

**THE ROLE OF LOCAL COMMUNITIES IN WILDLIFE MANAGEMENT:
A CASE STUDY OF THE SERENGETI REGIONAL CONSERVATION
PROJECT, TANZANIA**



BY

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**FOR REFERENCE
ONLY**

**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
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ABSTRACT

The study was conducted in the western corridor of the Serengeti National Park between October 2001 and January 2002. The study area included villages bordering the Ikorongo-Grumeti Game Reserve, Ikoma Wildlife Management Area, and the Serengeti National Park. Specifically, the study was intended to assess the effectiveness of local communities in wildlife management; assess the relationship between the local community and wildlife authorities; and assess if there is any decline in poaching in the study villages. The study involved four villages of 14 villages under the SRCP where in each village, at least 5% of the households were sampled. Primary data were obtained from questionnaire survey, focus group discussions, check list and the researcher's observations. The study revealed that both village natural resources committees (VNRCs) and village game scouts (VGS) were significantly effective in combating poaching than expected ($\chi^2 = 108.3$, $p < 0.001$ and $\chi^2 = 90.13$, $p < 0.001$, for VNRCs and VGS respectively). The relationship with wildlife authorities was said to be excellent by 29.2% of the respondents, 69.2% said there was good relations while 1.7% said it was poor. Furthermore, 98.3% of respondents said poaching has decreased since the introduction of community-based conservation by SRCP. Poaching was ranked as the most important threat to wildlife conservation, followed by lack of community participation in wildlife management, increasing livestock numbers, and agriculture. Other problems in the area included severe shortage of water for livestock during the dry season was pointed out by 83.3% of the respondents while 50% stated the shortage of grazing area. Crop damage was also a problem and the most problem animals mentioned by respondents were bushpig (*Potamochoerus porcus*) (84.2%), vervet monkey (*Chlorocebus aethiops*) (77.5%), olive baboon (*Papio anubis anubis*) (55.0%), and the elephant (*Loxodonta africana*) (44.4%). On the other hand, communities received a total

of 36 millions TAS (equivalent to 45.5 thousands USD) from 1998 to 2001 as a form of tangible benefits from the community wildlife hunting and 44 million TAS (equivalent to 48.1 thousands USD) from non-consumptive photographic safaris. The study concludes that active participatory approaches that are used by SRCP have contributed to the success of the project in winning support of local communities at the grass root level. Local communities are treated with respect, as equal partners in conservation, not as targets of conservation or education projects. Decision making power is shared, and the role of the project staff is to act as catalysts and intermediaries. Based on the study, the following recommendations are given:

- More support should be provided to the village game scouts.
- There should be integration between crop and livestock production system.
- Wildlife conservation education should be added in the primary school syllabus.
- The use of non-lethal deterrents for crop protection against wildlife especially elephants should be researched in the area.
- Villages should be assisted in exploring the potential investors especially on photographic tourism and tourist hunting.

DECLARATION

I, Nollasco Matozi Ngowe, do declare to the Senate of the Sokoine University of Agriculture that this dissertation is my own original work and has not been submitted for a degree award at any other University.

Signature.....*Ngowe*.....

Date.....*3/7/2003*.....

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This dissertation would never have taken this shape without the countless hours of discussion and unwavering commitment of my supervisor, Prof. S.L.S. Maganga, of the Department of Wildlife Management, Sokoine University of Agriculture. His contribution and guidance throughout the study enriched and created the foundation of this dissertation. Indeed the support, assistance and the professional input provided before and during the writing of this dissertation remain a permanent asset for reporting other scientific works in future.

Special appreciation goes to the Wildlife Division (WD) for allowing me to leave for further studies, the Serengeti Regional Conservation Project (SRCP) for financial support throughout the study period and the Tanzania National Parks (TANAPA) for allowing me to access various data and information.

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I would like to extend my thanks to the Acting Director General of TANAPA Mr. G. Bigurube, as well as Messrs M. Looiboki and E. Lufunguro for their maximum co-operation at the TANAPA headquarters. Also Messrs J. Hando, J. Nyamuhanga, S. Msumi, and Ms L. Dora of the Serengeti National Park (SENAPA) for their tireless co-operation.

The following members of SRCP, Messrs J. Muya, E. Sudai and L. Katakweba, provided invaluable support and advice during the field work. Finally my deepest

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ABBREVIATIONS

CBC	Community Based Conservation
FAO	Food and Agriculture Organisation
IGGR	Ikorongo-Grumeti Game Reserves
MBOMIPA	Matumizi Bora ya Maliasil Idodi na Pawaga
MLHS	Ministry of Lands Housing and Human Settlements
MNRT	Ministry of Natural Resources and Tourism
NCA	Ngorongoro Conservation Area
NORAD	Norwegian Agency for Development Co-operation
SCP	Selous Conservation Programme
SENAPA	Serengeti National Park
SRCP	Serengeti Regional Conservation Project
TANAPA	Tanzania National Parks
TAS	Tanzanian Shillings
URT	United Republic of Tanzania
USD	United States Dollars
WD	Wildlife Division

CHAPTER ONE

1.0 INTRODUCTION

1.1 Historical background to wildlife conservation in Tanzania

The philosophy in establishing wildlife conservation areas and similar protected areas like forest reserves was introduced to Africa by colonialists. This was soon after the scramble and division of Africa in the late 19th century. Wildlife conservation in Tanzania dates back to 1891 when laws controlling hunting were first enacted by the Germany rule (MNRT, 1998a). These laws regulated the offtake, hunting methods and trade in wildlife with some endangered species being fully protected. Selous Game Reserve was the first conservation area to be established in 1922 followed by the Serengeti Game Reserve in 1929. In 1940 Serengeti was given protected area status and a National Park was established in 1951 (Sinclair, 1995).

After independence, Tanzania showed her commitment to wildlife conservation and the current protected area network covers 28% of the total land area of which, about 4% is 12 National Parks, 15% is 31 Game Reserves, 8% is 38 Game Controlled Areas, and 1% is the Ngorongoro Conservation Area (MNRT, 1998a). In Game Reserves and National Parks no human settlement is allowed but in Ngorongoro Conservation Area limited Maasai pastoral communities are permitted (Thompson, 1997).

During the colonial period and after independence, the conservation philosophy was based on ecological principles of making the protected wildlife areas ecological entities or ecosystems (Maganga, 1999). Because of the emphasis on the ecosystem dimension, wildlife management and research activities were biased to gaining more knowledge on

the biology and ecology of the animals and protecting the wildlife areas from disturbance or interference (Maganga, 1999; IIED, 2000a). To prevent the use and disturbance of these protected areas law enforcement was instituted. This involved apprehending wildlife law violators and taking them to court of law for penalty if found guilty (Lyimo and Ndolezi, 1996; Maganga, 1999).

1.2 Introduction of community based conservation in Tanzania

The conventional system of wildlife management did not work as expected and was ineffective (IIED, 2000a). One major indicator of the ineffectiveness was the serious poaching that started in the late 1970s up to mid 1980s especially in East African countries. Tanzania lost about 290 000 elephants (*Loxodonta africana*) due to poaching which was about 60 elephants a day (Mboya *et al.*, 1995). The rural communities were not supportive and were against wildlife conservation activities. As a result some individuals in rural communities collaborated with commercial poachers by being either agents or hosts of the poachers (Maganga, 1999). The collaboration became very costly in terms of conserving wildlife to the extent of local extinction of some species like black rhinoceros (*Diceros bicornis*).

As poaching became a big problem in Tanzania, the government in June 1989 launched a nationwide special anti-poaching operation, named *Operation Uhai* which involved the army, police, and Wildlife Division staff. The operation continued until March 1991 and succeeded in halting the problem at least for a while but the fences and fines approaches required the government to administer and police protected areas despite that they have limited resources (Songorwa, 1999; Hahn and Kaggi, 2001).

With poaching being rampant and human population building up along the edges of protected areas, it was becoming increasingly clear that the issues faced by modern wildlife management were more human-related. It has now been recognised that the challenge is to develop a new strategy to cope with poaching and encroachment by instigating sustainable wildlife utilisation schemes in rural areas, and to provide rural people with real benefits from wildlife (Leader-Williams *et al.*, 1996; IIED, 2000b).

According to Ndolanga (1996), the Wildlife Division has gone some way down this route by establishing the Selous Conservation Programme (SCP), Serengeti Regional Conservation Project (SRCP), and Ruaha Ecosystem Wildlife Management Project (REWMP) renamed MBOMIPA, (Matumizi Bora ya Maliasili Idodi na Pawaga). The three projects are working with villages in training village game scouts, and providing legal quotas of game animals for the villages to hunt for meat.

