaluation can indicate whether WMP from these angles appears to be a success in practise and a representative of a sustainable development scheme.

In order to judge whether WMP or any other given CBMW project, can represent a sustainable development it is necessary to clarify the concept in the context of CBMW. Sustainable development is defined in relation to the Brundtland Reports (WCED, 1987) definition as:

- A development that meets the people's present needs without compromising the ability of future generations to meet their own needs
- A development that does not compromise the biological diversity in the given area by wildlife utilisation
- A development that will increase the people's opportunities of an increasing living standard

The social and biological opportunities and constraints identified at WMP can be extracted to a general level to discuss which conditions are required for CBMW to succeed.

1.3 Study Limitations

Being interdisciplinary means that different disciplines are integrated to identify overall dynamics. One gets a more holistic view of CBMW/WMP than if evaluated within just one discipline. Being interdisciplinary also implies that the main objective is to present overall conditions and contexts, which appear to be of importance for CBMW/WMP. With the conditions constraints for WMP are identified. Examples of strategies are suggested to overcome these, but these are not discussed in detail, as this is not the main objective. The study has been limited to social and biological conditions for CBMW/WMP. The reason for this is that those are considered as the first order conditions for CBMW/WMP to work in the long run. Analysis of political, legal and economic conditions in relation to CBMW/WMP are also of importance and interest, but has been excluded since an inclusion of those would result in a superficial analysis within the study framework, time and page limit given.

Some of the issues that are mentioned in relation to CBMW/ WMP, but not discussed include the institutional set-up, the legal framework, and a discussion on the tourist hunting market in Africa/Tanzania and the role of DJ and NGO's from developed countries acting in developing countries. These issues are all of interest and concern, but the choice of focus has not been within these issues in this study.
2 Empowerment of People & Sustainable Utilisation of Wildlife

There are different strands of arguments and concepts supporting CBMW. In this chapter the concepts behind empowerment of the people and sustainable utilisation of wildlife will be presented in more detail, as they relate to the main focus of the study.

2.1 Empowerment of People
CBMW is based on empowering the local communities through participation and land property rights. The empowerment of the rural communities is considered of importance and believed to have potential beyond wildlife management and community development. It is believed to inspire institutional changes and encourage other communities to influence their own development and demand for more power (Songorwa et al., 2000).

2.1.1 Participation
Public participation is viewed as a necessity to solve many problem issues (Panjabi, 1997). For example environmental degradation requires the action and understanding from all people to be avoided. Different levels of public participation are found and they range from passive to active self-mobilising actions (Songorwa et al., 2000; Barrow et al., 2000; IIED, 1994). Passive participation implies a limited involvement in decision-making whereas the active participation implies an extensive involvement (IIED, 1994).

Participation is in general seen to be an advantage for the promotion of economic development and people ought to influence their own development (Fluri, 1998). Participation should ensure better decisions for the people they target, because the decisions reflect the needs of the people and are taken or influenced by people living in and knowing the conditions of their society and environment (IIED, 1994). Participation is also seen, especially in the case of development in developing countries, as a mean of self-help, where people can take part in the development and be subjects instead of objects of their own development (Fluri, 1998). Participation is thereby a means or a strategy to obtain a desired development and empower the people to ensure continuous development.

Part of the reasoning behind participation in relation to CBMW, is that the African rural communities have traditionally been involved in management of natural resources and wildlife. Their knowledge is understood to be an inherent part of their culture or lifestyle (Songorwa et al., 2000; IIED, 1994). As Elliot (1998) phrases it ‘Indigenous people are the original sustainable developers and have often been able to live well in what others might consider marginal environments’. Not all agree with this, and Songorwa et al. (2000) claim that the communities’ traditional knowledge of wildlife and utilisation was lost long ago and does therefore not constitute a reason for participation.

2.1.2 Property Rights
Empowerment is not just about participation, but is also to have communal ownership and tenure of natural resources. If there is no ownership the utilisation and management of renewable resources will be inefficient and might lead to extinction, as there is no sense of responsibility towards the resources (Elliot, 1998; IIED, 1994; Hardin, 1968).
Through communal property rights the communities seek to promote the productive capacity of the communal resources. It gives the communities the rights and duties over the land, and decisions concerning the land are made collectively within an internal organisation, which also has to coordinate with external institutions (Forni, 2000). The communities have the right to exclude non-members from utilising or benefiting from the land. Even though outsiders obey these rules the possibility of a degradation and overexploitation is still present (Turner et al., 1994). This can result from the owners, who in their own self-interest use more than they have agreed to. This cumulative effect results in a worse case of overexploitation of the ecosystem, as known in Hardin's (1968) 'Tragedy of the Commons'. Ways to overcome such a potential tragedy of people free-riding is either by having utilisation levels below the sustainable yield, which will be explained later, or to regulate and control access (Miller, 2000). Additionally, cooperation and collective action is put forward as a means to avoid free-riding, and the presence of information and transparency are also important for communal ownership to function (Forni, 2000). Yet another factor that has proved to be problematic for communal land ownership is human population growth. This results in increased pressure on the land and over-exploitation of the natural resources because the communal land and facilities cannot satisfy the needs of the people (Barbier, 1998; Turner et al., 1994).

Although Songorwa et al. (2000) do not think that the African Governments are prepared to devolve authority and responsibility for wildlife management to local communities this is still what the CBMW approach aim at. The reasoning is based upon the assumption that undefined or no property rights are a serious threat to wildlife, 'because without clear property rights and incentives no one will invest in securing benefits from a resource' (Naughton-Treves & Sanderson, 1995). Devolving ownership to a community is therefore partly based on this threat of degradation and the view that 'local people best understand their own environment and hence are best capable of managing natural resources in a sustainable way' (Turner et al., 1994), which again refers to the inherent knowledge and the arguments for enhanced local participation.

2.2 Sustainable Utilisation of Wildlife

CBMW recognises the functional value of biological diversity and the fact that humanity cannot preserve it, but has either to use it sustainably or loose it. The traditional conservation strategy 'has been challenged by the notion of sustainable development' as Hulme & Murphee (1999) phrase it. Viewing the natural resource populations as renewable, they can be utilised as far as their sustainability and survival as populations are not compromised.

Biological diversity can be subject to both consumptive (hunting) and non-consumptive (game viewing) use (IIED, 1994). In this context of CBMW only consumptive use of wildlife will be considered. Even though a wildlife resource is renewable, it does not imply that it is not exhaustible. The resource has to be managed in a sustainable fashion, where the harvest is not higher than the resource's regeneration (Turner et al, 1994). It is therefore important to know a population's growth and rate of increase. Both strong and weak levels of sustainability can be applied to harvesting levels and they relate to what level of precaution that is adopted. Weak sustainability accepts extinction of a species in return of economic revenue, where strong sustainability would not accept any substitution for example (Hulme & Murphee, 1999; Turner et al., 1994). It thereby relates to what level of environmental change in the ecosystem that is accepted.
2.2.1 Population Growth
Ideally a wildlife population \( N \) rises from a low density to its carrying capacity \( K \) over time \( t \) (Begon et al., 1996), as the sigmodal population curve in figure 1 illustrates. This implies that regeneration of the particular wildlife species varies with population size and that a wildlife population does not have indefinite growth but stabilises around a carrying capacity, which is the maximum population a given ecosystem can support. The 'intrinsic rate of increase'- \( r^6 \) is dependent on the population size and carrying capacity and is expressed by the logistic equation \( \frac{dN}{dt} = rN^*(1-N/K) \) resulting in the sigmodal curve (Begon et al., 1996; Miller, 2000).

The logistic model is a simplified picture of a species in an ecosystem, as factors like inter- and intraspecific competition, seasonal fluctuations and human interference are not included. Nevertheless the logistic model has often been used for other extended population models (Begon et al., 1996; Miller, 2000).

Figure 1: Logistic population growth curve. Adopted from Miller, 2000

2.2.2 Maximum Sustainable Yield
One model derived from the logistic model is a population-harvest model, where the harvest of a species can be determined based on \( r \) (Begon et al., 1996). The goal is to avoid over- and under exploitation and determine the maximum sustainable yield (MSY), being; 'The largest harvest that can be removed from the population on a regular and repeated basis' (Begon et al., 1996). As figure 2 shows the maximum sustainable yield is below the carrying capacity of the species and where the rate of increase is highest. Due to the fact that MSY is a simple estimate caution should be taken in relying on it (Caughley & Sinclair; 1994; Begon et al., 1996).

The caution for applying MSY to determine the harvesting level of a species is based on the shortcomings it has when it, likes the logistic growth curve, treats the population as one entity and does not account for the population structure. It relies on a certain rate of increase and does not take into account yearly variation in the environment, which can change the carrying capacity. Furthermore, it can often be difficult in practise to obtain a realistic MSY estimate due to lack of information on birth and death rates (Begon et al., 1996). A wrong estimation can result in overexploitation. Another problem relating to harvesting levels and when to initiate a harvest, if MSY is not applied, is to determine the minimum viable population number that could allow for harvesting. This has proved to be a difficult estimate to obtain as well (Begon et al., 1996).

Sustainable harvest of wildlife is important for CBMW to be able to have continuous positive cash flows from tourist hunting for example. But, so far harvesting of wildlife in Africa has mostly been done by trial and error (Caughley & Sinclair, 1994; Christoffersen et al., 2000). Applying sustainable harvesting levels includes that population growth rates and harvest estimations are made and corrected along with new knowledge and ecological monitoring of the species harvested. This way estimates can be based on biological reasoning and the harvesting quota can be decided on

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6 \( r \) is the birth rate minus the death rate in the population. \( r \) equals 0 at carrying capacity.
according to these estimates. With the estimations shortcomings safety margins can be build in according to the quality of the input data to avoid over- and under exploitation of the species (Begon et al., 1996). But, harvesting of wildlife itself is not just an advantage for CBMW in terms of the positive cash flow; it is also advantageous because it can decrease the well-known conflict between wildlife and humans (Newmark et al., 1994).

3 Community Based Management of Wildlife in Tanzania

The global and local responsibility for sustainable development has been adopted at the international level through international conventions. These recognise the need for empowerment through participation and utilising people’s traditional knowledge in the Rio Declaration and the Agenda 21 agreements from United Nations Rio Conference on Environment and Development (UNCED) held in 1992 (Elliot, 1998). Regarding the importance of biological diversity it has been stated in the Convention on Biological Diversity from UNCED. The Rio Declaration advocates that the precautionary principle (Principle 15) is applied to avoid irreversible actions, when scientific uncertainty is evident (Elliot, 1998). These agreements do then in rhetoric support the concepts laid down by CBMW.

The Government of Tanzania has signed to the Rio Declaration, Agenda 21 and the Convention on Biological Diversity (Christoffersen et al., 2000; Severre, 2000). Tanzania should presumably be interested in following the concepts of these multilateral agreements and be an advocate for CBMW. This chapter briefly discusses the need for CBMW and the wildlife policies in Tanzania implying whether the international agreements have been implemented in the national policies.

3.1 Need for Community Based Management in Tanzania

There is a need for management of wildlife and to empower the people of Tanzania. Without proper management of the natural resources they will be depleted and future generations’ ability to be meet their needs will be compromised.

The human population growth rate has been high, 3-4% increase annually, but has today levelled of to around 2.6% annually for the 36 million people living in Tanzania (Severre, 2000; ODCI, 2001). With up to 80% of the population being dependent on agriculture for their living rural smallholder subsistence agriculture is a characteristic for Tanzania (Tenga, 1998). The growing poor rural population has to rely on natural resources to satisfy their daily needs and this intensifies the conflict over land and natural resources (MNRT, 2001). This conflict has in turn affected the expansive wildlife habitats of Tanzania, which have started to decline both in quality and quantity (MNRT, 2001; Severre, 2000; ASOS, 2000).

To change this pattern the Government has to prove its reliability to the majority of its people and not be the obstacle for an implementation of CBMW. It could be the solution that could turn the
downward spiral in some areas of the country depending on, the specific conditions where it is operating.

3.2 Wildlife Management Areas
In rhetoric the Government of Tanzania appears to be an advocate of CBMW, as some of the concepts in the multilateral agreements have been incorporated in the newer ‘Wildlife Policy of Tanzania 1998’ (Walsh, 2000). This policy places emphasis on community participation and promotes the establishment of Wildlife Management Areas (WMA) in buffer zones to National Parks, in Game Management Areas and on General Land (Severre, 2000). The policy thereby moves Tanzania away from the traditionally wildlife protection with prohibitive wildlife laws under the concept of ‘fines and fences’, enforced by the ‘The Wildlife Conservation Act No. 12 of 1974’ (Zacharia & Kaihuha, 2001; Walsh, 2001). With recognition of how essential participation and property fights are for sustainable wildlife management, the Government intends to devolve the responsibility, management and the beneficiaries of wildlife to the local communities in the WMA’s (Zacharia & Kaihuha, 2001; Danida, 2000).

To avoid potential tragedies of the commons in WMA’s the importance of cooperation and collective action is stressed. This should be established with an internal organisation referred to as the Community Based Organisation (CBO) (Christoffersen et al., 2000). The CBO will consist of representatives from all participating communities and other stakeholders involved in the management of an area (DJ, 2001). Furthermore, to prevent over utilisation in the area development of land-use plans for the communities’ own land and a management plan for the wildlife area, are prerequisites according to the draft WMA- regulations (DJ, 2001). The communities cannot set the wildlife harvesting levels themselves, but can suggest levels, which the Director of Wildlife\(^9\) can use as input to determine the quota (SCP, 1998). Previously the quota setting has been done by ‘by educated guesswork’ (From Caro et al., 1998) and applying proper biological reasoning should now follow the precautionary principle and result in sustainable quota setting.