The Wildlife Policy of Tanzania (MNRT, 1998a) has proposed the establishment of Wildlife Management Areas (WMAs) which will replace the present category of Game Controlled Areas (GCAs) with the objective of transferring to local communities the mandate of taking care of corridors, migratory routes, and buffer zones. The policy is intended to ensure that local communities obtain substantial tangible benefits from wildlife conservation. One of the strategy is to establish Community Based Conservation (CBC) programmes in WMAs by helping the rural communities to have secure ownership/long-term use rights of their land and enabling them to use the wildlife and natural resources on those lands.

Within WMAs the villages will be given the responsibility of deciding, with appropriate professional advice, upon the forms of wildlife utilisation they wish to pursue and deriving benefits from such management. If benefits are realised, then a sense of custodianship would return, and schemes to employ village game scouts would succeed in reducing illegal exploitation of natural resources (Ndolanga, 1996; IIED, 2000c).

While the governments were quick to take the rights and responsibilities over natural resources away from rural people, reversing the process has taken much longer. Conservation authorities seem reluctant to relinquish their power, and retain the belief that rural people cannot manage their natural resources on sustainable basis. The anticipated loss of revenues to national treasury has also slowed the progress (IIED, 2000a).

According to Gillingham (1998) (cited by IIED, 2000a) if community-based conservation is to become firmly established as a strategy for conservation, national policy and legislative frameworks for wildlife sector need to support and direct the empowerment of rural communities as wildlife managers. To date the Wildlife Conservation Act No. 12 (1974) of Tanzania has not been amended to support local communities in managing wildlife in the newly established WMAs.

Secure tenure or use rights over land and natural resources including wildlife and trees, is crucial if rural communities are to manage them (McNeely, 1995). Local communities need the rights to self-determination, and to set their own agenda. It does put responsibility firmly in the hands of those who will earn the benefits and pay the cost (McNeely, 1995). When land tenure is uncertain the investors are endangered, and a tendency to mine the resources results while investments that may be lost are minimised (IIED, 2000a).

1.3 Background to the Serengeti ecosystem

The Serengeti ecosystem (1° - 3° 30' S, 34° - 36° E) covers approximately 25 000 km² straddling the boarder of northern Tanzania and southern Kenya. The ecosystem comprises of several different conservation areas, namely Ngorongoro Conservation Area (8288 km²), Serengeti National Park (14 763 km²), Ikorongo-Grumeti Game Reserves (IGGR) (3767 km²), Maswa Game Reserve (2200 km²), Kijereshi Game Reserve, Loliondo Game Controlled Area and Ikoma Open Area (MNRT, 1986). The ecosystem harbours some 1.7 million wildebeest (*Connochaetes taurinus*), 250 000 zebra (*Equus burchellii*), and a vast number of ungulates and carnivores (MNRT, 1991). The area is characterised by the yearly migration of wildebeest (Maddock, 1979). It is during the north migration that the herds often transgress the protected area boundaries and enter areas of low protection with comparatively high human population densities of the western corridor.

Arcese *et al.*, (1995) showed that killing wildlife for meat is the most serious form of poaching now occurring in Serengeti. This activity appear to have increased since the park's inception, as indicated by the sixfold increase in the number of arrests made from 1957 to 1991. The preferred method of hunting is snaring. Large resident and migratory herbivores either wander or are driven into snare lines. Other wildlife species not specifically targeted by poachers are also caught, some of them in substantial numbers.

1.4 The Serengeti Regional Conservation Project (SRCP)

SRCP was created after the Seronera workshop held in 1985 in Serengeti National Park. The workshop was convened by the Ministry of Natural Resources and Tourism with the financial assistance from NORAD (MNRT, 1986). The origin of the SRCP hinges on the

question of the long-term future of the area since the need for land and the pressure on protected areas was increasing. The main challenges identified were demand and competition for fertile land leading to an increase in poaching, deforestation, and other illegal activities. On the other hand the local communities were not involved nor benefited from the management, utilisation and conservation of wildlife. This created antagonism between the local population and the protected area management (MNRT, 1998b).

The SRCP was established following the realisation that the main problem of the area was the non-involvement of local communities in the management of the protected areas (MNRT, 1991). Development of the communities in the area is dependent upon the use of natural resources, thus efforts to protect wildlife without considering local people's developing needs was creating conflicts. The only way to solve this problem was to integrate wildlife conservation and human development needs through community participation (MNRT, 1998b).

The project initiated a cropping programme to provide tangible benefits to local communities. Meat was sold at a reduced price and provided protein in their diet. Revenue generated from the scheme was used by the village governments in community development projects such as building schools, dispensaries and purchase of medical equipment (Mbano *et al.*, 1995). Each village controls poaching within the village and in open areas by employing village game scouts (VGS) under an elected Village Wildlife Committee (VWC) which later became to be known as Village Natural Resources Committee (VNRC).

The actual implementation of the field operations started in 1994 with four villages in Bunda and Serengeti Districts, and now there are fourteen villages under the programme,

with seven village in each district. In order for the project to achieve the identified purpose, it has formulated four main outputs namely:

- Protected areas management plans are developed and implemented.
- Communities are increasingly involved and participating in natural resources management.
- Improved institutional collaboration and transferring responsibility to local institution.
- Supervision, co-ordination and information networking achieved.

1.5 Problem statement and study justification

The Serengeti ecosystem is of outstanding biological, scientific, aesthetic and economic value. The majority of these values stem from the region's prolific wildlife diversity. As a result the ecosystem has been internationally recognised as a World Heritage Site (Mackinnon *et al.*, 1986). For many years the main duty of park rangers has been the curtailment of illegal meat and trophy hunting (Arcese *et al.*, 1995). Overexploitation of wildlife due to illegal hunting is likely to bring hazards to wildlife species falling as victims, and which depend on the biological reproduction for their natural regeneration (Peek, 1986).

There is, however, a growing concern about the long-term viability of the ecosystem. Land use pressure in the region is escalating rapidly bringing human populations into increasing conflict with the protected areas. In the west, settlements and farms are appearing on the periphery of the National Park (MNRT, 1986). This habitation is affecting the areas immediately surrounding the National Park that act as buffer zones and migratory corridors for wildlife species such as wildebeest, zebra, and Thomson gazelle (*Gazella thomsoni*) (Maddock, 1979). In addition, there has been an increase in

poaching, unplanned fires, and illegal tree cutting (Mbano *et al.*, 1995). In order to alleviate the situation, the government of Tanzania with financial assistance from NORAD established the Serengeti Regional Conservation Strategy (SRCS) in 1989 which later became known as Serengeti Regional Conservation Project (SRCP) with the aim of integrating conservation and development to win the support of local communities at grassroot level. The speed with which this occurs will depend very much on whether the local communities do indeed benefit from wildlife and the protected areas and not just lose access to resources that would otherwise be available to them (Mbano *et al.*, 1995). Where the benefits realised by local communities are clear and readily felt, there will be little difficulty in getting local communities to support the park. When the benefits are not so obvious, and local communities still see the park as a restriction on land needs, the park manager will have greater difficulty in gaining their co-operation (Mackinnon *et al.*, 1986).

This study aimed at examining the effectiveness of local communities in wildlife conservation and management as well as the bottlenecks they are facing, following the introduction of the SRCP. The study intended to suggest recommendations that may enhance better community participation in management of the ecosystem.

1.6 Study objectives, research questions and hypothesis

1.6.1 General objective

The overall objective of this study was to investigate the role played by local communities bordering Serengeti National Park and Ikorongo-Grumeti Game Reserve in the management of wildlife after the initiation of community based wildlife management by SRCP.

1.6.2 Specific objectives

Specifically the study intended to:

- (i) Assess the role played by the communities in wildlife conservation and management.
- (ii) Assess the relationship between the local communities and wildlife authorities.
- (iii) Assess the trend in poaching in pilot villages under SRCP.

1.6.3 Research questions

The study was underlined by the following research questions:

- (i) To what extent are the communities participating in wildlife conservation and management in the study area?
- (ii) Are the local people benefiting from community wildlife management or suffering from the project?
- (iii) What are the potential threats to wildlife conservation in the study area?

1.6.4 Hypothesis

1.6.4.1 Null hypothesis

- (i) Communities are playing a significant role in wildlife conservation after the introduction of SRCP.

1.6.4.2 Alternative hypothesis

- (i) Communities are not playing a significant role in wildlife conservation after the introduction of SRCP.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Protected areas and local community conflicts in Africa

Interventions by European colonial powers in the twentieth century in Africa had a radical impact on traditional land tenure systems. Statutory laws were promulgated that alienated local people from land, grazing, forest and wildlife resources. Rural people lost access to wild lands as protected areas were established and also lost legal access to wildlife on their own lands and the independent states maintained the principle of state control over wildlife while wildlife management authorities did not consider their local development efforts (Metcalf, 1995).

According to Thompson (1997) many of the protected areas were created with little consideration of traditional land use systems in the areas concerned, with little regard to the impact on local communities. The prohibition of human habitation led to a loss of access to varied resources critical to household needs and local communities had little option but to continue using resources within protected areas in contravention of protected area legislation. The resulting confrontation with government authorities has often led to growing antagonism, and in some cases to communities perceiving interests of conservation to be contrary to community development. The insular approach to wildlife management evolved at a time when human population densities around protected areas were low and human activities within the protected areas borders were relatively insignificant. Conservation and human development were able to proceed in isolation simply because there was room and a sufficient supply of natural resources (MNRT, 1986). Present day trends in the protected areas indicate that there can be no

long-term future in such an insular and antagonistic relationship between local communities and conservation areas, as the number of people and demand for land and resources have escalated. The implication is that it is no longer possible to ignore local communities and their development needs since this will only place the long-term future of the protected areas in jeopardy (MNRT, 1986). And yet, wildlife remains a source of cultural identity for many indigenous people, and wildlife resources may be valued in cultural, spiritual, ecological and economic terms (IIED, 2000b).

Maganga (2002) stated that the aim of conventional wildlife conservation was protecting the resource, and to effect this, there were laws prohibiting the use of the resource by the indigenous communities who had been custodians of the resource for centuries. The laws were used as a tool to facilitate punishing people who were supposedly found using the resource illegally. By using this approach, it was expected that the resource system would be stable and viable, which was never achieved. Local communities perceived that the state was taking away their natural and ancestral lands and transforming them into restricted wildlife conservation areas and augmented them with legislation that forbid the people to practice traditional wildlife utilization in these areas. Apart from that, wildlife conservation areas were formerly used communally by the people as common lands for obtaining wood fuel, building materials, and medicinal plants, for grazing their livestock and as cultural sites, which again they were denied access without being given alternatives. Worse still, local communities had to bear both the social and economic costs and losses due to wild animals marauding or attacking livestock, human beings and destroying crops (Bell, 1987; Maganga, 2002). Because of such circumstances, the communities created a feeling that people's lives were less valued than that of wildlife. They thus developed an antagonistic behaviour towards both wildlife and employees of wildlife institutions. The outcome of this was poaching and occasionally killing employees of the wildlife institutions (Maganga, 2002).

2.2 Community conservation initiatives

A community is taken to refer to a homogenous group of common interest generally resulting from a shared history, sense of tradition or residence within a common area (IIED, 2000c). Also a community is regarded as a group of people associated in spatial, social, cultural or economic terms which occupy, have access to, or have a legitimate interest in a particular local geographical area. A community represents users of a resource rather than a homogenous resident unit (IIED, 2000a).

A range of both plant and animal resources contribute to local livelihoods in the region, and the term wildlife resources encompasses wildlife and the habitats on which it depends (IIED, 2000c). Community-based conservation refers to the application of rules and regulations to ensure the long-term sustainability of wildlife resources use and hence the biodiversity. Barrow and Murphree (2001) identify three categories of community conservation that have occurred in Africa namely:

- Protected area outreach that seeks to enhance the biological integrity of National Parks and Reserves by working to educate and benefit local communities and enhance the role of a protected area in local plans. In East Africa this has been the predominant approach, (e.g. the Community Conservation Service, CCS of TANAPA).
- Collaborative management that seeks to create agreements between local communities or groups of resources users and conservation authorities for negotiated access to natural resources which are usually under some form of statutory authority. For example the Uganda Wildlife Authority (UWA) community conservation programme takes this form through negotiation of resource sharing agreements.

- Community-based conservation, which has the sustainable management of natural resources through the devolution of control over these resources to the community as its chief objective. This has been the predominant approach in Southern Africa, for example Zimbabwe, Namibia, and pilot projects in Tanzania (SRCP, SCP, and MBOMIPA).

In East Africa arrangements for collaborative management and community-based conservation have evolved in recognition that community conservation is more than outreach programmes. However, despite the good intentions of institutions concerned with community conservation it is unclear whether there has been any real handing over of ownership and responsibility for natural resources and their management to local communities (IIED, 2000a).

2.3 Integrated conservation and development projects (ICDP) in southern Africa

The conflicts between protected area authorities and local communities has prompted growing calls for protected areas to play a greater role in the development of adjacent local communities. As a result there has been an evolution of a variety of approaches seeking to achieve this. These have been described as benefit sharing, joint management, integrated conservation and development projects (MNRT, 1986; Thompson, 1997).

Zimbabwe's community-based wildlife use and management policy is actualised in its Communal Areas Management Programme for Indigenous Resources (CAMPFIRE). The programme applies to the areas of the country under communal tenure conditions as opposed to private land or land under direct state management such as parks and wildlife state (Murphree, 1996; 2001a). The Rhodesian era of systematic subjugation of the indigenous majority, their land and natural resources resulted in a number of problems in

the area of wildlife management (Patel, 1998). Antagonism between local communities and wildlife grew, particularly those communities evicted from the newly established National Parks. Prohibited from hunting for subsistence, they were forced to cultivate the poor soils. Colonial laws provided no compensation for the destruction of crops or physical injuries inflicted by wildlife. Local communities expressed their desperation and alienation towards colonial policies by killing wildlife for food and money. In response they were named 'poachers' and their activities named illegal. Staff at the Department of National Parks and Wildlife Management (DNPWM) were given authority to kill these poachers, despite these draconian measures 'poaching' did not subside and the antagonism expressed by local communities grew stronger with time (Patel, 1998).

The guiding philosophy of CAMPFIRE is one of sustainable rural development that enables rural communities to manage, and benefit directly from wildlife while providing local communities with incentives to conserve and manage inter-related natural resources such as soil, water, woodlands and grazing (Bond, 1993 cited by Patel, 1998). CAMPFIRE started in 1989 and the implementation in the rural areas is conducted through local government administered through rural district councils (RDC) (Patel, 1998). Although the implementation of CAMPFIRE has mainly occurred in those areas adjacent to National Parks and protected wildlife areas, districts with very little wildlife are also implementing CAMPFIRE through translocation of wildlife. Trophy hunting forms the main revenue generator comprising over 90% of total income realized under the programme (Patel, 1998).

Safari operators (SO) are required to submit the revenue figures to RDC and the agreed percentage split is applied. From the percentage the RDC receives, a further percentage is to be disbursed to the relevant rural communities. The RDC convenes a meeting with the respective villagers to announce their share of revenues. The villagers in turn decide

whether they want their share in cash or to be put towards community development projects such as school or clinic. The programme has been driven primarily by a desire to make wildlife a competitive form of land use (Murphree, 1996; 2001a). Thus in the CAMPFIRE initiative, it is the district councils and not the communities that receive the wildlife revenue from agreements with private operators. They can hold up to 35 % of the revenue as a management fee and 15 % as levy and pass the rest on the communities under their jurisdiction (Murphree, 1996; Patel 1998). Metcalfe (1995) acknowledges that the CAMPFIRE programme has managed to establish the framework for developing institutional capacity in the local community for managing wildlife resources in a holistic way.

According to Mwima (1996), the Zambia's National Parks and Wildlife Service (NPWS) suffered a humiliation from uncontrolled poaching during the 1970 and much of the 1980s. In order to resolve these problems NPWS introduced the Administrative Management Design (ADMAD) for Game Management Areas (GMA) as a method of administering wildlife and improving the standard of living of people in the Game Management Areas.

The Zambian government established the Wildlife Conservation Revolving Fund (WCRF) in 1983 as a mechanism for recycling some of the revenue earned from wildlife utilisation by the NPWS. The WCRF has the responsibility of collecting and disbursing the money earned in ADMAD areas from hunting concession fees and from income earned from other forms of wildlife utilisation. The WCRF retains 50% of earnings from game licence fees, while the remaining 50% goes directly to treasury. Out of 50% of the WCRF share, 35% goes directly to local communities within the GMA where the money was earned (Mwima, 1996). The economic benefits derived from tourist hunting have

reduced illegal hunting through local investment schemes and the employment of village game scouts (Lewis *et al.*, 1990).