When initiating WMA’s, ‘the Government will have its hands off but its eyes on, to ensure that sustainable conservation and development is attained’ (Severre, 2000), which gives the government an opportunity to assess, whether it can leave the responsibility to the rural people. The guidelines for WMA are not in place yet, but they are expected to be complete and accepted in the near future (DJ, 2001). They are, according to Walsh (2000), urgently needed to support CBMW and the pilot projects set up in Tanzania since the 1980’s. Songorwa et al. (2000) question, whether the policies are more than just rhetoric and do not believe that the Government of Tanzania is prepared to act according to this in practise. Barrow et al. (2000) agree with this, saying that even though the policy is innovative and supportive for CBMW ‘there is a major gap between policy and practise’ in Tanzania. Nevertheless the necessity of CBMW is present and the upcoming WMA guidelines can still prove that both international and national policy and practise can be cohesive.

4 Wami-Mbiki Community Based Natural Resource Protection & Utilisation Project, Tanzania

‘Wami-Mbiki Community Based Natural Resource Protection and Utilisation Project’ –WMP - is one of the pilot CBMW projects set up in Tanzania (DJ, 2001) and it is the project subject for analysis in this study. This chapter introduces the background and the conditions surrounding WMP

\(^9\) Head of Wildlife Division of the Ministry of Natural Resources and Tourism (WD).
and how the project intends to obtain empowerment and sustainable utilisation of wildlife through the activities planned.

4.1 WMP Set-up & Objectives
WMP is set up in Morogoro and Bagamoyo District in the Coast and Morogoro Region, with Morogoro as the largest nearby town (DJ, 2001) - see map 3. WMP covers 4000 km² of which 2500 km² is core-protected wilderness area. The remaining surrounding area is village land belonging to the 23 villages participating in the project. The villages are located 5-15 km away from the core area (DJ, 2001). WMP operates from Mkongo Camp in the core area – see map 4.

Map 3: The location of the Wami-Mbiki area in Tanzania

Map 4: The Wami-Mbiki area. The black line indicates the border of the core area and the black dots the villages participating in WMP.

The NGO, the Danish Hunters Association (DJ)¹⁰ set up a joint WMP in 1997 with the Central Government and the Wildlife Division of the Ministry of Natural Resources and Tourism (WD) in

¹⁰ DJ is a NGO with approximately 93,000 members throughout Denmark. The purpose of the association is to ensure Danish hunting interest, game availability and hunters reputation. The association is represented in the Danish Ministry of Environments Wildlife Management Council, which advise on hunting and wildlife and the International Hunting Council (Jaegerne, 2002).
Tanzania. WMP receives external financial funding from the Danish Ministry of Foreign Affairs (Danida) (MNRT, 2001; DJ, 2001).

The main objectives of WMP are ‘sustainable management of wildlife by the local communities and socio-economic development or poverty alleviation in those communities’ (DJ, 2001), which is in line with the general objectives of the CBMW approach. With DJ being primarily concerned with conservation of wildlife and nature, this is where the main emphasis for the project is made. The project differs from other CBMW projects in the fact that the Wami-Mbiki core area belongs to the category of General Land, which will be described later (DJ, 2001). Most of the CBMW projects are set up in game controlled areas or buffer zones to a National Park (Danida, 2000).

4.2 The Wildlife Area & the People

The category of General Land implies that the Government owns the land and it allows for general access and utilisation under certain restrictions with a permit from the District Authorities (Rwegasira, 2001). However, the previous utilisation in the Wami-Mbiki area was not controlled and utilisation happened at a faster rate than the resources regeneration and thereby threatened the biological diversity in the area (Rwegasira, 2001; Robertson, 1999). The area therefore represents the general decline of wildlife habitats in Tanzania and Africa in general. Because of the overexploitation the core area is at present closed for utilisation by WD in order to leave the ecosystem to regenerate. Despite the active protection of the core area it does not have any conservation status and is still General Land. The project aims at getting the WMA status for the core area once the guidelines are in place (DJ, 2001).

The core area of Wami-Mbiki consists mainly of the miombo woodlands 11, semi-open plains and a smaller percentage of thick bush and rocky outcrops and the area centres on the River Wami, which is a permanent source of water running through the area (Berg, 2000). Except for rhino and wildebeest, most of the East African wildlife species 12 are present in the core area, but the population numbers remain low with a total density of 5 wildlife species per km² (GC, 2000). Despite the small wildlife populations the core has been characterised by having ‘a high potential for game hunting by local and international hunters, initially as “plains game” hunting, but eventually also as trophy hunting’ (Danida, 2000). Tourist hunting represents a promising economic opportunity in the area. Tourist hunting of elephant, lion, leopard and buffalo have been estimated to generate net revenues of 150,000 US$ (135 million TSH) per annum for the core area (Danida, 2000).

There are approximately 55,000 people in the area and the size of the 23 villages differs in the number of inhabitants and tribal backgrounds 13. The sizes ranges from around 900 to 7400, but the majority of the villages are inhabited by a couple of thousand people (VP, 2000; Danida, 2000). The people are representative of the majority of the Tanzanian population by being poor people dependent on subsistence agriculture and are according to the review mission of Danida (2000) ‘best characterised as survivors always looking to make ends meet from season to season’.

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11 Miombo woodland is the main forest type in Tanzania (MNRT, 2001). It is characterised by the two leguminous trees of the genera Brachystegia and Julbernardia (Chidumayo, 1997).

12 Of the species present can be mentioned elephant, hippo, buffalo, giraffe, sable antelope, eland, kudu, impala, hartebeest, waterbuck, duiker, zebra, warthog, lion, leopard, hyena and crocodiles (Berg, 2000).

13 The people belong to Zigua, Kwee, Kani, Kutu or Luguru tribe. Two of the villages though are resettlements of the Masai people (Danida, 2000).
people do apparently have limited capacities and capabilities in terms of management and knowledge of sustainable natural resource utilisation (Danida, 2000). Nonetheless, the villages have decided to participate in WMP and accept that there is no utilisation in the area at present. Generally, they view the project as ‘a safeguard against intruders’ (Danida, 2000).

4.3 Activities & Phases
In relation to the conditions surrounding the wildlife and the people, WMP’s focus is made on protection of the core area, development of public facilities, capacity building in the communities in terms of wildlife management and administration and cooperation among the villages. The project firstly aims at a restricted local utilisation of natural resources and in the longer term, by the year 2007, to initiate tourist trophy hunting of wildlife and make this the main economic activity and income source, which should add to the communities’ livelihoods (DJ, 2001).

WMP has acknowledged from its own and others experiences that CBMW is a time consuming process. Therefore a period of at least 15 years is considered realistic before the villages will have the capacity and capabilities to be in charge of community development and wildlife conservation. WMP has so far been perceived in three phases where the 1st phase is coming to an end in January 2002. The main proposed activities within the three phases are listed below. All activities within the first phase have been initiated and in most places completed (DJ, 2001).

Phase 1, (1997-2002):
- Active protection of the core area. One WMP game scout has been selected from each village to carry out the protection and anti-poaching effort
- Establishment of Natural Resource Committees (NRC) with 9 members in each village
- Seminars on natural resource management
- Setting of boundaries between villages and core area
- School development project, restoration of old school buildings, building new class rooms or building a teachers house supported by Tanzanian Schilling (TSH) 1 million (1100 US$) per village

Phase 2, (2002-2007):
- Establishment of the CBO Wami-Mbiki Authorised Association (WMAA) and transfer of responsibilities for protection and development activities to this
- Attain the WMA-status for the core area and develop management plans for both the core area and the village land
- Dispensary and clean water development projects each supported by 1 million TSH (1100 US$) per village
- Initiation of local natural resource utilisation
- Seminars and education on administration of funds and natural resource management
- Late in the phase test hunting of wildlife

- Review if this phase is needed and where capabilities are lacking. Give support where this is needed for the villages and the WMAA to carry on with the activities by themselves

4.4 Empowerment & Sustainable Utilisation of Wildlife
The empowerment of people through participation and property rights is to some extent currently limited at WMP. Participation is where the project so far has had the greatest opportunity to empower the people through the active protection of the core area, capacity building on natural resource management and with the supply of a working force for development projects (DJ, 2001).
The review mission of Danida (Danida, 2000) found a very strong local interest for WMP, which could point towards active participation and a desire for empowerment. This empowerment will enable a continuous development carried out by themselves. Property rights will be gained in the future through the establishment of the WMA’s (DJ, 2001), which gives the people the opportunity to have the responsibility for the core area, but it is still uncertain when this will take place. The establishment of the CBO WMMA and management plans will prepare the villages for the WMA status (DJ, 2001) and increase cooperation, collective action and responsibility to avoid an unsustainable use of the area.

The utilisation of wildlife at Wami-Mbiki is dependent on both the WMA and the Director of Wildlife to re-open for utilisation (Danida, 2000; SCP, 1998) and has therefore not been practised yet. The wildlife populations in the Wami-Mbiki area are generally low (GC, 2000), which indicates that they are far from the carrying capacity of the ecosystem. The potential for increase should therefore be high and since the initiation of the project in 1997 the wildlife populations have also been increasing according to the recent game censuses (GC, 2000). However, these are not scientifically acceptable (Danida, 2000). The increase in wildlife populations has been backed up by anecdotal accounts from the participating villages. Furthermore the amount of poachers arrested has significantly increased after the anti poaching effort was initiated (Rwegasira, 2001). This indicates a decreasing poaching level and that the protection of wildlife has so far been successful.

The activities planned for the future point towards a more extensive active participation and empowerment of the people and sustainable utilisation of the wildlife populations. But, this is not dependent on just the activities taking place. The people must be interested in the project and the wildlife populations must be present in adequate numbers.

5 Field Study Objectives

To identify opportunities and constraints for WMP, concerning its potential as a sustainable development scheme, it is necessary to get more insight in the conditions surrounding the people and the wildlife. This chapter goes through the questions raised for the field study at WMP to get more insight in the people and the wildlife.

5.1 The WMP Villages

The incentives for participation in WMP are considered important for the project, as the incentives will be the driving forces for the villages’ commitment, loyalty and participation in WMP. The villages participating in WMP have decided to do so based on a range of incentives, which differ according to individual conditions and circumstances within the villages. The choice of participation and the activities offered by WMP is what the villages have in common and this indicates a common interest for WMP despite other differences. The focus on incentives will therefore be in relation to the conditions which WMP target, both to be able to identify whether they represent incentives for or against participation and to indicate how well targeted WMP is for the villages. The specific question asked is:

What are the villages’ incentives for participation in WMP?

This will not only reveal the incentives but also indicate how strong they are for continuous participation. In relation to WMP’ objectives and planned activities the attention is made on the villages’ economic conditions, their needs for public facilities, their needs for natural resource utilisation and their capabilities of wildlife management. Furthermore their historical use of the area
and their present project experiences are included, as this is expected to also influence the incentives.

Another incentive to participate in a project is the understanding of what it is, you are participating in. The villages might have one or more understandings of what WMP is about and trying to achieve, which differs to those of the project. This could be a problematic issue for WMP. If there are conflicting understandings the villages’ expectations will not be fulfilled and this could affect participation. Comprehension is thereby viewed as another important aspect of incentives for participation. The specific question asked is:

What are the villages’ comprehensions of WMP?

The attention here is on the present understanding and the future expectations of the project. This will give an indication of how well their understanding is, in relation to WMP’s objective and its present and future activities.

Even though the villages’ incentives for participation might be well founded and the comprehension of the project might prove to be in accordance with the project, it does not necessarily mean that the project will represent a sustainable development in the long term. Human population growth and the increase in wildlife populations have in other similar contexts been known to create problematic situations (Turner et al, 1994; Newmark et al, 1994). It is therefore of interest to question whether they represent potential problems to the villages and WMP in the long term.

5.2 The Wami-Mbiki Buffalo

Many factors influence the wildlife populations and their potential increase. It is therefore considered of importance for WMP to know more about these factors, as they will affect the potential harvesting levels of the wildlife species. The factors affecting a population include intra- and interspecific competition, diseases, human and environmental disturbances such as poaching and droughts (Miller, 2000; Begon et al., 1996). To identify these factors and the ones which are the most profound currently would facilitate management whereby the present critical factors could be diminished and allow for high rates of increase. Furthermore it is with this knowledge possible to identify possible population increases and thereby harvesting levels of the wildlife populations.

The African Buffalo –*Syncerus Caffer*-, is in Tanzania among the principal species hunted, since Tanzania has a reputation for having the largest buffalo of all the African countries (Leader-Williams et al., 1996). Furthermore substantial prices up to 25.000 US$ (225.000 TSH) are paid for a 2 week trophy hunt including hunting of buffalo (Caro et al., 1998; Wilkie & Carpenter, 1999). With the presence of buffalo in Wami-Mbiki this could substantially add to the livelihood of the villages when tourist hunting is initiated. The African buffalo at Wami-Mbiki has been subject to heavy poaching (Berg, 2000; Massawa, 2001), which has resulted in a population of only 200 individuals (GC, 2000).

With a focus on the African buffalo at Wami-Mbiki it would be relevant for the project to identify the factors affecting population dynamics. The specific question is:

What are the factors, which could affect buffalo populations in Wami-Mbiki and which ones appear to be limiting current population growth?
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The attention here is only on buffalo, but this will not only give an indication of which factors can be limiting for buffalo, but also for the other wildlife species at Wami-Mbiki.

Both local utilisation and tourist hunting of wildlife is expected to add to the livelihoods of the WMP villages in the future. WMP has decided to wait until 2007 before introducing tourist hunting allowing the ecosystem to regain its resilience and the wildlife populations to increase. However it aims at a local utilisation before this time. To identify the possible factors that can influence the buffalo population and its rate of increase also creates an opportunity to estimate harvesting levels. It is therefore of interest to question the possible levels of harvesting and when local or tourist harvesting could be initiated.