The Koakoveld (Kunene Region) in Namibia is communal land and has no formal conservation status. It is dominated by semi-nomadic pastoralism and wildlife due to low and erratic rainfall, combined with soils which are unsuitable for agriculture (Jones, 2001). After the region was de-proclaimed as a Game Reserve in 1970, large-scale illegal hunting of all game species occurred (Owen-Smith, 1996; Jones, 2001). Historically the Ministry of Wildlife Conservation and Tourism was 'preservationist' focusing on fences between people and parks as a means of conservation (Ashley, 1995). After independence a national Community Based Natural Resource Management programme (CBNRM) was established. The goal of the CBNRM programme is the protection of bio-diversity and maintenance of ecosystems and life support processes through sustainable use of natural resources for the benefits of rural communities. The programme focused more on enterprises, such as campsites, selling thatch grass, and traditional village for tourists that can go on without such legal rights. The CBNRM programme developed and promoted the 'conservancy' approach. If a community forms itself into a conservancy, with defined boundaries, and has a management plan agreed by the ministry of environment and tourism, it will be granted rights to utilise and benefit from wildlife within its boundaries. These rights include non-consumptive use of wildlife (Ashley, 1995).

As local communities were re-empowered with regard to the wildlife resources in their area, they took more responsibility for the protection and management of wildlife, thereby reducing the financial and manpower load on government (Ashley, 1995; Owen-Smith, 1996). Ultimately the government agency only needed to supply technical and legal support, for example, the extra-armed manpower if necessary, and watchdog role over national and international conservation issues. Examples of wildlife-tourism

activities that generated economic benefits for the local communities included the employment of local communities as government game rangers, community game guards (CGG), tourist lodges and safari workers. When the CGG responsibilities became firmly established and assured in their community role, uniforms were issued and some informal training given mainly to improve their skills in reporting.

This had considerable success for example in most areas big game numbers has continued to decline with the exception of Kunene Region where a CBNRM programme was operating. Between 1983 and 1992 the period during which the community game guard system has been active, only eleven rhino are known to have been poached in the Kunene Region. During the same period the neighbouring Etosha National Park lost not less than 50 black rhino to poachers (Owen-Smith, 1996).

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 Description of the study area

The location of the study area is to the north-west of the Serengeti National Park (the western corridor of the Serengeti National Park). The study area is between 34° - 36° E and 1° - $3^{\circ}30'$ S which is defined by the migratory movements of wildebeest (Sinclair, 1995). The area includes villages bordering Ikorongo-Grumeti Game Reserve, Ikoma Open Area, and the Serengeti National Park (MNRT, 1991). The normal legislation of Game Reserves does not permit human residence but allows consumptive utilisation, such as tourist hunting and game cropping while in the National Parks only non-consumptive photographing safari is permissible (Mackinnon *et al.*, 1986). The Ikoma Open Area (a proposed Wildlife Management Area) is conducting both consumptive and non-consumptive wildlife utilization (resident hunting, tourist hunting and photographic safaris). The study area encompasses two administrative districts namely Serengeti and Bunda, each having seven villages under SRCP forming a total of 14 villages. According to the Bureau of Statistics (1988), the two districts had a population of 312 000 people with an average annual population increase of 3.1%.

3.1.1 Climate and topography

The Serengeti is part of the high interior plateau of East Africa. It slopes to its highest part (1850 m) on the eastern plains near the Gol Mountains towards Speke Gulf (920 m) along Lake Victoria. The temperature shows a relatively constant mean monthly maximum of 27° - 28° C. The minimum temperature varies from 16° C in the hot month of

October-March to 13⁰ C during May-August (Sinclair, 1995). Rain typically falls in a bimodal pattern with the long rains during March-May and the short rains during November-December. Rainfall varies from 1200 mm in the north to less than 400 mm on the south-eastern plains and the Rift Valley (MNRT, 1991).

3.1.2 Soil and vegetation

Soils on the eastern plains are highly saline and alkaline as well as shallow due to recent volcanic origin. The soils become progressively deeper and less alkaline towards the north-western plains and into the woodlands which are dominated by *Acacia sp.* The south-eastern plains are treeless and the grasses are alkaline tolerant. The dominant grass being *Themeda triandra* and *Pennisetum mezianum* (McNaughton and Banyikwa, 1995).

3.2 Methods

3.2.1 Research phases and methods

The study was carried out in three phases. Phase one was exploratory, phase two involved primary data collection, and phase three secondary data collection.

3.2.1.1 Exploratory phase

The first phase involved categorization of the different stakeholders in the study area. The exploratory phase was also used for questionnaire pre-testing and questions that proved difficult for respondents to answer were revised.

3.2.1.2 Sampling procedure for questionnaire survey

A multistage random sampling procedure was employed whereby stage one involved selection of divisions, stage two selection of wards, stage three selection of villages, stage four selection of respondents (Alreck and Settle 1985; Fowler, 1993). The villages picked in the study area were those falling under SRCP and a total of four villages were sampled which is about 30% of the total programme villages. The villages picked were Nyamatoke and Hunyari in Bunda District, and Nyichoka and Natambiso in Serengeti District. At least 5% of the households from each village were interviewed taking into consideration that villages with less than 30 households were raised to 30 for effective representation of the population under study (Akitanda, 1994 cited by Mbwambo, 2000). The sample unit of the study was the household. Simple random sampling was used to identify the sample units. In this method every household had an equal chance of being selected. Household heads were picked from the updated village register book where all members of the village and households are listed (Deaton, 1998). Households were defined as a group of people living together and identifying the authority of one person the household head, who is the decision-maker for the household (Katani, 1999). The distribution of respondents in the study villages are shown in Table 1.

Table 1: Distribution of respondents by villages.

Districts	Villages	Number of households	% of the households	Main ethnic groups
Bunda	Nyamatoke	291	30	Sukuma, Ikizu, Ikoma, Kurya, Zanaki
	Hunyari	402	30	Ikizu, Zanaki, Kurya, Sukuma, Taturu
Serengeti	Natambiso	361	30	Nata, Ikoma, Kisii
	Nyichoka	495	30	Ikoma, Nata, Kurya
Total		1 549	120	

3.2.1.3 Primary data collection

Primary data for the study was obtained from four main sources: questionnaire survey, focus group discussion, interviewing key informants and researcher's observations.

3.2.1.3.1 Household questionnaire survey

The questionnaire consisted of open-ended and closed questions, and ranking scales. According to Newell (1993) open questions allow the individuals to respond anyway they wish while the closed questions can be pre-coded easily and do save time for both the interviewer and the respondent. A ranking scale is a form of closed question that can be valuable when trying to ascertain the level of importance of a number of items. A list of choices was provided and the interviewee was asked to rank them. Respondents were allowed to look at the questionnaire showing the choices. A sample of the household questionnaire is shown in Appendix 1.

3.2.1.3.2 Focus group discussion

Group discussions provide access to a larger body of knowledge of general community information (Mikkelsen, 1995; Borrini-Feyerabend, 1997). Group discussions are cheaper and quicker to conduct than individual interviews with the same number of respondents. However, they have their own disadvantages that not everyone who was invited will

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attend but if some of them have shown up, you will have to run the session regardless (Cooksey and Lokuji, 1995).

Mikkelsen (1995), recommends groups of not more than 25 people since they will be difficult to manage. Twenty respondents were invited to participate in focus group discussion for each village sampled. Members required were:

Village government chairman (1), village executive officer (1), village natural resources committee chairman (1), village natural resources committee secretary (1), representatives from village government (2) (one female), representatives from village natural resources committee (2) (one female), village wildlife fund treasurer (1), village game scouts (3) (one female), prominent livestock keepers (3) (one female), prominent farmers (3) (one female), livestock extension officer (1), and agriculture extension officer (1). A list of participants is shown in Appendix 2.

Group discussions were conducted in a classroom where a blackboard and chalk were available after seeking permission from school authorities. Questions were written on the blackboard, and the chairman who was elected by the participants guided the discussions by first reading the questions loudly for every member to hear and allowed for contributions through raising a hand. The group leader's role also was to make sure that one person does not guide the discussion, and encouraged ladies to contribute for those who were shy to speak.

The researcher and his assistant took notes as well as probing questions when judged that the respondent's statement was ambiguous. Probing involved a follow up questioning to get a full response, but the probe was as neutral as possible not to incline the respondent to a particular response (Cooksey and Lokuji, 1995). The discussion included the problem ranking, institutional ranking and participatory mapping in order to expose their

indigenous technical knowledge (ITK) on the natural resources available. The information collected was used to supplement the household questionnaire survey. For the purpose of dialogue, information generation and analysis, the researcher provided breakfast and lunch to participants for an effective participation that took a whole day.

3.2.1.3.3 Interviewing key informants

Interviews were conducted of government officials, conservation institutions and private companies. This included the District Commissioner of Serengeti, Chief Park Warden of the SENAPA, Project Manager of the SRCP, Project Manager of the IGGR, the District Game Officers of Serengeti and Bunda and the Manager of Ikoma Bush Camp that operates in village wildlife areas. A sample of the checklist is shown in Appendix 3.

3.2.1.3.4 Researcher's observations

Participant observations involved the researcher recording the various community and household activities. It was a useful tool for cross checking with the information obtained from the questionnaire survey.

3.2.1.4 Secondary data collection

Supplementary data for this study were obtained from SRCP, SENAPA, private tour companies operating in village wildlife areas, libraries and government offices. Data accessed was in the form of reports, manuscripts and other documents found in office files and other collections.

3.3 Data analysis

The quantitative and qualitative information collected through questionnaire survey were coded and entered into the computer. The statistical package for social science (SPSS) was employed for analysis of the data. Cross tabulations, frequencies and percentages were obtained. The χ^2 test was employed to examine the effectiveness of village natural resources committees and village game scouts in wildlife management after being introduced by SRCP. Data from focus group discussions were summarised picking the main points and conclusions reached by the group members themselves (Cooksey and Lokuji, 1995). Focus group discussions data was used in clarification of information obtained from the household survey.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 General information on residents in the study villages

The study population comprised of males and females with different ages, family size and education background (Table 2). Of the household heads interviewed, 59.2% of the respondents were above 40 years old. This was important because they understand the historical trend of their areas as well as the various indigenous technical knowledge (ITK).

The study villages were found to have large household sizes. Results show that 57.5% have 1-7 persons per household and 42.5% have more than seven persons. This is due to the culture of marrying many wives (polygamy) which results into a lot of dependants to feed and take care of. For example in Hunyari village there was one household head with eight wives and 40 children.

Education background of the surveyed population is mainly primary education (65.0%), very few had secondary education (5.8%), and 15.0% had no any formal education. This is due to shortages of schools especially primary school resulting into children walking long distances to school. There was no single secondary school in the study villages.

Table 2: General information on residents of study villages.

Information	Villages				Overall N=120
	Natambiso n=30	Nyichoka n=30	Hunyari n=30	Nyamatoke n=30	
(a) Age class:					
20-40	12 (40.0%)	19 (63.3%)	9 (30.0%)	9 (30.0%)	49 (40.8%)
41-60	11 (36.7%)	11 (36.7%)	14 (46.7%)	15 (50.0%)	51 (42.5%)
Above 61	7 (23.3%)	0 (0.0%)	7 (23.3%)	6 (20.0%)	20 (16.7%)
(b) Sex:					
Male	20 (66.7%)	27 (90.0%)	26 (86.7%)	23 (76.7%)	96 (80.0%)
Female	10 (33.3%)	3 (10.0%)	4 (13.3%)	7 (23.3%)	24 (20.0%)
(c) Education background:					
No formal education	5 (16.7%)	2 (6.7%)	6 (20.0%)	5 (16.7%)	18 (15.0%)
Adult education	6 (20.0%)	3 (10.0%)	3 (10.0%)	5 (16.7%)	17 (14.2%)
Primary education	16 (53.3%)	24 (80.0%)	19 (63.3%)	19 (63.3%)	78 (65.0%)
Secondary education	3 (10.0%)	1 (3.3%)	2 (6.7%)	1 (3.3%)	7 (5.8%)
(d) Household size:					
1-7 persons	22 (73.3%)	18 (60.0%)	15 (50.0%)	14 (46.7%)	69 (57.5%)
8-14 persons	6 (20.0%)	11 (36.7%)	8 (26.7%)	12 (40.0%)	37 (30.8%)
More than 14 persons	2 (6.7%)	1 (3.3%)	7 (23.3%)	4 (13.3%)	14 (11.7%)

According to URT (1998), one of the signs of poverty in the country is the low level of literacy and numeracy. The literacy level in Tanzania is now estimated to be 68%, down from 90% achieved in the 1980s. The gross enrolment rate for primary school pupils was 77.8% in 1996, down from 90% in 1980s. The Tanzanian government has managed to pay teachers' salaries and allowances but no other payments have been made in terms of new equipment or building repairs. With cost sharing, the number of girls has dropped in schools as parents have to choose between boys and girls to educate (Maliyamkono, 1997).

4.2 Land-use, tenure and associated problems

4.2.1 Land area and ownership

Most of the study population (98.3%) has land and those without land (1.7%) were females who were either divorced or widowed because the customary law for accessing land did not favour them (Table 3). They managed to survive from assistance provided by kind relatives for small areas to cultivate on temporary basis. The minimum farm size owned by an individual farmer was 0.81 ha, while the maximum farm land was 24.28 ha. Average farm land per farmer was 5 ha. Regarding land area, 64.2% of the respondents have land parcels between 1-5 ha, 29.2% had more than 5 ha and 6.7% had less than 1 ha. However, 72.5% of the respondents claimed that land was not enough. For possibilities to get more land for cultivation, 65% claimed that it was possible either through formal application to the village government (80.8%), buying from those with big farms (14.1%) and borrowing on temporary basis (5.1%) (Table 4).

During the focus group discussions it was found that the main problem of land arose in 1994 when Ikorongo-Grumeti Game Controlled Area was upgraded to the status of a Game Reserve where no human habitation is allowed, and people were evicted from the newly established Game Reserve. This resulted into conflicts between the evicted communities and wildlife authorities. In a game controlled area human habitation is allowed but hunting is prohibited except by obtaining a licence from wildlife authorities. Livestock was also prohibited and more conflict erupted between pastoralists and wildlife authorities. This led to further conflict between pastoralists and farmers because there was no land use plan for the villages in place.

Table 3: Response towards land ownership in study villages.

Information	Villages				Overall N=120
	Natambiso n=30	Nyichoka n=30	Hunyari n=30	Nyamatoke n=30	
(a) Land ownership:					
Yes	30 (100%)	29 (96.7%)	30 (100%)	29 (96.7%)	118 (98.3%)
No	0	1 (3.3%)	0	1 (3.3%)	2 (1.7%)
(b) Land owned in hectares:					
Less than 1 ha	1 (3.3%)	0	2 (6.7%)	5 (16.7%)	8 (6.7%)
1-5 ha	26 (86.7%)	14 (46.7%)	18 (60.0%)	19 (63.3%)	77 (64.2%)
6-10 ha	1 (3.3%)	11 (36.7%)	6 (20.0%)	4 (13.3%)	22 (18.3%)
11-15 ha	0	4 (13.3%)	0	1 (3.3%)	5 (4.2%)
More than 15 ha	2 (6.7%)	1 (3.3%)	4 (13.3%)	1 (3.3%)	8 (6.7%)
(c) Land available:					
Enough	13 (43.3%)	4 (13.3%)	11 (36.7%)	5 (16.7%)	33 (27.5%)
Not enough	17 (56.7%)	26 (86.7%)	19 (63.3%)	25 (83.3%)	87 (72.5%)
(d) Possibility to get more land:					
Yes	24 (80.0%)	23 (76.7%)	19 (63.3%)	12 (40.0%)	78 (65.0%)
No	6 (20.0%)	7 (23.3%)	11 (36.7%)	18 (60.0%)	42 (35.0%)

Table 4: Means used to acquire land by study villages.

Information	Frequency	Percent
Application to the village government	63	80.8
Buying	11	14.1
Borrowing	4	5.1
Total	78	100

According to MLHS (1997) land is publicly owned and vested in the president as a trustee on behalf of the citizens. The right of occupancy whether statutory or customary are and will continue to be the only recognized types of land tenure.

These results agree with the National Land Policy (MLHS, 1997) in showing that under customary land law, women generally have inferior land rights relative to men, and the access to land is indirect and insecure. Traditional provisions which used to protect women's land use rights have been eroded. The policy statement regarding women access to land is that women will be entitled to acquire land in their own right, not only through purchase but also through allocations. From the land policy (MLHS, 1997), village

councils shall administer village lands but will be required to report all decisions on land allocation to the village assemblies.

The situation where the majority of people in study villages own land is quite an achievement to the Tanzanian Government. This is contrary to Zimbabwe where the majority of the land still remains in the control of white private land owners who comprise less than 1% of the population (Patel, 1998). Moyo (1995) cited by Patel (1998) reveals that the land issue is polarised between two broad racial interest groups. The first group comprises of the majority land-poor indigenous Zimbabwe Africans and a second interest group largely represented by white farmers who dismiss land hunger as an excuse for a 'ruinous land grabbing policy'.