6 Field Study at Wami-Mbiki, Tanzania

The primary data collection for the social and biological analysis was carried out during the dry season from the 26th of July to the 26th of September 2001 from Mkongo Camp, Wami-Mbiki, Tanzania. The establishment and arrangement of the stay was planned in collaboration with WMP’s Project Leader J. Korning (DJ) earlier that year. This chapter goes through the methods and the data collection carried out during the stay.

6.1 Mkongo Camp, Wami-Mbiki, Tanzania

At WMP’s main office and project camp Mkongo fieldwork ideas and proposals of obtaining the required information to answer the proposed questions were developed with WMP’s Chief Technical Advisor A. Busk Petersen and Capacity Building Officer H. Chale. The most appropriate and efficient methods for obtaining the information were decided to be a mixture of qualitative and quantitative research and this required drivers, interpreters, and game scouts from WMP. The research consisted of:

- Semi-structured interviews in the Wami-Mbiki villages
- Questionnaire for WMA game scouts
- Identification of buffalo habitat in the Wami-Mbiki core area
- Interview with key-informant

6.2 Semi-Structured Interviews in the Wami-Mbiki Villages

In order to obtain an insight in to the villages’ incentives and comprehension of WMP interviews in each of the 23 target villages was preferred. Since the villages are known to have cultural differences it was considered important to get the viewpoint from all participating villages and not generalise from a few selected villages. Because of time constraints and the dependency on drivers and interpreters to conduct the interviews it was only possible to make one interview with a limited number of people in each of the 23 villages.

To conduct the interviews a semi-structured interview technique (Andersen, 1990; Buciek, 1996) was used. This implies an interview with certain themes and questions to be covered, but at the same time the technique allows for flexibility and coverage of other issues if appropriate to the interview. Furthermore one can add in specific questions to clarify circumstances and ask people specifically about their views when necessary (Andersen, 1990; Buciek, 1996). This technique was considered to be most appropriate for the purpose of the interview. It reminds of a conversation and

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14 A Capacity Building Officer is responsible for capacity building, development projects and communication with the villages. The employed Capacity Building Officers are all of Tanzanian nationality and have completed a bachelor university degree in community development or wildlife management.
this is suitable to reveal people’s incentives and comprehension, as these are not straightforward questions to ask. A mixed group of people of different age, sex and position in each village were interviewed and their statements were used as the overall broad view for the village. An interview does not necessarily reflect the views of all villagers in that particular village. The information does therefore represent indications of views and circumstances on a village level.

An interview guide for the semi-structured interviews was developed in relation to the stated objective of the study covering the following themes: The interview group and the village; The Wami-Mbiki project; The needs of the village in relation to the project; The buffaloes of Wami-Mbiki - see Appendix 1 for the interview guide. The interview-sessions lasted from 1/2 an hour to 1 hour and were typically held at the villages’ schools. In most cases the interviews were conducted after a general meeting held by Capacity Building Officer H. Chale, M. Sakaya or H. Ngelima evaluating the successes and the problems of WMP at the current stage. This meeting could last from 1-3 hours. It was a time consuming process to attend the meetings and in some cases it meant limited time for the interview. Attending these general meetings assisted in generating a positive outcome of the interviews, as the people were more relaxed towards my presence and talkative compared to the few cases where no general meeting was held before the interview.

One of the Capacity Building Officers would act as interpreter during the interview session. Questions, themes and objectives for the study had been discussed beforehand. The interpreter asked the questions in a manner, which he or she found appropriate for the villagers and would summarise the content of their answers. This is both seen as an advantage and a limitation. It is an advantage in the sense that the interpreter knows the villagers and how to tackle them, and that the villagers feel safe in the interpreters presence. But it also constitutes a limitation for the interviews, as the villagers might feel restricted in answering sensitive questions about hunting and the project when the interpreter is from the project. Additionally when the interpreters ask questions it is the interpreters’ subjective view on what he or she thinks I intend to ask about. Furthermore she or he can make a subjective selection on the information given by the villagers, which is not possible to control when the language is not spoken. However it was my impression that the villagers were not restricted in talking openly and that the Capacity Building Officers had a good understanding of the objectives of the interviews and that they were reliable in their translations, but this of course is also a subjective view. It should though be mentioned that the quality of the interviews increased along with the number of interviews conducted as both the interpreters and I became more confident with the method and each other.

The interviews differed according to the amount of people present. Seven interviews were made with a small group of 5-6 men and women ranging from the age of 16 –80. The people were either members of NRC, the Village Government (VG) or ordinary villagers and the interviews had a character of an informal conversation. 16 interviews were made with a larger group ranging from 12-30 persons. The difference in age and occupation was similar to the small group. Men dominated at these interviews and due to the larger amount of people present these interviews were more formal and had a character of an open question session. The large group interviews consisted of the people participating in the previous general meeting and typically some people were more dominating than others. To interview these people was an agreed compromise with the interpreters, as it was a very time consuming process to gather other people in the villages. In order to get viewpoints from all 23 villages this compromise was accepted. When analysing the information from the interviews it should not be overlooked that with members from NRC and VG and people participating in the general meeting it is the more well-informed and influential people in the
villages that express their views. These people might very likely have more knowledge than the average villager concerning the questions asked.

The pros and cons of using a semi-structured interview in this context is summarised below.

**Possibilities with the technique**
- You can have a structured but still flexible interview when appropriate
- You can ask sensitive questions and can add in questions that can clarify circumstances
- You can ask people specifically to get their view represented
- The interviewed know the interpreters and can feel safe in their presence

**Limitations with the technique**
- You must rely on an interpreter for asking the questions in the right manner
- You must rely on the interpreters' judgement of the interviewed answer
- The interviewed can feel restricted in talking openly when the interpreter is from the project
- The interviewed might tell what they think you want to hear instead of the real circumstances

### 6.3 Questionnaire for WMA Game Scouts

Primary information on the buffalo populations present in Wami-Mbiki was necessary in order to indicate factors affecting the buffalo population and future harvesting levels. The information was collected through questionnaires answered by the game scouts employed by the project. As these people work in the field every day and the Wami-Mbiki buffalo is not very often seen it was assumed that they would have the most available and valuable information.

The questionnaire was developed according Neuman's (1997) principles for constructing a questionnaire. The questions asked were a mixture of close- and open-ended and dealt with the buffalo in Wami-Mbiki. The questions covered population numbers, habitat and feeding, diseases and poaching. Some advantages of using close-ended questions are that they are easy and quick to answer and comparison of answers is easy. For the open-ended questions they allow for detailed answers and responses can be qualified and clarified. Some disadvantages of using close-ended questions are that they can be answered without having an opinion or knowledge and there is a possibility that misinterpretation can go unnoticed. For the open-ended questions different respondents can give different degrees of details in the answers and the comparisons and statistical analysis can become difficult. The advantage of combining both types of questions in a questionnaire is that you overcome some of the disadvantages of just using one of the question forms (Neuman, 1997), which was applied in this questionnaire.

Capacity Building Officer H. Ngelima translated the questionnaire into Swahili and Capacity Building Officer H. Chale and WMP manager T. Semwua crosschecked it. Capacity Building Officers H. Ngelima and M. Sakaya translated the answered questionnaires to English. Due to a few problematic answers I went through the answered questionnaires with M. Sakaya to identify the reasons to these answers and decrease the possibility of misinterpretations.

19 scouts out of the 23 scouts employed by WMP filled in the questionnaire and so did the beekeeper and the fisherman employed by WMP. They are all referred to as WMP game scouts. The scouts are all men between 22 and 48 years old and all have primary school education (standard 7), except for two who have a higher degree. The majority of the scouts have been employed by WMP for 3 years and the rest between 1-2 years. Half of them have previous experience with the Wami-Mbiki core area from lumbering, charcoal burning, herding, hunting and fishing etc. It
should not be neglected that the scouts have more practical knowledge than theoretical biological
knowledge. This might be the reason why the majority of the scouts had difficulties in answering
the questionnaire, but it could also be because of the questionnaire was not clear and targeted
enough for the scouts. Only a limited amount of the information gained was considered of adequate
quality to use for analysis.

6.4 Identification of Buffalo Habitat in the Wami-Mbiki Core Area
Buffalo herds are confined to a certain home range and are dependent on water every day (Prins,
1996). To get insight of the buffalo home ranges and the potential habitat in Wami-Mbiki during the
dry season, waterholes and small streams in the core area were visited to identify tracks of buffalo.
Furthermore, areas where game scouts had seen buffalo previously were visited. Whenever a
buffalo track or a buffalo was identified a Geographical Position System reading was taken to
identify where in the area they are known to occur. Due to time constraints this has not been
included in the study and added to the Geographical Information System (GIS) map over the area.
The primary ecological information gathered from this was small, but it has added to the
understanding of the buffalo’s habitat and the ecological conditions facing the buffalo during the
dry season in the Wami-Mbiki area.

6.5 Interview with Key Informant
The final source of primary data stems from an interview conducted with a person well informed
about WMP. WMP’s Chief Technical Advisor A. Busk Petersen was used as a key-informant
(Neuman, 1997) to get more insight into social and biological conditions at WMP. He is the
initiator of WMP and has worked for WMP since 1994. He is of Danish nationality, but has lived in
Tanzania for 18 years. When using the information it should not be neglected that the opinions are
subjective and are not necessarily held by everyone involved in WMP.

7 Behind the People of the Wami-Mbiki Villages
The conditions surrounding the villages participating in WMP create incentives for the people for
and against participation. The villages’ incentives and comprehension of WMP will in this chapter
be analysed and discussed based on a continuous presentation of information gained from the semi-
structured interviews in the 23 villages. A causal loop diagram (CLD) will illustrate the villages’
combined comprehension of WMP. Future human population growth and ‘problem animals’ will
also be discussed.

7.1 Findings & Analysis of Incentives for Participation in WMP
In order for the WMP to work it requires that the target villages have an incentive to participate.
These incentives not only indicate whether this represents reasons for continuous participation, but
also how well targeted the project is for the villages.

7.1.1 Historical Use of the Wami-Mbiki Area
The villages that are part of WMP have all been utilising the natural resources of the core area in
the past and as the people in Mkono Wa Mara village said ‘Since we remember we have used the
Wami-Mbiki area’. Only Maseyu village claimed that they had never been dependent users of the

15 The GIS map only shows rivers, Mkongo Camp and the villages’ position.
16 A Causal Loop Diagram is a tool to visualise the understanding of a given system and the dynamics within it. It
shows the actors and the factors, how these affect each other and together result in an outcome. Circular connections
and feedback can be identified and it is possible to get an overview of the forces working in the system.
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Wami-Mbiki area. The majority - 21- of the villages have been dependent on the Wami-Mbiki area for hunting of wildlife and the species most hunted were impala, hartebeest, buffalo, elephant and giraffe. Only the two Masai villages have not been hunting wildlife to satisfy their need for protein, but to get the fur. A villager in the Masai village Mindutulieni expressed: *'We have never liked hunting and it is not part of our culture – we don’t even like the meat!*’ Half of all the villages have further been fishing in the River Wami; got honey from beekeeping and collected traditional medicines and ‘mwidu’ and ‘kindu’, which they use to make mats and baskets of. Kinzagu, Makombe and Visakazi village stress that the area has helped them to satisfy their food demand through the dry years. A couple of the villages further mentioned that they used to live in the area and had agriculture and grazing livestock there. For those living in the area it also meant that their ancestors were buried there. Additionally a few villages mentioned that people used the area to collect roots and worms, to get timber and firewood, and carried out charcoal burning.

From the interviews it is evident that the communities that are part of WMP have all been dependent on the natural resources in the Wami-Mbiki area. They have a strong relation to the area in that it has helped them make ends meet. The dependency and their varied and multifunctional utilisation of the area indicates that the people are well acquainted with their surrounding environment and the Miombo woodlands and the functions they offer. But, the information also indicates that the individual villages’ utilisation of the natural resources differs according to their cultural background.

These findings relate to the conditions facing many poor rural people in that they have to rely on natural resources for their daily survival (UNCTAD, 1995). It further relates to the statement put forward earlier on rural people’s inherent knowledge of their environment and utilisation of natural resources (Songorwa et al., 2000; Elliot, 1998; IIED, 1994). The people of Wami-Mbiki belong to these categories and the previous utilisation pattern is in harmony with that knowledge available among the elderly people and not the younger, which has been identified by WMP (DJ, 2001). With regards to this previous dependency, the villages have a reason to be interested and a strong incentive to participate in the project when they in the future can rely on some of these resources for their living. But, at the same time they appear to have different interests in how to use or what to gain from the area relating to their cultural beliefs and customs.

The question that arises from this is if the villagers still have the same need for natural resource utilisation. According to Danida’s review mission they do not, have a need for utilisation as the villages had never had an intensive use of the core area and did not feel deprived from the present closure of the area (Danida, 2000). This contradicts the present indications, which although it cannot specify the intensity of utilisation, can point towards a dependency on the area. Another question is if they are able to have a sustainable utilisation considering the previous overexploitation. These issues will all be returned to later.

7.1.2 Economic Conditions in the Villages

The villages participating in WMP are all living on subsistence agriculture and their production per household in the villages’ ranges from 2 – 20 bags\(^{17}\) of maize per year. Five of villages additionally mentioned that they had livestock keeping. The general earnings from the maize productions range from 9,000 to 200,000 TSH or around 10 to 220 US$ per year per household\(^{18}\). The earnings are without doubt very little to survive on for a family and as a villager from Visakazi said: *This makes*

\(^{17}\) 1 bag holds 20 kg.

\(^{18}\) Household size ranges from 2-10 people.
up the poorest region in Tanzania. Some people survive by eating cassava'. A few villages expressed the need for more support in the future, not only in terms of initiation of development projects but also finances. A villager in Kwamsanja said: 'We would like in the future to have an increase to Tanzanian schilling 2 million per village' (2200 US$).

From the information it is clear that the WMP villages are faced with socio-economic conditions that favour participation in WMP from an economic perspective. WMP represents an opportunity to increase the general standard of living in the village and there are clear indications that the villagers are too poor to initiate the improvements in their villages themselves.

In relation to the findings it should be mentioned that agriculture is not the only source of income, but the people do apparently live under the international poverty line. Other sources of income that add to the household economy are charcoal burning, production of local brew and causal labour (Danida, 2000). Though the general production and earnings were a rough estimation there appears to be a clear difference in earnings between the villages. Furthermore, there is a difference in population size between the villages, which results in substantial differences in support from WMP per village, as they all get 1 million TSH (1100 US$). Overall 23 million TSH distributed among 55,000 peoples gives around 420 TSH (0.5 US$) per head, but the amount ranges from 135 TSH (0.15 US$) per villager in Kidudwe village to around 1100 TSH (1.2 US$) per villager in Kinzagu and Pongwe msungura villages. The development activities within the villages and the economic support represent strong incentives for the villagers to participate. But, the economic differences between the villages both in terms of present income and the aid from WMP could be expected to result in a feeling of an unequal distribution of the economic resources and cause internal conflict.

7.1.3 Need for Public Village Development
All the villages were concerned with a lack of access to permanent and clean water and a lack of health services. In the Masai village, Mindutulieni, a villager expressed this as: 'We have a need for a clinic. The nearest clinic is 10 km away and some people die because of that. Another need is water and a dip tank to bath the cattle. Now we only have one tank, and that is used both by the cattle and the people'. Other needs that were expressed in half of the villages were improvement of the dust roads, a tractor and a graining mill for the village. For example, a villager in Pongwe kiona felt that: 'Road construction is definitely what we need most. We will be proud when that problem has been solved', and the Village Chairman in Visakazi expressed that: 'We would like to have agricultural diversity in the village for the benefit of the people living in the village. The hand hoe we use is not efficient', and stressed the importance of a tractor and farming implements to increase the number of agricultural products and the production. Other needs that were expressed in a couple of villages were more classrooms, loans for small-scale business, an office for the village government and electricity amongst other things.

From the interviews it was clear that the villages were perfectly aware of their needs for public village development. The primary needs were factors that would improve their daily livelihood and help to fulfil their basic needs. The secondary needs were more general and could add to the livelihood rather than explicitly being a fulfilment of needs. Furthermore the villages differed in their needs according to what was already available within the village.

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19 There are around 7400 people in Kidudwe village, which is the biggest village (VP, 2000).
20 There are around 900 people in Kinzagu and Pongwe msungura villages, which are the smallest villages (VP, 2000).
As Turner et al. (1994) say ‘Needs are not as substitutable as wants are’ and the villages do first of all express what could be categorised as basic human needs that can not be overlooked. The possibility of meeting the needs exists through WMP and represents therefore a strong incentive for them to participate. But at the same time different needs are expressed and it can be problematic if the villages are not able to influence the village development, and satisfy what they feel are their most striking needs. A villager in Visakazi expressed that ‘Because we have a serious need for a clinic it would have been better for us if we could have used the money for that instead of using it for the school’. Though this was a single statement it could be of critical importance for the future of the project and in general, for the villages’ incentives. Not to have influence represents the passive form of participation (IIED, 1994). The villages could at worst be objects instead of subjects of their own development (Fluri, 1998), if the active participation, which is generally practised at WMP, is not used. Nevertheless, faced with their realities and conditions the villages might not even be critical towards this or oppose it. Little aid it is possibly better than nothing, as Nielsen (2000) says.

7.1.4 Need for Local Natural Resource Utilisation in the Core Area

Most of the villages -18- still have a need for consumptive utilisation of the natural resources in the Wami-Mbiki core area. The primary needs were to have access for hunting, fishing and the collection of ‘mwidu’ and ‘kindu’. Both Makombe and Visakazi village were very excited to start utilisation and as a villager from Visakazi said: ‘For our sake the harvesting could start tomorrow as people are eager to harvest from the area’. Other needs that were additionally expressed in relation to the area were to get honey, traditional medicines, fire wood and to use the area for cultivation and living like they used to do. The five villages - Kwamsanja, Kanga, Mkono Wa Mara, Pongwe msungura and Gwata Ujembe - clearly expressed that there was no need for consumptive utilisation of wildlife. In the cage of Kwamsanja a villager for example claimed that: ‘We do not want to hunt animals, as we want to conserve them’, and in the case of Pongwe msungura and Gwata Ujembe they both expressed a need to go and visit the area and have the opportunity to see the wildlife.

The information given from the interviews clearly indicates that there is a strong need for local utilisation of the natural resources for the majority of the villages which is in favour for participation in WMP. But there are also villages that do not have a need for consumptive utilisation in the Wami-Mbiki core area.

Since the majority of the villages still express a need for consumptive utilisation it gives them strong incentives for participation. But it also indicates that they have not been able to find alternative ways of meeting their needs. This is also what Rwegasira (2001) found in his analysis of four of the Wami-Mbiki villages. Furthermore, it indicates that the school development activities offered by WMP do not substitute the basic human need for food and materials, which they used to harvest in the core area. This is in line with Massawa’s (2001) findings in four of the Wami-Mbiki villages, where he found negative economic impact from the abandoned utilisation. Even though the development activities are considered a compensation by the project (DJ, 2001) it is most probably not what it seems, as it represents a substitution of a basic need with a want (Turner et al., 1994).

The outcome of this could be an increase in poaching from the villages, which according to key informant Busk Petersen, has probably already increased. Besides fulfilling the need itself, poaching could occur because of the tradition and cultural heritage of hunting. According to Gibson & Marks (1995) CBMW-projects ‘fail to understand the significance of wildlife to rural residents
and do not offer sufficient incentives for them to stop hunting'. Gibson & Marks (1995) claim that the substitution of public goods for access to wildlife is unappealing to the rural people. Whether the increased poaching is a result of need or tradition is not possible to clarify here, but the need expressed for local utilisation to satisfy basic needs was clear. This contradicts Danida’s (2000) findings that the villages do not feel deprived by the closure of the area.

It was not all the villages that stressed their need for utilisation of the Wami-Mbiki area and it can be questioned why those villages are not interested in consumptive utilisation. It could be explained by the fact that these villages did not have consumptive utilisation in the past. However according to statements earlier made previous consumptive utilisation did take place. It could also be explained by the assumption that these villages were better of economically and able to satisfy their needs. However only two of the villages have earnings over 100,000 TSH (110 US$) per household per year, which is still low. Yet another reason could be that the villages were subject to the constraints of the interview method in that they felt uncomfortable in being honest towards people working for the project and that they answered what they believed we wanted to hear. This is difficult to judge, but the villagers appeared to speak honestly and were straightforward when answering other questions. What can be said for sure is that it shows a difference among the villages in terms of incentives and needs and wants from the Wami-Mbiki area, but what causes this difference is not possible to clarify from the information available.

7.1.5 Capabilities in the Villages of Sustainable Natural Resource Utilisation

The issue of knowledge and capabilities in terms of previous or future natural resource utilisation was not discussed in all villages. However the following statement were obtained from a few of the villages.

For the previous utilisation in the core area a villager from Mkono Wa Mara expressed that: ‘There has been poachers and this has caused a lot of destruction of the area’, implying that control of the previous utilisation was a problem. A villager from Pongwe msungura expressed that: ‘We basically went for all species when we went hunting’ and another villager from Kaloleni supported this by saying: ‘Long time ago we used to set up nets and take everything that went in there’. Concerning the village land a villager from Kinzagu said: ‘We have finished these things (traditional medicine, roots and wildlife) in our village land that we could need from the core area’ implying a lack of management of the resources. This was clearly spelled out by Mwidu, Makombe and Lukenge villages who expressed a need for education and advice on management of the natural resources. A villager in Mwidu for example said: ‘we need more education on how to manage the conservation of the area’.

Though the information is limited it does indicate that the management or coordination of natural resource harvesting has never been profound in the villages. But at the same time there are indications that some villages have realised the negative impacts of their utilisation and a limitation in their own management capacities.

It is obvious that the previous utilisation has not been managed sustainably and the villages apparently have no inherent sustainability factor in them concerning utilisation, since the area has been subject to overexploitation and reminiscent of the ‘Tragedy of the Commons’. But it should be kept in mind that utilisation was not just carried out by local people, but also by Tanzania residents living further away and that neither of these owned the land and control was limited (Rwegasira, 2001; Robertson, 1999). Furthermore, too many conclusions about their previous utilisation should
not be drawn without considering that both harvesting technologies were less efficient and that the supply of wildlife was higher than the demand as the human population was smaller (Songorwa et al., 2000).

Nevertheless, it is to Songorwa et al. (2000) no surprise that limited management is profound, as local communities have little or no knowledge of how to manage wildlife sustainably and that ‘They only harvested it depending on availability and according to local beliefs, customs and taboos’. The IIED (1994) on the other hand stresses that communities are generally aware of the negative impacts of their utilisation, as they are dependent on it for their livelihood and are affected directly by environmental degradation.

Both of these views can be supported by the information from the interviews. But when including the acceptance of closing the area for exploitation for a while, the need in the majority of the villages for utilisation, and the villagers view on the project as ‘a safeguard against intruders’ (Danida, 2000), the villages do appear to have captured the importance of sustainable utilisation for their livelihood. They have realised their need to improve their capabilities of this and appear to have the desire for empowerment as earlier mentioned. This indicates yet another strong incentive for them to participate in WMP. However, knowledge and capabilities do not necessarily ensure sustainable utilisation, as the individual persons might still act in favour of maximising their own in front of the majority’s situation.

7.1.6 Present Experiences from WMP

Half of the villages have never been part of development and conservation projects before and the other half of the villages have been part of development projects, but on a very small scale. They all express their satisfaction with WMP at this stage though over half of them have experienced one or more problems. These include logistical problems with delivery of materials, communication, equipment for the NRC members, setting of the boundaries between villages and the core area and that they have not received all what was promised. This was seen in the case of Gwata Ujembe where a villager expressed: ‘The project has been going on well especially the development project. We have though experienced some problems with the boundaries between the villages that are not quite clear as they were promised to be’. Despite the fact that a couple of villages had quite a few problems they all felt that as a villager from Gwata Ujembe expressed: ‘Though some issues have not been clarified we still have faith in the project’.

The information from the interviews revealed that the villages do not have any experience with combined nature and development projects. Furthermore it became clear that there have been some problems among others with boundary setting in the initial phase of the project. The villages do regardless of this still have trust in the project.

Past development projects and their impacts can according to Folke (2000) affect the incentives to participate in new projects, but this does not appear to be the case in WMP as the level of experiences is low. According to Nielsen (2000) receivers of aid are often disinclined to be critical towards the project, as they do not want to lose the aid. In this case the villages are critical in that they do express where the project has limitations, but at the same time they express that they do believe in the future of the project. They cannot afford to lose the aid they get from the project and they do not have many other choices than to participate. The fact that the villages do express their criticism must be seen as a positive sign in terms of active participation and points towards not wanting to be objects of development, but wanting to be empowered. Furthermore, it indicates an
interest and a good communication between the villages and the project staff. Additionally, the criticism can to some extent point to the villages not feeling restricted in talking openly in the presence of project employees.

In his analysis of WMP Rwegasira (2001) also experienced the boundary problem expressed by the villages and MNRT (2001) reports of the problem from a Wami-Mbiki project official. In relation to the earlier described importance of property rights and its related responsibility towards land (Turner et al., 1994, Naughton-Treves & Sanderson, 1995), this could be a problematic issue. It could lead to lack of common responsibility of the natural resources and conflicts among the villages if this is not taken care of. The other problems in relation to WMP also need attention and this attention would demonstrate that active participation is practised by WMP in the interest of the villages. This would give yet another reason for participation and can increase the empowerment of the people.

7.2 Identified Incentives for Participation in WMP

From the information and the analysis it is possible to answer the question earlier raised concerning peoples incentives. It is clear that a range of conditions represent incentives for participation and that peoples needs, can be met through participation in WMP. WMP does in this respect appear to be well targeted for the Wami-Mbiki villages, and it indicates that the CBMW-approach has been a positive and adaptive process in accordance with local conditions. The incentives for participation appear to be strong in the sense that the people do not have many other alternatives to escape their present situation if they do not want to leave the area. The villages' identified incentives for participation in WMP are listed below.

Table 1: The Wami-Mbiki villages' incentives for participation in WMP

<table>
<thead>
<tr>
<th>Incentives for participation</th>
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<tbody>
<tr>
<td>Historical dependency of the Wami-Mbiki area</td>
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<tr>
<td>Low economic income</td>
</tr>
<tr>
<td>Primary basic human needs not fulfilled</td>
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<tr>
<td>Need for local consumptive natural resource utilisation</td>
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<tr>
<td>Need to increase capacity of wildlife management</td>
</tr>
<tr>
<td>General satisfaction and faith in WMP</td>
</tr>
</tbody>
</table>

However there are circumstances that can represent incentives against participation. The main problem facing WMP is that it has to wait for the ecosystem to regain its resilience (DJ, 2001) and this means that the villages in the meantime have to fulfil their basic human needs some other way. As Songorwa (1999) argues, there is a possibility that CBMW fails when the costs are higher than the gains. Though this will most properly change with time this is the present situation for the individual people of Wami-Mbiki. Barbier (1998) in line with Songorwa states that: ‘People may be reluctant to wait for future returns from maintaining wild resources, because they are simply impatient for money now, because of uncertainty over the future’\(^{21}\). Despite the people’s active participation and involvement in protecting the core area there are no economic gains yet – except for the external Danida support. Therefore it can become difficult for them to keep their faith in WMP. Without this faith, a lack of basic human needs and a need for natural resource utilisation, the villages’ incentives can disappear. Not because their interest in protection of the ecosystem is

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\(^{21}\) This refers to a high discount rate, which is characteristic for people in developing countries. They value the present goods higher than futures goods (Turner et al., 1994).
simply not present, as Songorwa et al. (2000) claims, but because they cannot forgo their basic human needs for public facilities and ecosystem protection only.