Contrary to Zimbabwe, Tanzania has about 48 million hectares of arable land but only 0.1% of the country's total area is under cultivation. Of this area, 93.4% is used for small scale farming by landholders who cultivate the land mainly under customary tenure. The remaining 6.6% is under large scale farming under granted rights of occupancy (MLHS, 1997). The policy statements are:

- All citizens shall have equal and equitable access to land.
- In case of local companies, priority shall be given to those who the majority are citizens.
- Non-citizens shall not be granted land unless it is for investment purposes under the Investment Promotion Act.

Land shortage in the study villages can be ascribed to poor agricultural practices. With an average of 5 ha for most individuals in the villages, and with proper application of agricultural inputs, food shortages could have been minimized.

4.2.2 Agriculture

Communities in the study villages are predominantly agriculturalists, and all the households reported farming at least one plot. The principal food crops grown in the area are cassava, maize, finger-millet, cotton, sorghum, sweet potatoes and beans (SRCP, 1998). The cropping cycle follows the rains. Maize, finger-millet, sorghum, are planted and harvested twice a year, first during the short rains starting in September to October and harvesting is done between January and February, and the second cropping is before the heavy rains in February and harvested in June. Cassava is planted and harvested all year around and harvested six months after planting. Cotton is planted between mid October and January and harvested between May and October (SRCP, 1998). All the crops are grown for subsistence and trade, but cotton remains the principal cash crop.

The study shows that there was a decline in crop harvests for the last five years in 61.7% of the respondents. However, 29.2% claimed that they had an increase in crop harvest (Table 5). The decline in harvest (40.4%) was attributed to a lack of farming inputs especially fertilizers and pesticides for cotton. Other reasons include bad weather (34.6%), low soil fertility (6.9%) and poor extension services (5.6%). The increase in crop harvest was due to the proper timing of the rains (45.7%), chemical fertilizers application (17.1%), and fallow systems practise (8.6%).

Table 5: Trend in crop harvests and the underlying factors for the past five years from 1996

Information:	Percentage (%)
(a) Trend	
Decreasing	61.7
Increasing	29.2
Constant	9.1
Total	100
N	120
(b) Reasons for decrease in harvest	
Poor farming inputs	40.4
Bad weather	34.6
Poor farming inputs, bad weather	9.7
Decline in soil fertility	6.9
Poor extension services	5.6
Lack of markets for crop produce	2.8
Total	100
N	72
(c) Reasons for an increase in harvest	
Timing of the rain, fertile soil	45.7
Use of fertilizers	17.1
Soil is fertile	11.4
Improvement in weather	11.4
Fallowing practices	8.6
Intercropping	5.8
Total	100
N	35

These results support Mboya *et al.*, (1995) findings in showing that in Tanzania only 30% of the farmers use organic manure because crop-livestock systems are not integrated, and only 15% use chemical fertilizers. There has been a decline by 30% in the number of households using fertilizers. Various factors that account for this deterioration in farming practices include (a) poor agricultural extension due to underfunding and poor links with research, (b) lack of access to improved technologies especially chemical fertilizers. Since the structural adjustment programme began, access to fertilizers has been limited by price, because 80% of subsidy on fertilizers has been removed and credit has become harder to obtain both for farmers and potential input traders.

The increase in fertilizer prices and reduction in credit have hit smaller farmers harder because they are on poorer land which needs more of fertilizer which they are less able to afford. This has resulted in increasing cultivation of marginal areas with associated

deforestation and erosion problems. For example, cotton is a notorious intensive user of pesticides and its cultivation depletes soil fertility.

Increasing human population and poor agricultural methods in the of Serengeti Region coupled with the demand for food from urban areas will lead to more cultivation of the rangelands for subsistence and commercial purposes (MNRT, 1986). According to MNRT (1991) before the massive increase of people in the 1950s and 1960s, areas adjoining the Serengeti National Park had a low density. In these areas livestock grazing and wildlife conservation were the main forms of land-use and only low level of cultivation were present. Actually these fringe areas formed a natural buffer zone between the Serengeti National Park and human populations in which wildlife and people could interact with minimal conflict.

With the increase in human numbers and an expansion of agriculture from the western side of the National Park, the buffer zone has been steadily compressed. For example, Hurt and Ravin (2000) show that the boundary of Maswa Game Reserve south-west of Serengeti National Park, has been altered three times over the past twenty years because of human encroachment. Maswa Game Reserve is now about 5000 km², which is about 40% of its size twenty years ago. According to Hurt and Ravin (2000), wildlife is extremely resilient to heavy hunting pressures, but it cannot survive the loss of habitat.

4.2.3 Livestock keeping and grazing land

About 42.5% of the respondents in the study villages have cattle, 41.7% have goats, 25.0% have sheep while 44.2% did not own any of these livestock (Table 6). The maximum number of livestock per household was 254 heads of cattle, 178 sheep and 53

goats while the minimum number of livestock per household was 2 cattle, 1 sheep and 1 goat (Table 7a). The total number of livestock in the study villages was 14 573, with cattle being the most numerous (9880), followed by goats (3551) and sheep (1142) (Table 7b).

The great rinderpest epizootic, together with trypanosomiasis and East Coast Fever, around the turn of the 20th century wiped out a large proportion of livestock in the Serengeti ecosystem (MNRT, 1991). Subsequently, improved veterinary services, coupled with the loss of tsetse-infested bush through agricultural expansion led to dramatic growth in number of livestock. For example between 1915 and 1960 the cattle population of the then Lake Province grew from 450 000 to approximately 2.75 million.

Table 6: Distribution of respondents by livestock ownership.

Information	Villages				
	Natambiso n=30	Nyichoka n=30	Hunyari n=30	Nyamatoke n=30	Overall N=120
Livestock kept					
Cattle	10 (33.3%)	17 (56.7%)	13 (43.3%)	11 (36.7%)	51 (42.5%)
Sheep	6 (20.0%)	8 (26.7%)	9 (30.0%)	7 (23.3%)	30 (25.0%)
Goat	10 (33.3%)	17 (56.7%)	14 (46.7%)	9 (30.0%)	50 (41.7%)
Non above	17 (57.7%)	8 (26.7%)	13 (43.3%)	15 (50.0%)	53 (44.2%)

Multiple response answers were present.

Table 7a: Livestock descriptive statistics in the study villages

	N	Minimum	Maximum	Sum	Mean	Std Deviation
Cattle	51	2	254	994	20	37
Sheep	30	1	178	442	15	33
Goat	50	1	53	546	11	11

Multiple response answers were obtained.

Table 7b: Total number of livestock kept in study villages in year 2001

Information	Villages				Overall total
	Natambiso	Nyichoka	Hunyari	Nyamatoke	
Cattle	1645	5506	2100	629	9880
Sheep	229	304	456	153	1142
Goat	510	2100	656	285	3551
Total	2384	7910	3212	1067	14 573

Source: Village government records.

By keeping livestock, farmers are able to add manure into the fields to improve soil nutrients, soil structure, water infiltration, and reduce soil erosion (FAO, 1997a). Pastoralists have much desire to own as many animals as possible for social exchange, wealth and prestige. The commercial attitude of keeping livestock is still very uncommon among them. There is a large variation in the number of livestock kept. For example one household was found to possess 254 cattle while others possessed a single cattle and others had nothing. According to SRCP (1998), one household in Mariwanda village, one of the SRCP pilot villages in Bunda District, was found to possess 1000 cattle while the majority had only a few or no cattle.

Group discussions show that lack of livestock extension officers is still a problem in all surveyed villages. Only in one village out of four had an agricultural extension officer who served both sectors of agriculture and livestock for the whole division. There is shortage of cattle dips, watering points (dams), and a problem of cattle rustling. The absence of agricultural/livestock extension officers is so tremendous that the farmers believe dung manure destroys crops and therefore they do not apply it in their farms despite its abundance in the study area.

Given the lack of chemical fertilizers in the Sahel, access to manure is of the utmost importance for promoting short cycle crop production and ensuring strengthened food security, despite rain season uncertainties (Toulmin, 1983). Livestock manure may

contribute as much as 35% of soil organic matter, while also helping to maintain soil structure, water retention and drainage capacity. Manure and urine may be the external input available for sustaining soil fertility in small holder agriculture. Jansen and de Wit (1996) estimate that livestock can supply 2-10% of nitrogen requirement for rice and 40-120% phosphorus requirements for cassava.