It is also evident from the information and the analysis that while the incentives for participation are similar there are differences between the 23 villages. These differences could have an impact on the project. The differences identified were in relation to previous and future utilisation of the natural resources in Wami-Mbiki, in what were the most urgent needs and in the economic conditions facing the villages. What causes these differences is not possible to say from the available information.

What can be said for sure is that the villages of WMP are not just a parallel group of poor Tanzanian communities living on subsistence agriculture, but they are individual villages with different priorities of needs and wants and cultural backgrounds. It should not be neglected that even though a village is a small entity it still consists of a societal context, which is formed and influenced by many different processes (Folke, 1998; Sorensen, 2000). WMP has recognised that the diverse human cultures in the area can be problematic and make it difficult to solve possible conflicts (DJ, 2001), but the question is how well this is adopted in the project strategies. Songorwa et al. (2000) in their criticism of CBMW put forward the ‘failure to adopt the intended participatory approach and inability to meet the basic needs of the communities’, which they believe is a result of a lack in comprehension of the communities.

The lack of comprehension of the societal context of the participating villages by project employees was not experienced during the fieldwork study at Wami-Mbiki. But what is probably lacking at WMP is realisation of how important this comprehension of the villages is. Why this realisation is apparently lacking, is difficult to say, but it might be because DJ’s and WMP’s first emphasis is on wildlife protection. However, without using the valuable knowledge in the participation process it is difficult to have a subjective development and an avoidance of conflicts (Fluri, 1998). A first suggested step to improve the situation could be a development of individual village strategies, that would include a prioritised list of the needs and wants in relation to village development and natural resource utilisation, to ensure that the individual villages’ desires are known and can be met. Furthermore, it would be worth considering if the present distribution of economic support would be more reasonable if the villages received aid according to population size. The drawback of this could be that an increase in population size could occur in some villages and an increased human population might not be a desired outcome, as will be discussed later.

7.3 Findings & Analysis of the Villages Comprehension of WMP

One issue is the WMP’s comprehension of the villages and their conditions and another is how the villages perceive the project. The perception is another reason for participation, which will be dealt with now.

7.3.1 WMP According to the Villages

The villages are all aware of WMP’s actions both in terms of development in their villages and protection of the area. They are familiar with the school development project they have had, the NRC, different seminars and the employment of scouts and that these are benefits from active participation in the project. The majority - 21- of the villages further agree to that the wildlife populations have increased in both the core area and on the village land due to the protection of the area. But for the project as such the villages perceive it as a ‘conservation project’ and only Dihinda, Maseyu and Kaloleni villages mention that it is a conservation project in conjunction with
a development project. For example a villager in Kaloleni said: The Wami-Mbiki project is a conservation project and it has been an assistant for social welfare.

From the information given in the interviews the villages appear to have a fairly good and similar understanding of the project and the benefits they have gained from participating. The majority though do not relate their own development to the protection at present, but perceive them as separate and as something initiated by WMP. The reason why they do not perceive a connection is probably that they have not been able to feel the link between the protection and increasing animal populations and their development, as no utilisation takes place.

Though Salafsky and Wollenberg (2000) emphasize the perception of the above-mentioned link for CBWM projects to succeed they also say that it does not ‘guarantee a conservation success’. In this case the conservation of the area has, as earlier indications showed, been a success with an increasing animal population (GC, 2000). But, for this to continue, a development of the perception of the link is most likely essential. The understanding of why it is important to participate and how protection is connected with the development activities is seen as crucial if the villagers should loose their incentives in some respect. According to key informant Busk Petersen, it is no surprise that the perception of the link is missing and he emphasises the fact that they have only been able to inform about the link but not demonstrate it. The reason why they cannot demonstrate the link relates to the ecosystem and that it needs time to regenerate from the previous over-exploitation. Since WMP is dependent on the WMA-guidelines and the Director of Wildlife to open up the area for utilisation (DJ, 2001) there is no exact time frame for when utilisation can start. It was put forward earlier that the WMA-guidelines are in general urgently needed in Tanzania and this also appears to be the case for WMP.

Even though the connection between protection and development is hardly perceived, this still represent incentives for participation. The incentives are indicated through the villages’ interest in the project as their awareness of the project activities are high and this is also what the Review Mission of Danida found (Danida, 2000). It should be remembered that in most cases the interviewed people are involved in WMP through the NRC or VG and these people are likely to be better informed about the project than the average villager. This should therefore not be interpreted as a generally good understanding of WMP held by all villagers, but rather an indication that in all villages there is awareness of WMP held by some individuals.

7.3.2 The Villages’ Future Expectations of WMP
The villages are all aware of the future and what to expect from WMP. The villages all mention that tourist hunting will be initiated and that they will get a certain percentage of the revenue for village development. A couple of them further mention that they will get meat from the animals killed. For example a villager in Makombe expressed that: ‘When one person will kill one animal many people will benefit from that’ and a villager in Tukamisasa said: ‘The tourism will benefit us both directly and indirectly as quotas will be sold and bring in cash and the meat will be available for us.’ A few villages mention that they will be able to utilise the natural resources themselves and that they will be offered loans and employment. When exactly tourist hunting will take place is subject to dispute. Either the villages have no idea when this will take place, they believe the project management, WD or other experts will and should decide that, or they suggest anything from 1 to 15 years. For instance a villager in Kifuleta said: ‘There has not been set any time limit so when this will happen we do not know’.
From the information given in the interviews the villages appear to have a similar and good understanding of the project and the future gains. Here the perception of the link between their development and protection appears to be more spelled out than it is at present, and as something that will exist in the future. Again, this does not necessarily reflect the general villagers’ understanding, but rather indicate that some people within the villages have this perception. When exactly harvesting will take place is uncertain and this uncertainty could be critical. Although they might be aware of the bright future and understand the reasons behind the present conditions other forces might play an influential role. If they, as earlier indicated, already feel the deprivation and cannot be told when this will come to an end, it can affect their incentives to participate. Furthermore, the villages appear to take a passive role in the future utilisation and leave it to others to decide though, in the long term they should be part of that decision-making. It could also indicate that the villages do not feel that they themselves have capacities within wildlife management, as earlier discussed.

7.4 Identified Current Image of the Villages’ Comprehension of WMP

From the information and the analysis it is possible to answer the question earlier raised concerning peoples comprehension. It is clear that the villages have a fairly good and similar comprehension of WMP and its current and future activities. This comprehension is in accordance with the project’s objective and stated future activities and there does not appear to be misperceptions that could lead to unfulfilled expectations. From the villages’ information a CLD can be created which illustrates a simplistic image of how the villages appear to perceive the project at present – see figure 3. The thick lines in the CLD indicate the present perceptions and, as can be seen, there is no linkage from the protection of wildlife to their development – everything comes from WMP. The dotted line reflects the possible present deprivation that is felt from the abandoned utilisation and might as seen have a negative effect on the villages’ livelihood. The thin lines indicate the future where the linkage between the protection and development is perceived and will positively affect on the project activities. The diagram would be reinforcing when the thin lines will be acting in the future. Livelihood and empowerment would drive the protection and development activities and WMP’s role would diminish with time.

Figure 3: Causal Loop Diagram (CLD) of the WMP villages’ present and future comprehension of WMP

As mentioned before the problematic issues are that WMP has to wait for utilisation to start and for the WMA guidelines to be in place (DJ, 2001). Busk Petersen did express that: ‘We are ready to take the next step further with the awareness and the interest that all the involved villages have’, and this step of being able to initiate utilisation is critical in order to turn the thin lines into thick
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lines. Because, although the long-term understanding is present, the short-term need might overrule
the understanding and poaching could, for example, increase.

Tourist hunting of wildlife is not planned to be initiated at present (DJ, 2001), but a restricted local
utilisation of selected wildlife species as well as plant materials like ‘mwidu’ and ‘kindu’ appear to
be highly important to demonstrate the link and value of participation in the project to the villages.
Species like impala and hartebeest, which have some of the highest population numbers, were the
earlier preferred species to hunt (GC, 2000). These could be selected as species to hunt, together
with buffalo for example, which will be touched upon in the biological part of the study. Utilisation
would require a proper estimation of how much could be harvested within safe limits and require a
continuous monitoring of the harvested species (Begon et al., 1996). With this done, it is strongly
suggested that WMP puts pressure on the Director of Wildlife to open up for a limited utilisation, as
this would be in the spirit of the project and a cheaper solution than other forms of compensation
(Newmark et al., 1994), which could be an alternative temporary solution. It would also give the
Government of Tanzania the opportunity to prove Songorwa et al. (2000) and Barrow et al. (2000)
wrong and show that the Government is not the obstacle for WMP and CBMW, in general, to work
in Tanzania.

7.5 Reflections & Discussion on Human Population Growth & ‘Problem Animals’ at WMP

Human population growth and conflict between wildlife and people has before been known to be
problematic for common resource ownership and CBMW projects (Barbier, 1998; Turner et al.;
1994; Newmark et al. 1994). These factors will now be subject for a short discussion in relation to
WMP, to identify if these issues could also be problematic here.

7.5.1 Human Population Growth

A statement, which was made from a villager in Kaloleni, concerning the utilisation of the Wami-
Mbiki area in the long term was: 'We might have to use the Wami-Mbiki area in the future as the
population booms'. This implies that the human population and its potential boom could be a threat
to the core area and thereby WMP.

At present around 55,000 people live around the Wami-Mbiki core area and they have the village
land available to them, which constitutes around 1500 km² (DJ, 2001; VP, 2000). This gives a
human density of 36 people per square kilometre. If the human growth rate of 2.61% (ODCI, 2001)
for Tanzania is used for the future, the human population of the Wami-Mbiki area will be more than
doubled within less than 30 years. This is a very simple calculation and the future population
number around Wami-Mbiki might be higher or lower depending on the local level of fertility,
infant mortality, the effect of AIDS and how the improved livelihood would affect life expectancy
and family planning etc. The important issue here is not the exact population number but to
illustrate the future the area will very likely face. Within 10 years from now the density with the
present growth rate will have increased to around 44 people per square kilometre. This inevitably
increases the demand for food and shelter, areas to settle on and areas to cultivate. It is likely that at
some stage the carrying capacity of the village land will be exceeded and an expansion of the
village land into the core area would be necessary.

An increasing human population in the area can have critical effects for WMP. As the amount of
people in relation to area and benefit changes it means less benefit per individual (UNCTAD,
1995). Furthermore, it puts pressure on the core area as a protected area if the village land cannot
satisfy the need for food, even though agricultural productivity is increased. And the core area
cannot generate enough revenue for the people to satisfy their needs in other ways. Human population growth has, as earlier mentioned, proved to be one of the reasons for the previous breakdown of common property systems (Barbier, 1998; Turner et al., 1994) and it is an issue that should be given attention at WMP.

7.5.2 ‘Problem Animals’
As a result of the increased protection in the core area the increase in wildlife populations have also been evident on the village land. All the participating villages expressed that they have increasing problems with wildlife. Most of the villages -17- face problems with elephants and smaller animals like monkeys, baboons and bush pigs that destroy crops. Eight of the villages also have problems with predators like lions, hyenas and wild dogs that kill their livestock or come into the villages. The conflict between wildlife and humans is a well-known phenomenon (Newmark et al., 1994) and wildlife does already at this stage appear to impact the people at Wami-Mbiki.

Though a villager in Mwidu said: ‘It is better to have Wami-Mbiki as a protected area like the Wami-Mbiki project has made it. Then many people will benefit instead of everybody can go into the area because then it would all be destroyed and leave nothing behind’ it also means that the villages surrounding Wami-Mbiki area have to cope with the problems of destroyed agricultural fields, livestock killed by predators and a general human fear from wildlife. According to Songorwa et al. (2000) the increase in wildlife population is a direct threat to the ‘sustainable livelihood’ of the communities if there are no effective control mechanisms. The conflict as such between wildlife and local people can according to Newmark et al. (1994) ‘never be entirely eliminated’. Newmark et al. (1994) argue that the increase in human population adds to the problem, and the human population could very probably increase in the Wami-Mbiki area. The wildlife populations will also increase as long as harvesting does not control the population. Since the village land surrounds the core area the only possible expansion for the wildlife population will be into the village land. Wildlife might become the villages’ enemies if these problems are not taken care of. This can result in negative attitudes toward wildlife and increasing poaching similar to the situation experienced with the old approach to wildlife conservation (Songorwa et al., 2000; Severre, 2000).

7.5.3 Strategies to Overcome Human Population Growth & ‘Problem Animals’
The problem that can be faced by WMP in the future is the situation illustrated in figure 4. Here there is pressure from the wildlife into the village land and from the human population into the core area of Wami-Mbiki.

Figure 4: Human pressure on the core area and wildlife’s pressure on the village land.

The way to deal with this potential and already emerging conflict is to act on both problem issues. In order to moderate the growth rate of the human population, education concerning family
planning as well a continuous monitoring of the demographic development should be initiated. This way WMP would be a step ahead with the development in the area and this would leave more time to develop strategies that could ensure good conditions for both people and wildlife. Currently family planning and monitoring of the demographic development does not exist and it is not part of any of the planned future activities (DJ, 2001). The reason to this might relate to the fact that DJ is mainly concerned with wildlife protection. But, population growth itself is not the only threat as people migrating to the area and new settlements of people from other areas could also be expected when the rumours spreads that these villages have become more affluent. To overcome this problem restrictions on immigration could be established as seen in some of Zimbabwe’s CBMW- projects, referred to as Campfire (Kalén & Trägård, 1998).

To deal with the ‘problem animals’ key informant Busk Petersen expressed that ‘it does not make a difference to me if the problem animals like the elephant is not here for example’ since the main thing for the project is that villages and stakeholders get enough revenue and the profitable wildlife species are not driven to extinction. Elimination of the most problematic species and fencing could be solutions to deal with the problems. Fencing has been the solution in some instances in the Campfire projects (Kalén & Trägård, 1998), but Newmark et al. (1994) argue that fencing is often ineffective ‘as the problem is often smaller animals plus it gives ecological impacts and disturbances’. Instead they argue in favour of agricultural land use activities that are less attractive to wildlife and for compensation programmes (Newmark et al., 1994). Applying another kind of land use can be difficult in an area like Wami-Mbiki, where the present agricultural productions is their mean of daily survival. The suggestion might not even be a solution to the problem since the increasing wildlife population will inevitably expand to the village land as it surrounds the core area. For the compensation programmes this, according to Busk Petersen, is not an economically viable possibility.

At present the project takes care of ‘problem animals’ and the critical issue for WMP is to decide on how to tackle the increasing wildlife— and human conflict in the future. WMP also has to determine what level of environmental change i.e. sustainability (Turner et al., 1994) is desired as Busk Petersen’s comment on elimination of species might not be a commonly held view by all involved in the project. To eliminate species and change the biological diversity will not only remove the conflict between wildlife and humans, but also impact on the ecosystem and its balance (Begon et al., 1996). Furthermore, WMP must be aware that their actions can be subject to public dispute from the outside world, which eventually affect its reputation.

From an environmental point of view the soundest solution to the ‘problem animals’ would be to keep the population numbers of the species causing the most problems down, but not eliminate them. This harvesting could be connected with the need for local restricted utilisation. The harvested species could be distributed to the villages, which would be interested in game meat, for example. A problem species like the elephant would probably be of interest as this has previous been one of the species harvested by the local people. To combine the need for harvesting with the harvest of the species causing problems would help to demonstrate the ‘missing link’, between the protection of the core area and development in the villages. Although this cannot be initiated before harvesting in the area is permitted. Furthermore, harvesting of a species like the elephant might be problematic, because it is a controversial species and in some areas of Africa is an endangered species (Miller, 2000).
7.6 **Conclusions on the WMP Villages & Suggested Strategies**

The findings and the analysis of the social conditions and the context surrounding WMP represents both opportunities and constraints for WMP and these can be of crucial importance for the project’s future. The opportunities and constraints found from the focus on incentives and comprehensions are:

**Opportunities**
- Strong basic incentives for participation in WMP in the villages
- The villages have confidence in WMP
- WMP present and future activities are well targeted for the villages’ conditions and needs
- The villages have a good comprehension of WMP

**Constraints**
- Differences between the villages in terms of needs and problems experienced in relation to WMP
- Individual natural resource utilisation/dependency is substituted by public village development
- WMP’s comprehension of the villages not used sufficiently
- Waiting time for natural resource utilisation to initiate

The opportunities found appear to be very strong and they give the villages and the project a well-founded basis to build on if constraints are met. But at the same time the constraints identified also appear strong and could affect the well-founded basis. The villages’ short-term thinking on how to survive till the next day might be stronger than the long-term thinking and understanding.

Furthermore, human population growth and increasing wildlife populations can be expected to be problematic for WMP, as it can become difficult to keep the core area as a protected wild land. Additionally, the increasing conflict between wildlife and humans can affect the villages’ incentives for participation.

Possible solutions to try and overcome or decrease the present and future constraints and problems are summarised below.

**Strategies**
- Development of individual village strategies with prioritised needs
- Deal with the problem issues raised by the villages – especially the boundary problem
- Consideration of a distribution of funds according to the population in each village
- Open for restricted local utilisation based on ecological estimations and monitoring
- Education on family planning and continuously demographic monitoring of the area
- Regulation of ‘problem animals’ to keep their population numbers down

Of critical importance is utilisation of natural resources, but this is dependent on permission from higher levels, and to some extent out of reach for WMP to act upon. Furthermore, it is dependent on the state of the ecosystem, the wildlife populations and the factors affecting their growth. Those factors will be dealt with now in the biological part of the study.
8 The African Buffalo Population at Wami-Mbiki

The conditions surrounding the buffalo populations at Wami-Mbiki create possibilities and limitations for their potential growth. The factors affecting the Wami-Mbiki buffalo population will in this chapter be analysed and discussed based on scientific knowledge on the African buffalo supplemented with information gained from key informant Busk Petersen, the questionnaires filled in by WMP game scouts and the field trips in the Wami-Mbiki core area. Logistic buffalo population curves will demonstrate possible future population increases depending on the rate of increase and a CLD will illustrate the factors, which currently and in the future can affect the buffalo population. Potential harvesting of the buffalo according to the logistic population curve will also be suggested and discussed.

8.1 Findings & Analysis of the African Buffalo and the Population at Wami-Mbiki

The African buffalo – *Syncerus Caffer* - belongs to the family *Bovidae* and is closely related to cattle and bison (Sinclair, 1974). Historically the African buffalo inhabited nearly the whole Sub-Saharan Africa. In the 19th century 3 million buffalo were present, but now only around 400,000 individuals are left of which most are in protected areas (Van Hooft et al., 2000; Simonsen et al., 1998; Wenink et al., 1998). The buffalo populations have been affected by habitat fragmentation and were almost extinct in 1889 due to the disease Rinderpest (Prins, 1996). Today the buffalo is not an endangered species and the present population numbers indicate a fast recolonisation and relate to the high dispersive capabilities of buffalo (Wenink et al., 1998; Van Hooft et al., 2000). The buffalo is still affected by the increasing human population and the demand for land, agriculture and proteins (Prins, 1996), which the situation at Wami-Mbiki is a representative example of.

8.1.1 Habitat & Feeding Requirements

The buffalo has a wide habitat tolerance but is constrained by water availability, as the buffalo needs to drink every day. Because of the high water requirement the buffalo’s grazing grounds/home range might be governed by the availability of water in a given ecosystem (Prins, 1996). There is water availability throughout the Wami-Mbiki core area and according to the WMP game scouts the buffalo uses waterholes, smaller streams and the Wami River in the area as their drinking sources. The buffalo can thus potentially inhabit the whole area and this was also the impression from the fieldtrips in the core area, where plenty of water was available during the dry season.

The buffalo is mainly found in open woodlands and savannahs with a high grass biomass, but can also be found in dense forest and dry bush (Simonsen et al., 1998; Prins, 1996; Stuart, 1997). The vegetation types in Wami-Mbiki area are a mixture of open grassland and woodlands and represent suitable habitats for the buffalo throughout the majority of the area. Where the buffalo might be constrained is during the dry season because of a low standing green biomass and wild grassfires. For example in year 2001 around 60 % of the core area burned in the dry season, which Busk Petersen said ‘should be down at 40 %’ at maximum. Therefore it is expected that the buffalo’s grazing grounds will be governed by the quality of grass rather than water availability in Wami-Mbiki especially during the dry season.

The buffalo’s home range varies with the size of the herd and can range from 5 to 100 km² (Prins, 1996). The home ranges are used continuously for years (Mloszewski, 1983; Prins, 1996) and the herds are constantly moving within their home range and can travel up to 50-100 km per day (Alleen, 1999). The exact home range areas for the Wami-Mbiki herds are not known, they could
potentially cover large parts of the core area depending on how scattered the dry season grazing grounds are.

The buffalo is an herbivore and a ruminant and is mainly known to graze although it can occasionally browse (Prins, 1996). The buffalo nearly always eat a balanced diet and the total food intake varies with the seasons. During the wet season the buffalo easily meets its protein requirements, as the quality of the diet is high with high leaf production and crude protein concentrations. (Prins, 1996; Mugango et al., 1995; Prins, 1989b). During the dry season the quality is lower and according to Prins (1989b) not high enough to allow for fattening or milk production. The food quality is then strongly related to rainfall and the length of the seasons, and the quality affects the buffalo’s condition loss or gain during the year. The buffalo can, according to this, be resource limited over the year (Prins, 1996). Resource limited is also what the Wami-Mbiki buffalo appear to be during the dry season, and Busk Petersen estimate that only 5% (125 km\(^2\)) of the core area is available grazing habitat for the buffalo in the dry season. In the case of a drought this area will inevitably be smaller. 5% seems small, but without better information on the vegetation in the area and the yearly differences in rainfall it is difficult to evaluate. Since the buffalo is apparently food limited during the dry season and not limited by water in Wami-Mbiki the 5% will be used for an estimation of the carrying capacity for buffalo.

8.1.2 Herd & Population Structure
The buffalo is a highly gregarious species and lives in mixed herds with male dominance. The cows live only in the mixed herd and are never observed in any other herd than their own, whereas the bulls steadily move between the two social environments of either the mixed herds with females and males or the adult bachelor herds with only males – typically 3-5 bulls (Prins, 1989a & b). The mixed herds remain within separate home ranges where there is little interchange between the units (Simonsen et al., 1998). A mixed herd can range from 20 –1600 individuals, and there are no clear indications of a typical group size (Van Hooft et al., 2000; Mloszewski, 1983). Regarding the number of herds in Wami-Mbiki, Busk Petersen said ‘We know for sure that we have 3 herds with around 40-50 buffaloes in each and then there is probably around 50 smaller herds, bachelor groups and solitary bulls wandering around.’

High densities of buffalo have been characterised, as a density of around 20-buffalo/km\(^2\) and the maximum density experienced is 24-buffalo/km\(^2\) (Prins, 1996). The present population at Wami-Mbiki is estimated to around 200 individuals (GC, 2000). This give a density of 0.08-buffalo/km\(^2\) for the whole area and around 2-buffalo/km\(^2\) for the available grazing area in the dry season and indicates the low population number in the area. From the known maximum density of buffalo and the 125 km\(^2\) available grazing area in the dry season in Wami-Mbiki, it is estimated that the carrying capacity for buffalo in the Wami-Mbiki area is 3000. The carrying capacity might be higher, but is accepted as an estimate to be able to indicate and illustrate logistic Wami-Mbiki buffalo population growth curves.

A buffalo lives on average for 12 years and the cows can reproduce from when they are 6 years old and the bulls start their wandering life between bachelor herds and mixed herds when they are 7 years old (Prins, 1989b). The calving interval can range from 1 to 3 years (Prins, 1996), which Prins argues can differ according to herd size, inter- and intraspecific competition and the individual buffalo’s condition. In other words the calving interval does appear to be density dependent. In Manyara National Park, Tanzania, the calving interval is 3 years and here the level of inter- and intraspecific competition is high with the population fluctuating around the carrying capacity. The
calf mortality was estimated to 43% in Manyara (Prins, 1996). There was no clear explanation on this estimate, but it is probably both dependent of predators and density factors.

8.1.3 Diseases, Predation & Poaching
The population growth can be affected by diseases and the most known are rinderpest, anthrax, herpes and foot-and-mouth disease. The diseases have in some cases been subject of big concern as they can infect other species and human livestock (Prins, 1996; Grobler & Van der Bank, 1996). In the case of Wami-Mbiki there has, according to all the WMP game scouts, not been any past or present epidemics in the buffalo population. But if one of the diseases would spread it could be detrimental to the buffalo and other populations as was experienced with Rinderpest in the 19th century.

In the absence of diseases and environmental changes affecting the carrying capacity, predation is seen as an important factor affecting mortality. The main predator is the lion, but hyena can also occasionally kill buffalo (Prins, 1996; Mugango et al., 1995; Mloszewski, 1983). The rate of predation is dependent on the predator’s abundance as well as potential prey species distribution (Funston et al., 1998; Prins, 1996). The level of predation on the Wami-Mbiki buffalo is difficult to judge, but with the present numbers of 20 lions and 25 hyenas (GC, 2000) and the low buffalo population number, buffalo is probably not the species of first priority. Both impala, hartebeest, bush duikers and reed buck have population numbers of at least 1000 (GC, 2000) and their higher density will probably also mean a higher predation pressure for those species. Furthermore predation on buffalo is of risk for the predator, as the buffalo is known to sometimes kill the lion in a lion attack (Prins, 1996).

Yet another factor influencing the mortality is the predation by humans either in terms of hunting or poaching (Prins, 1996; Mloszewski, 1983). The WMP game scouts all agree to that the present increase in the buffalo population has been due to a decreased poaching, as a result of the anti-poaching effort in the area. But at the same time they all, except for one, agree that poaching of buffalo is still occurring mainly because of the need for money and meat. 15 of the WMP game scouts say it is the local people that carry out poaching activities, 1 did not know and 5 say it is outsiders. Because the buffalo has previously been a species of priority for the villages to hunt and the scouts are from the participating villages this information is considered to have a high validity. The level of poaching though is not known and is difficult to predict.