In Africa, livestock and wildlife graze on the same land as a larger part of wildlife is living outside protected areas (Baldus, 2001). Despite many diseases that are transmitted by wildlife, such as foot and mouth disease, tick-borne, and rinderpest, wildlife can be combined with livestock production so long as there is just a 20% reduction of cattle stocking rate in order to create a niche for most wildlife species to prosper (Standford, 1986; FAO, 1997a).

An initial reduction in stock numbers if followed by good pasture management will enable the land to carry more stock. Pasture management will essentially involve the introduction of some form of rotational grazing coupled with the controlled use of fire to prevent bush regeneration or encroachment. However, reduction in stock numbers demands a radical change in traditional pastoral way of life in that they must be persuaded to abandon their custom of maximising the number of animals they own for the purpose of prestige or tribal obligation. To aid in increasing offtake of animals, it is necessary to establish more markets in the villages, with access roads to buyers.

The present study shows that availability of livestock pastures is not a serious problem in the study villages when compared to water availability for livestock. There were mixed feelings regarding availability of livestock pastures, with 50% of the respondents claiming that there was shortage (Table 8). In the case of water availability for livestock, 83.3% said there was severe shortage of water especially during the dry season, while

only 15.4% said there was enough water. However, there is a friendly agreement between livestock keepers and IGGR authorities to use the Rubana River inside the reserve during the dry season with prior permission to do so. Improved water supply is an essential prerequisite for pasture improvement. It is generally desirable that watering points should not be further than 11 km apart in order to restrict the distance over which animals have to move between grazing and watering, as well as reducing soil erosion by watering points (FAO, 1997b).

Table 8: Responses towards grazing in the study villages

Information	Villages				Overall N=66
	Natambiso n=13	Nyichoka n=22	Hunyari n=16	Nyamatoke n=15	
(a) Grazing area					
Enough	11 (84.6%)	10 (45.5%)	10 (62.5%)	2 (13.3%)	33 (50.0%)
Not enough	2 (15.4%)	12 (54.5%)	6 (37.5%)	13 (86.7%)	33 (50.0%)
(b) Water for livestock					
Enough	2 (15.4%)	0	3 (18.8%)	6 (40.0%)	11 (16.7%)
Not enough	11 (86.4%)	22 (100.0%)	13 (81.3%)	9 (60.0%)	55 (83.3%)

4.2.4 Wildlife protected areas

In the Serengeti ecosystem, wildlife numbers were drastically reduced by rinderpest epizootic of the 1890s and some species experienced mortality level as high as 90%. The control of rinderpest in the last century has led to a rapid expansion of wildlife populations. The most noticeable rise has been in the number of wildebeest which rose from 190 000 in 1959 to their present level of almost 1.7 million recorded in the 1989 aerial census (MNRT, 1991). The size and mobility of the migratory populations is such that they cannot be contained within the major protected areas, as a result they spill over into adjacent areas where wildlife conservation has not been given a priority and are often occupied by people (MNRT, 1991).

The growing number of people, farms, livestock and wildlife in the Serengeti Region are leading to increased conflict between the needs of conservation and development. As settlements front approaches the National Park boundaries, areas which once served as transitional zones have been eroded. As a result, the park and its contiguous protected areas have experienced increased level of poaching and encroachment.

The IGGR were declared GCAs through Government Notice No. 269 of November 1974 (MNRT, 2002). During the declaration, the areas were already occupied by human settlements. The major factors which led to the establishment of GCAs were to form a buffer zone to the western part of SENAPA and to protect the migratory routes for wildebeest. After the establishment of GCAs, it was realised that the natural resources were still at risk. Restriction methods were still not enough to ensure effective protection of wildlife and migratory routes. This concern was followed by a proposition from the Wildlife Division to upgrade the GCAs into Game Reserves. This was followed by the gazettelement of the areas as Game Reserves in the Government Notice No. 214 of June 1994 (MNRT, 2002). Game Reserves prohibit residence of people and livestock while game viewing and hunting are permitted under permit from the Director of Wildlife. In the GCAs residence of local communities and their activities are allowed except for hunting of game animals (Lyimo and Ndolezi, 1996). The time lag (20 years) between the upgrading of the GCAs to Game Reserves allowed local communities to re-establish settlements especially in the IGGR. In the year 2000 the government succeeded to evict all local communities who were residing in the reserve, and moved them to other villages within the Serengeti district, by conducting an operation that involved the police and wildlife authorities.

4.2.5 Problems

4.5.2.1 Threats to wildlife conservation

Respondents were asked to rank from a list provided in a survey questionnaire about four potential threats they think are facing wildlife conservation as they happen or happened in their village. The listed threats were: expansion of agriculture close to wildlife areas, increasing livestock numbers, poaching, and lack of community participation in wildlife management. Poaching was ranked as the most important threat (41.7%), followed by lack of community participation (69.2%), increasing livestock numbers (45.0%), and expansion of agriculture close wildlife areas (55.0%) (Table 9).

Table 9: Potential wildlife threats as ranked by study villages

Rank	Threat	Frequency	Percent	Total (N)	Percent
1	Poaching	50	41.7	120	100
2	Lack of community participation in wildlife management	83	69.2	120	100
3	Increasing livestock numbers	54	45.0	120	100
4	Expansion of agriculture	66	55.0	120	100

The findings concur with the data obtained from the SENAPA Law Enforcement Department indicating continued severe poaching inside the park. For a period of one year alone between July 2000 and July 2001, a total of 956 poachers were arrested inside the National Park originating from seven districts. Six of the districts are in Tanzania and one is in Kenya (Table 10).

Table 10: Number of poachers arrested in Serengeti National Park from July 2000 to July 2001

District	Number of poachers arrested	Percent arrested
Serengeti	437	45.7
Bunda	170	17.8
Tarime	146	15.3
Bariadi	179	18.7
Magu	19	2.0
Ngorongoro	2	0.2
Narok (Kenya)	3	0.3
Total	956	100

Source: Serengeti National Park law enforcement records.

Hunting of wildlife has already resulted in reduced populations of several resident herbivore species (Campbell and Hofer, 1995). Hofer *et al.*, (1996) cited by Campbell and Loibooki (2000) made an estimate of an annual illegal harvest of wildlife close to 160 000 animals from SENAPA and associated protected areas, equivalent to over 12 000 tones of fresh meat. Hurt and Ravin (2000) estimate that up to 80% of the annual wildlife offtake in the Serengeti ecosystem is by poaching mainly through long line steel cable snaring for commercial operations.

Poaching is mainly for subsistence (35.0%), cash requirements (23.3%), subsistence and trade (18.3%), tradition to eat game meat (12.5%), and tax together with other contributions from the village government (10.8%) (Table 11).

Table 11: Reasons for villagers to get involved in poaching

Reason	Frequency	Percent
Subsistence for meat	42	35.0
Trade to meet basic domestic needs	28	23.3
Subsistence and trade	22	18.3
Tradition to eat wildlife meat	15	12.5
Raise cash to pay tax and other contributions	13	10.8
N	120	100

The present findings support Arcese *et al.*, (1995) in showing that killing wildlife for meat is the most serious form of poaching occurring in the Serengeti since the park

inception. Illegal hunting in the Serengeti is also linked to poverty. Similar findings have been reported by Campbell and Loibooki (2000) on game meat hunting in the Serengeti where 32.8% of the arrested poachers gave reasons for needing cash to pay tax, 31.1% for contributions including school fees, and for buying clothes by 15.1%.

In discussing the reasons for poaching with the focus groups it was learned that traditionally local communities prefer wildlife meat to that of livestock and it is part of the culture for tribes like Waikizu, Zanaki, Kurya, Ikoma and Nata, to conduct hunting using traditional weapons. Children were taught how to shoot wild animals using bows and arrows before they grew and practiced in the field. However, the kill was distributed freely to the neighbouring households contrary to these days where wildlife meat is sold and wire snares are used to trap wildlife. Increasing poverty has made poaching to be commercialized, and wire snares have proved effective especially during the large annual wildebeest migration. Snares reduce the risk of poachers being arrested by wildlife authorities since a normal hunting involves a lot of chasing for the wounded animal.

It was observed that the pastoralists were reluctant to slaughter their animals until they are sick and have no hope of recovering. This has resulted into increased demand for meat in villages, and wildlife meat from poachers dominates the market. The desire by village governments to improve social services previously being provided by the central government has led to increased contributions by the villagers. These include money for schools buildings, health centres and offices, and those who fail to pay are punished by the village government, either by taking their livestock or agricultural harvests for selling, a term called 'nzagu.' This provides an incentive for poor villagers to poach and get money at a cheaper cost rather than parting with a goat, cattle, or a bag of maize to the village government.