8.1.4 Intra- & Interspecific Competition
Intraspecific competition can affect the population structure and growth. It is very likely to occur during the dry season where the buffalo have been observed to graze closer (Prins, 1989b). Additionally, competition within larger herds appears to be more profound than in the smaller herds. These signs of intraspecific competition and density dependent relations can result in a split of the herds into smaller ones, which is seen mainly in large herds and during the dry seasons (Prins, 1996). Furthermore, Prins (1996) has observed what he describes as ‘large inequalities’ in the mixed herds because the position within a herd has great influence on the individual buffalo’s condition. Being in the front of the herd is the best position and those animals mitigate better the negative effects on condition in the dry season. Intraspecific competition in the Wami-Mbiki buffalo is most likely not a problem at present, with the low density and population number, but it can occur when the total population size and the different herd’s sizes increase.
Interspecific competition with buffalo can be expected to occur with elephants, zebra, wildebeest, hartebeest and waterbuck as to a large extent these species are dependent on the same resources (Prins, 1996; Mloszewski 1983). Mloszewski (1983) did not experience any clear indications of interspecific competition in his research, whereas Prins (1996) suggests the possibility of elephant being the major competitor in the Manyara National Park. This is based on the evidence that the buffalo growth rate increased in the Park’s smaller herds when elephant numbers decreased, due to poaching. In the Serengeti National Park, Tanzania, wildebeest is known to be buffalo’s prime competitor (Prins, 1996). Whether interspecific competition occurs and with which species does thus appears to be dependent on the ecosystem and species composition in question. Of the potential competitors, wildebeest is the only species not present at Wami-Mbiki (GC, 2000). The other species could with increasing population numbers represent competitors especially during the dry season. At present elephant and hartebeest have the highest population numbers of the species mentioned (GC, 2000), but whether one or both of these will become a competitor for the buffalo in the future is difficult to predict. The potential competitors all have different rates of increase and potentials for increase according to habitat requirements, but to go into discussion of this is beyond the scope of this study. Interspecific competition though is not expected to be a restriction on the buffalo population at present, but could be expected to be so in the future.

8.1.5 The Logistic Buffalo Population Growth Curve

From the information on buffalo’s lifetime, calving interval, the present Wami-Mbiki population of 200 individuals and the estimated carrying capacity of 3000 it is possible to make a logistic population growth curve—see Appendix 2 for equations and values used. The greatest uncertainty concerning the growth of the Wami-Mbiki buffalo lies in the rate of intrinsic increase and applying a sensitivity analysis with three different r-values shows how much this affects the population increase. r ranges from the idealistic 0.16 to 0.11 and to 0.6 with the last taking into account a calf mortality of 0.43 as found in Prins’ research. Though the logistic equation is a simplified picture of the population (Begon et al., 1996) and the carrying capacity of 3000 is a rough estimate it does illustrate potentials for the buffalo populations increase within the next 7 generations or 80 years.

As can be seen on the graphs in figure 6 the rate of increase makes a great difference for how quickly the carrying capacity is reached.

Furthermore with the present 200 buffalo it illustrates clearly how far the buffalo is from the might be carrying capacity of the system.

Figure 6: Logistic growth curves for the Wami-Mbiki buffalo population over a time span of 80 years with r-values of 1) 0.16, 2) 0.11 and 3) 0.06.

22 Has been made using the modelling program Stella Software.

23 Assuming the all buffalo live for 12 years, that all females between 6 and 12 years clave and that the calving interval is 1 year (Prins, 1996).
This exemplifies that the rate of increase and the factors affecting it are important to know. It is important in terms of an adaptive management of the population, which could decrease the factors affecting the population negatively and could keep the rate of increase as high as possible. And it is important to be able to judge sustainable harvesting levels (Begon et al., 1996). The factors will now be discussed for the Wami-Mbiki buffalo.

8.2 Identified Factors Influencing the Buffalo Population at Wami-Mbiki

From the information and the analysis on the African buffalo and the population at Wami-Mbiki it is possible to answer the question earlier raised concerning the factors affecting the Wami-Mbiki buffalo even though the knowledge is somehow limited. It appears clear that there a few critical factors influencing the buffalo population and its potential increase. This can be seen in the CLD—figure 7. The thin lines indicate the interactions, which do not at present appear to have a great influence on the buffalo population. The thick lines, on the contrary, indicate the present conditions that can have a great impact on the buffalo population as well as on the other wildlife species in the Wami-Mbiki ecosystem.

As can be seen in the CLD poaching, wildfire and rainfall has been selected as the current critical factors affecting the population. Poaching affects the population directly and wildfire and rainfall affect indirectly by decreasing the available edible grass biomass.

Poaching has probably, as earlier mentioned by key informant Busk Petersen, been increasing even though many poachers have been caught since the initiation of WMP ( Rwegasira, 2001). During the field study at Wami-Mbiki several incidents of poaching or poachers in the area were experienced. A complete stop or just reduction of poaching is according to Songorwa et al. (2000) a general failure of CBMW projects. Whether the continuous poaching has to do with the need or the tradition of hunting (Gibson & Marks, 1995) as earlier discussed is difficult to judge, but according to the WMP game scouts it mainly appears to be because of the need. A small percentage of subsistence hunting can probably never be entirely eliminated in these areas. However wildlife harvesting and provision of game meat would most likely decrease poaching from the villages, if the need is the driving force. Until this happens a more intensive anti-poaching effort would be worth considering.

Wildfires are natural occurring and from a management perspective needed in these kinds of ecosystems. But it is problematic when the fire is in the late dry season, because these are the fiercest and most damaging due to a high quantity of dry litter biomass (Chidumayo, 1997). A better
management of early fires to avoid the late fires is of importance for the wildlife population. Especially if only 5% is available grazing habitat during the dry season. Rainfall can, on the contrary, not be accounted for, but if a drought sets in the grazing area available for the buffalo will decrease and might not be able to sustain the population numbers present at that time (Begon et al., 1996). Here it should also be remembered that the Wami-Mbiki ecosystem is fairly isolated and the wildlife populations do not have many opportunities of migration, as there are no National Parks or wilderness areas close by. This according to Walsh (2001, personal communication) is a problematic issue for the wildlife populations at Wami-Mbiki not just in this respect, but also because there are no buffer stocks to cover the losses caused by diseases, poaching or hunting.

8.3 Reflections & Discussion on Factors Affecting the Buffalo & Hunting Levels

The thin lines in the CLD –figure 7- illustrating factors affecting the buffalo would be of higher influence and importance for the buffalo population when it reaches the carrying capacity (Begon et al., 1996). But the thin lines might not have a great impact on the population if hunting is practised and keeps the population below the carrying capacity. It is considered to be good management of wildlife populations if they are kept below the carrying capacity to minimise habitat damage, diseases, inter- and intraspecific competition and the population will be less vulnerable to environmental changes like droughts (Leader-Williams et al., 1996). This is in line with the MSY-concept, which is also below the carrying capacity where the rate of increase is highest (Begon et al., 1996). Applying MSY to the buffalo logistic population growth curves presented in figure 6, can give an indication of possible maximum harvesting levels depending on r. MSY results in the following max and min level, as seen in figure 8 and 9.

MSY ranges, according to figure 8 and 9, from a harvest of 45- 120 buffalo per year when the population has increased to 1500 individuals. The year when the population reach 1500 buffalo and MSY can be applied ranges from year 2017 to 2044. This demonstrates a large difference in harvesting levels according to the r-value and thereby related economic output. It also illustrates that it takes the best part of 15 years, even with the highest r-value, before this hypothetical MSY would be reached and the harvest of buffalo could set in.

![Figure 8: MSY for the Wami-Mbiki buffalo population over a time span of 80 years with the r-values of 0.16.](image)

![Figure 9: MSY for the Wami-Mbiki buffalo population over a time span of 80 years with the r-values of 0.06.](image)
MSY in itself might not be the desired goal for WMP, as this would mean WMP would have to wait even longer than expected for utilisation to start. Tourist hunting should, according to the plan, start in 2007 (DJ, 2001) and it might not be possible to start earlier because the institutional set-up and permits are not in place. But a limited utilisation could be of great value, both economically and for the villages to demonstrate the link between the protection and their development. By including a present yearly harvest of 2% of the estimated buffalo population growth curves this does not have a great impact on the future population and the curves look similar to those in figure 6. It would mean a harvest of 4 buffalo per year from now on, which would increase according to the r-value for the buffalo population. The buffalo could, if tourist hunting could not be initiated, be sold to resident hunters or be hunted for the benefit of the villages to supply them with meat, depending on what would be found most appropriate for the project and possible in practise.

The most important thing is to demonstrate that a limited utilisation now would hardly impact on the possible harvesting levels applied in 2007. With the earlier applied r-values to the buffalo population the maximum harvesting level from 2007, is around 5% of the population. This results in a harvest ranging from 14- 25 buffalo the first year depending on the r-value. Having a 2% utilisation from now on and until 2007 would on the contrary mean that the 5% harvesting from year 2007 and onwards would give a harvesting ranging from 12-22 buffalo for the first year. Taking into consideration the benefit that would be received from this and the apparent need for utilisation it appears to be futile to wait with harvesting. But as can be seen on graph 3 in figure 10, 5% harvesting hardly allows for a population increase if the r-value is low. This not only stresses the importance of knowing the r-value in order to be able to determine sustainable harvesting levels, but also points towards a consideration of what the minimum population ought to be. Not only from a biological point of view but also from the hunters, as the trophy quality and the abundance of the buffalo has to be fairly high to get high prices and to attract hunters according to Leader-Williams et al. (1996).

![Figure 10: Wami-Mbiki buffalo population logistic growth curves over a 80 years with 2% harvest from 2000 and 5% from 2007 with r-values of 1) 0.16, 2) 0.11 and 3) 0.06.](image)

Returning to the factors affecting the buffalo population in Wami-Mbiki these are of essential importance to know to make more precise and reliable estimates than the ones presented, and to be able to manage the populations for the benefit of the villages. The illustrations are simplistic and leave a range of factors out. They do not distinguish between males and females for example even though trophy hunting is based on males, but they do nevertheless highlight opportunities. If the species in the Wami-Mbiki ecosystem could be managed, the factors having a negative effect on the individual species’ r-values could ideally be kept down. Wildfire and rainfall would not be too critical, because the buffalo population, if managed, would be below carrying capacity and therefore less vulnerable towards a decrease in carrying capacity (Begon et al., 1996). But poaching is still
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evident and if not controlled this could be critical for the harvesting levels applied to the populations.

The critical thing about poaching, except that it reduces the wildlife population, is that 'it is extremely difficult to obtain accurate information on' (Caro, 1999). But, without knowing the removal rate it can be difficult to estimate what a sustainable harvesting level could be and how large a safety margin should be built into the estimation. Whereas trophy hunting is targeted at old males, who have already dispersed their genes, poaching is generally not age or sex specific (Leader-Williams et al., 1996). This can make it even more difficult to evaluate its impact on the population. What could be considered as a safe harvesting quota, like the 5% for buffalo, for example, might prove to be critical for the population, when poaching is not accounted for. Therefore an estimation of the poaching levels would be of importance for sustainable harvesting levels in Wami-Mbiki.

Trophy hunting can be problematic; especially when the population density is low because the population is vulnerable to removal and it may be difficult for females to find mates (Caro et al., 1998). Low population numbers are characteristics of the Wami-Mbiki core area and another characteristic is that no buffer-stocks can cover the losses in the wildlife populations. This indicates that extra precaution like the precautionary principle prescribes (Elliot, 1998) should be taken. The need for proper biological information and monitoring of the wildlife populations cannot be underestimated to be able to judge sustainable use of the wildlife populations. What are needed are both continuous monitoring of the populations and an estimation of the carrying capacity based on rainfall and vegetation. Caro et al. (1998) cautiously suggest the susceptibility of small populations towards hunting and this is also what the WMP should be aware of. But at the same time, it should not forgo the opportunity of harvesting if it can be based on proper biological reasoning and be sustainable.

8.4 Conclusions on the Buffalo Population at Wami-Mbiki & Suggested Strategies

The findings and the analysis of the biological conditions and the factors affecting the Wami-Mbiki buffalo represent both possibilities and limitations for an increase in the buffalo population. They can be critical, in general, for the wildlife populations, and the WMP in the future. The opportunities and constraints found from the focus on factors affecting and limiting the buffalo are:

Opportunities
- No water constraints in the core area
- Limited intra- and inter specific competition
- Limited predation
- Harvesting of wildlife species can decrease future vulnerability and density dependent factors

Constraints
- Continuous poaching
- Late dry season wildfires
- Limited grazing area during dry season
- Current harvesting can be problematic due to a low population number
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**Strategies**

From the opportunities and constraints identified it was suggested that WMP could act in favour of an increasing buffalo and other wildlife populations by:

- Increased anti-poaching effort
- Better management of burning of the area to avoid late dry season wildfires
- Controlled harvesting according to population estimations to decrease competition and density dependent factors

But even though this could be positive for the wildlife populations sustainable harvesting levels must still be estimated and this is not possible with the present level of biological information available. WMP could initiate a limited harvesting now, but it would need to be based on more exact biological knowledge of the wildlife populations and this would, in general, and for the future require:

- At least a yearly consistent and continuously monitoring of the wildlife populations to be able to predict future population increases
- A vegetation map of the area preferably a GIS map, which could allow for potential habitat predictions and species distribution in the area
- Continuously monitoring of rainfall in the area to be able to estimate the primary production in the area and carrying capacity
- Estimations on predation levels and density dependent factors for the wildlife populations to incorporate these in population estimations
- Estimation of poaching levels to incorporate these in population estimations

Although comprehensive for WMP this is considered of importance to be able to make reliable population and harvesting estimates. The monitoring and estimations expenses would probably pay its way in the long term with the income from future harvesting. The estimations of hunting levels would be eased and be more than 'educated guesswork' (From Caro et al., 1998). It would be in line with the precautionary principle and be based on proper scientific biological information. It would increase the assurance of applying sustainable harvesting levels, which again would add to the overall biological sustainability for the Wami-Mbiki area. But most importantly it would indicate whether a limited harvesting could be introduced now, without compromising the wildlife species and potentially boost the incentives for participation and comprehension of WMP in the villages.
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9 Integrated Discussion on the People & Wildlife

This chapter integrates the conclusions and findings from the field study at Wami-Mbiki to indicate whether WMP appears to be a success and representative of a sustainable development and discuss shortly the general conditions required for CBMW to work.

9.1 Sustainable Development at Wami-Mbiki

WMP has both opportunities and constraints within the social and biological conditions, but these need to be connected in order to evaluate how they act together. The opportunities do look promising with indicators of strong incentives for participation, a good comprehension of the project, good biological conditions for a wildlife population increase and prospects of a limited utilisation. There are also constraints associated with the indicators, which include differences between the villages and a limited use of the comprehension of the villages’ conditions, resulting in not all needs being met at present. Furthermore, there is a waiting time before utilisation of wildlife can start and for example poaching limiting the wildlife population increase.

The accumulative effect of the indicators points in two opposite directions depending on how constructively the opportunities are used and the constraints are diminished. At present the project has achieved a success in terms of being well targeted for the people, the people being interested and increased wildlife populations, but to continue this success also requires counteracting the negative features. The problem is seen in the waiting time for natural resource utilisation because this represents a need and it is felt as a deprivation to some people. At the same time initiation of harvesting might compromise the biological diversity in the area and decreases the opportunities of future income and utilisation.

On paper WMP represents a sustainable development in accordance to the earlier definition with the project activities planned and already initiated. This is in terms of WMP’s aim of meeting the needs of the people, having a sustainable utilisation of natural resources and increase the general standard of living in the villages. In the present situation WMP tries to achieve a sustainable development by not allowing utilisation in the core area, which could compromise the future generations’ needs, the biological diversity and futures increase in living standard. But at the same time this does not result in a sustainable livelihood for the people, as certain needs are not met. As a nature ‘rehabilitation’ project WMP is subject to a time delay before it can be sustainable for both people and wildlife and before the spiral starts spinning faster in an up-ward direction.

The potential for a sustainable development scheme is present at WMP. Whether this potential will grow or not depends on how the constraints are tackled and especially on when, how and to what extent the natural resource utilisation will take place. A cautious utilisation at WMP would be able to not only satisfy a need for the people, but also ensure the biological diversity in the area. Through this, it would avoid compromising future generations needs and increase the possibility of increasing living standard from a future utilisation of wildlife. The level of utilisation is a challenge for the project, but what can be an obstacle is if the Government prolong the establishment of WMA’s and refuse to reopen utilisation at Wami-Mbiki in the near future.

Presently the most promising conditions for WMP are within peoples’ participation, their desire to be ‘sustainable developers’ (Elliot, 1998) and the increasing wildlife populations. The most problematic are with no property rights and lacking information to estimate sustainable utilisation.
of the wildlife populations. Although these are the present opportunities and constraints, there is still a need in the future to follow the indicators of people’s incentives and comprehension of the project and the factors affecting the wildlife population. These might change, and with these changes come new opportunities and constraints, which affect the potential for a sustainable development. Without knowing these it will be difficult for WMP, as long as the villages are still dependent on management and supervision from WMP, to have an adaptive management reflecting the conditions present.

To follow the indicators in the future the semi-structured interviews in the villages can be applied as these worked well to reveal incentives and comprehensions. However, to have several interviews in each village would increase the value and quality of the information. This would not only result in stronger conclusions on a village level, but probably also indicate reasons for the differences between the villages. To identify biological factors and indicators affecting the wildlife populations more extensive research than questionnaires for game scouts and simple fieldtrips are necessary. The game scouts do have valuable information and some were experienced from the questionnaires and the fieldtrips to be more knowledgeable than others. To attain this information single or small group conversations with the scouts are probably a better method to apply than questionnaires to reveal this information in the future.

Empowerment of people and sustainable wildlife utilisation are attractive words and thoughts with great potential. However they are, as WMP demonstrates, and Hulme & Murphee (1999), Walsh (2000) and Kremen et al. (1994) among others have identified, not quick and easy solutions to solve the problems of rural poverty and avoidance of natural resource degradation.

9.2 Conditions Required for CBMW to Represent a Sustainable Development
For CBMW to create a sustainable livelihood for the people it targets and to represent a sustainable development scheme is a challenging process. Not only does CBMW to succeed require that the project set up is well targeted for the people to give them incentives to participate. It also requires comprehension from and empowerment of the people to give the people the power, capabilities and tools to administer the development and activities in their area. This is a time consuming process and though WMP was initiated in 1997 there is still a long way to go and patience is required. This has been acknowledged by WMP, but according to the IIED (1994) the time aspect has often been underestimated in CBMW projects. Management and development plans are not a characteristic of rural communities and it is an extensive procedure to change this, which should not be neglected (MNRT, 2001; Zacharia & Kaihula, 2001). But, as Hulme & Murphee (1999) say: ‘This may be problematic for policy makers and particularly for donor agencies, which commonly have to pretend that an aid investment can eradicate poverty, conserve the environment and promote economic growth within a few years’.

Although active participation and time for empowerment is comprehended there is still the issue of ownership and property rights. The ownership of the natural resource is, from Walsh’s (2000) experiences the heart of the problematic conditions for CBMW and this also appears to be the case at WMP. As Walsh (2000) claims ‘Inevitably any such attempt to shift the balance of political and economic power produces winners and losers. Resistance to being a loser in this sense helps explain why the process of developing community wildlife management is so slow’. Songorwa et al. (2000) take another angle on this as they say the external funding of CBMW project result in a lack of true ownership for the people it targets. On the contrary, without external funding most of the
CBMW projects would probably never have been initiated. The problem is rather that many CBMW projects are still dependent on external funding to be economically viable (IIED, 1994).

Whether the CBMW projects are not economically viable because not enough time is given for the people to have the capacities to administer the funds, the wildlife populations have not been adequately managed or the revenues are too low to cover the expenses, can be difficult to judge and probably differs from project to project. For WMP the economic viability is no doubt dependent on external funding and will remain so for a while yet. However, in general, it can be said that CBMW requires the presence of wildlife populations that are well managed and can allow for harvesting to make significant economic revenues to support the conservation and development in the communities. This implies not only the abundance of trophy animals, but also the demand for African trophy animals by hunters (Wilkie & Carpenter, 1999) and suitability of the area to attract hunters. Still with this, the demand might not reflect the true TEV of biological diversity and might not be exposed to the free economic market forces, as it in theory should be (Turner et al., 1994).

Nevertheless trophy hunting represents a major advantage for CBMW because it can immediately generate considerable revenues with little or no investment and more importantly it can be used for other income generating activities (Christoffersen et al., 2000). CBMW should not depend on one source of income, but also try to diversify the income sources to make the people less vulnerable to sudden changes and decrease the dependency on only one source. The lessons learnt here have according to IIED (1994) showed that activities based on skills already existing within the community or the presence of an easy accessible market have been the most successful.

As a concluding remark concerning the conditions required for CBMW it should be kept in mind that although CBMW is a multifunctional approach and is believed to have impact beyond alleviation of poverty and nature conservation, it is ‘just’ a project. The people which it target still have their ‘old life’ and they are, as Roe et al. (2000) express it, like ‘mini-corporations – with a range of businesses and troubles to deal with – winning on some and loosing on others’. At the same time as a villager from the WMP village Diozile said: ‘When you do not have money the chances are that you fail to do a list of things’. What CBMW can do is to help the rural people to win a bit more and help them to accomplish more than they possibly can do at present. For CBMW to work it should be realized that the issue is not just to identify under what conditions it does work – it is just as much for, the CBMW approach and the people who set up a project to understand the different conditions in which it is set up and working. Without this holistic understanding it will be difficult for any CBMW project to achieve the blueprint as a sustainable development scheme.
10 Conclusions on Important Conditions Required for CBMW

The major findings of this study for social and biological conditions, that are required for CBMW to represent a sustainable development scheme, can be summarised in a few concluding sentences:

- Comprehend the target people to develop a well-targeted CBMW project
- Target needs, which give the people strong incentives for a continuous participation
- Give time to allow for empowerment of the people
- Have clearly defined property rights over land and wildlife populations
- Have well-managed wildlife populations suitable for utilisation
- Use social and biological indicators to follow development and changes with the people and wildlife

These cannot ensure that a CBMW project will succeed in a sustainable development. But they are important prerequisites and with those CBMW can potentially turn the downward spiral in some areas of Africa.

11 A Future Perspective on WMP

The findings of the study point toward CBMW as a possible solution for a sound development in some areas of Africa if favourable conditions and mutual willingness for cooperation and participation to work with problematic issues are present. In the case of WMP there are favourable conditions, but this project might have to use more time than most CBMW projects to demonstrate its worth – not only for the people that participate, but also for the surrounding world.

This period in the light of the new Danish Government\(^{24}\) appears to be very critical for WMP and its future. The Government has decided to decrease development assistance, which is administrated by Danida and this implies that the economic support for the project could now be withdrawn. WMP is not yet at a stage where the people are empowered to control the conservation activities and the development activities themselves. Furthermore the utilisation has not started and more research is needed before it can start. Because of this WMP might have to close down due to lack of funds and the people and the wildlife populations will return to their previous state.

Someone will have to inform the villager from Kaloleni – and all the 55.000 other people- that his future expectation and dream that 'When that time is coming (tourist hunting) we will be proud of the project and we will be able to both protect and use the area for our own benefit and it is something that people will get to know about' is just an illusion. They have been offered empty promises, but not from their own Government, as they are so used to (personal communication, Busk Petersen, 2001), but from the Danish Government.

Like the Brundtland Report stated in 1987: 'It is both futile and an insult to the poor to tell them that they must remain in poverty to protect their environment' (From Hulme & Murphee, 1999). But, to offer the poor rural people help as a mean of self-help to both increase their standard of living, their economic independency and at the same time protect the environment and some of World’s most spectacular wildlife species and then withdraw this help before the poor people even got to feel it. That is an even greater insult in a World where local and global responsibility and interdependency cannot any longer be denied.

\(^{24}\) Liberal and right-oriented government.
Reference List


The Opportunities & Constraints for a Sustainable Life with Wildlife


United Nations Conference on Trade and Development (UNCTAD) 1995: Sustainable development, population, human resources, and environment. UNCTAD’s contribution to the implementation of the


Village Profile (VP) (2000): *Information on the project villages collected from September 2000 and forward.* Hold by WMP.


Personal communication

Walsh M. Project leader on MBOMIPA project, Iringa, Tanzania. Communication on the 11th of September 2001 in Iringa at Mbomipa's office.

Webaddresses


Appendix

Appendix 1: Semi-structured interviews with the Wami-Mbiki villages

We usually started off with an introduction of me and my project and how their answers could hopefully add to their own future and fulfil some of their needs and the success of the project. Before we started the interview we mentioned that none of the information that they will give will be used against them and that they could talk freely. We wanted further all of them to give their views on the questions so we can get the broad picture of the village. The following represents the basic structure of the interviews and what I wanted to have answers on, not necessarily the way the questions were asked or phrased.

The interview group and the village:
- Their names, age, education, household/family, their position in the village (member of committee)
- What is the village’s general income base - agriculture, small business’s or others?
- What is the general income in the village/households per year in terms of production and what is this production worth?
- Was there a tradition before the project started to use the Wami-Mbiki area and what was utilised?
- Have there been other kinds of development projects in the village and were they successful?

The Wami-Mbiki project:
- What is the project dealing with?
- What has the project contributed to the village at this point?
- Have the animal populations increased in the area and which species?
- Has the village at this point got what the project promised from the beginning?
- What has the project promised for the future and when do they expect this to take place?
- Due to the answers on the above has the village been satisfied with the project at this point?

The needs of the village in relation to the project:
- What are the needs in the village in terms of social services, things that benefit all villagers?
- What are the needs for access to the core area of Wami-Mbiki and utilisation of its natural resources?

The buffaloes of Wami-Mbiki
- Have the buffaloes been observed in the core area or near to the village and in which numbers?
- Has the buffalo been observed near the villages?
- Have the buffaloes ever been a problem to the village destroying crops or the like?
- Are other species a problem in the village and how do they deal with these problems?

The interview was finished with a thank you for their time and answers and questions for me.

Appendix 2: The Logistic Buffalo Population Growth Curve; Equations and Values Used

The logistic equation: \[ \frac{dN}{dt} = rN\left(1 - \frac{N}{K}\right) \]. The solution to the equation is:

\[ N(t) = \frac{N_{(t=0)} e^{rt}}{1 + N_{(t=0)} \left(e^{rt} - 1\right) / K} \]

\( N \) is the present population number: 200 buffalo. \( T \) is the time and a time frame of 80 (2000-2080) years was used.

\( K \) is the carrying capacity: 3000 buffalo. \( K \) was calculated as 24 buffalo/km\(^2\) * 125 km\(^2\).

\( r \) is the rate of increase. \( R = \) birth rate (B) - death rate (D). D = 0.08 was used considering that the buffalo lives for 12 years. For all \( r \)-values it decreases linearly to 0 as it reaches the carrying capacity of 3000. \( r \)-value of 0.16 calculated as: B: 0.5*0.5 = 0.25 considering that half of the population are females and that they can reproduce in half of their lifetime. \( r \) = 0.25 - 0.08 = 0.16. \( r \)-value of 0.11 calculated as: B: 0.5*0.5*0.75 = 0.19 considering that half of the population is females and that they can reproduce in half of their lifetime and that 25% of the calves die. \( r \) = 0.19 - 0.08 = 0.11. \( r \)-value of 0.06 calculated as: B: 0.5*0.5*0.57 = 0.14 considering that half of the population is females and that they can reproduce in half of their lifetime and that 43% of the calves die. \( r \) = 0.14 - 0.08 = 0.06.

Harvesting level of 2% used from year 0 (2000) and harvesting of 2% from year 0 (200) and 5% from year 7 (2007).