According to Baldus (2001), a two year study done in seven Eastern and Southern African countries gives empirical evidence that the hunting and consumption of illegal game meat in these two regions is comparable to the flourishing, well researched bush meat trade in Western and Central Africa. It is only a romantic myth that bush meat originated from small-scale consumptive poaching which is less destructive than commercial trophy poaching. Meat poaching is widespread, uncontrolled, and mostly at unsustainable levels (Arcese *et al.*, 1995; Baldus, 2001). Poaching for trade, meat, skins, feathers, and trophy, is a threat to the survival of many species. In view of the increasing demand for these products, it is unlikely that the illegal market will subside in the future (Mackinnon *et al.*, 1986). Sometimes perpetrators are not free agents but are sponsored by distant individuals. Tackling the sponsors and their market facilities may be an easier way to stop these crimes than chasing the thieves through the bush (Mackinnon *et al.*, 1986). However, protected areas work at high costs to defend them. They are difficult to finance, as many of these countries belong to the poorest of the world with the majority of their people surviving in poverty (Baldus, 2001; Maganga, 2002).

4.2.5.2 Problem animals and their control

In Tanzania, protected areas are not fenced thus wildlife freedom of movement is almost unlimited. District Councils have a duty to combat dangerous animals and assist farmers in crop protection. Many districts are understaffed and not adequately equipped to perform their duty (Hann and Kaggi, 2001). The fact that the government does not pay compensation for damages or losses make the rural people have negative attitudes towards wildlife more understandable. As Hulme and Murphree (2001) quoted a villager at Rwenzjeru in Uganda that 'it is not fair if their animals from the National Park come on our land and do a lot of damage, we get no compensation. If our cattle stray into the National Park, we are punished.'

The present study shows that 91.7% of respondents suffered from problem animals while only 8.3% had not experienced the problem for the last cropping season (Table 12). The most problem animals mentioned were bushpig (*Potamochoerus porcus*) (84.7%), vervet monkeys (*Chlorocebus aethiops*) (77.5%), olive baboon (*Papio anubis anubis*) (55.0%), elephant (41.4%), and porcupine (*Hystrix africae-australis*) (33.3%). However, the problem of elephant has been experienced over the past three years when compared to other animals. The most susceptible crops include maize (96.5%), cassava (75.4%), millet (57.9%), sweet potatoes (47.4%), and cotton (39.5%) (Table 12).

Table 12: Percentage response on problem animals destroying crops in the study villages

Information	Percent N=120
(a) Problem animals destroying crops	
Yes	91.7
No	8.3
(b) Common problem animals	
Bushpig (<i>Potamochoerus porcus</i>)	84.7
Vervet monkey (<i>Chlorocebus aethiops</i>)	77.5
Olive baboon (<i>Papio anubis anubis</i>)	55.0
Elephant (<i>Loxodonta africana</i>)	41.4
Porcupine (<i>Hystrix africae-australis</i>)	33.3
Wildebeest (<i>Connochaetes taurinus</i>)	19.8
Bushbuck (<i>Tragelaphus scriptus</i>)	7.2
Gazelles (<i>Gazella spp.</i>)	4.5
Zebra (<i>Equus burchelli</i>)	3.6
Topi (<i>Damaliscus lunatus</i>)	2.7
Rodents	2.7
Tortoise (<i>Geochelone pardalis</i>)	0.9
Hippopotamus (<i>Hippopotamus amphibius</i>)	0.9
Dik-dik (<i>Madoqua kirki</i>)	0.9
(c) Crops mostly destroyed	
Maize (<i>Zea mays</i>)	96.5
Cassavas (<i>Manihot esculenta</i>)	75.4
Millet Sorghum (<i>Sorghum bicolor</i>)	57.9
Sweet potatoes (<i>Ipomea batatas</i>)	47.4
Cotton (<i>Gossypium hirsutum</i>)	39.5
Groundnuts (<i>Arachis hypogaea</i>)	19.3
Finger-millet (<i>Eleusine corocana</i>)	17.5
Beans (<i>Phaseolus vulgaris</i>)	13.2
Banana (<i>Musa paradisiaca</i>)	4.4
Pigeon pees (<i>Cajanus cajan</i>)	3.5
Sugar cane (<i>Saccharum officinarum</i>)	3.5
Water melon (<i>Citrullus vulgaris</i>)	2.6

Multiple response answers were obtained.

Similar findings were reported by Masunzu (1998) in villages adjacent to Selous Game Reserve where yellow baboon, vervet monkey, bushpigs, elephants were observed to be the major animals damaging crops.

On problem animal control, Masunzu (1998) showed that a combination of shotgun blanks and flares were effective in chasing animals especially elephants and buffaloes which were reluctant to move out when chased by local means such as use of fire and shouting. The method reduced mass killing of elephants due to crop protection, for example in Liwale alone from 1975 to 1996, about 3043 elephants are estimated to have been killed by wildlife authorities because of crop protection (Masunzu, 1998).

Due to under-staffing, the district game scouts (who are supposed to carry out problem animal control), utilize the VGS in carrying out crop protection within SCP pilot villages (Hahn and Kaggi, 2001). This is possible because the villages possess registered hunting rifles that are used by the trained VGS. The situation is different in the study area where the villages depend entirely on the district game scouts for crop protection. Villages in Mara Region have not yet been allowed to possess rifles due to the past records of higher levels of bandits and cattle rustling.

4.3 The role of local communities in wildlife management

Since independence, protected areas were created at an increased rate and managed under the fences and fines approach (Adams and Hulme, 2001; Siegel, 2001). Communities were barred from entering and disturbing these areas, and wildlife outside protected areas was perceived as pests and was severely reduced in crop protection schemes (Siegel, 2001). The prevailing attitude during that period by both conservationists and game wardens was to regard every local villager as a potential poacher. Police action, rifles, and handcuffs were regarded by the authorities as the instruments to settle this conflict. This approach was conserving against the people (Baldus, 2001; Murphree, 2001b). It

was based on the illusion that governments everywhere on the continent were in control of the natural resources and were able to protect them country wide.

In reality African economies started to under-perform and fences and fines approaches could not prove successful especially to wildlife resources outside National Parks and Game Reserves (IIED, 1994; Borrini-Feyerabend, 1997; Siege, 2001). In order to alleviate the situation in the Serengeti, the government of Tanzania with financial assistance from NORAD established the Serengeti Regional Conservation Strategy (SRCS) in 1989 but the actual implementation of the project started in 1994 (Mbanjo *et al.*, 1995).

The project started by forming village natural resource committees (VNRCs) under the Village Act of 1975 as amended in 1982. Villages are permitted to form committees and sub-committees within the village, and those committees will deal with the social, economic, political and administrative matters (Kauzeni and Kiwasila, 1994). Under the VNRC, a law enforcement unit was to be established consisting of the village game scouts (VGS). Law enforcement was seen as essential to the success of the community based conservation programme.

The economic viability of this programme depends on revenue accruing from wildlife resources. The need for the establishment of a mechanism through which communities will have to participate in law enforcement is necessary, and communities can take over responsibility of law enforcement (Kauzeni and Kiwasila, 1994).

4.3.1 Village natural resources committees (VNRCs)

The village government advertises the posts or invites applications. The village council screens names and shortlists them to 16 persons. The village council calls a village

assembly meeting whereby villagers vote and elect eight VNRC members, three of them being female. From the eight candidates who have won the majority votes, the village assembly votes for a chairman, secretary, and treasurer. The duration of the committee is three years before a new election. The functions of the VNRCs are the following:

- To prepare annual budgets, work-plans, progress reports for village wildlife conservation, management and utilization activities.
- To manage village wildlife community development fund.
- To initiate activities and effective ways of collecting revenue from various wildlife related activities, for example community hunting.
- To supervise receipt of revenue from hunting and tourist concession fees.
- To provide punishment to poachers and all illegal activities concerning natural resources, mainly by fines.
- To perform any other functions assigned by the village government.

4.3.2 Village game scouts (VGS)

The village government invites applications for the post of VGS. Individuals from within the village who are interested in the job do apply. The village government in collaboration with the VNRC interview and shortlist names using criteria formulated for selection of game scouts. After being short-listed candidates are interviewed by a panel consisting of members from SRCP. The villagers do determine the number of VGS they wish to employ. Currently each village has a minimum of 12 VGS that have been trained by the SRCP. The job is on voluntary basis, however they receive some allowance when they go out on patrol. VGS are also supplied with uniforms, boots, but currently they lack identity cards and firearms.

The functions of VGS are:

- To patrol the village wildlife areas in order to control poaching.

- To monitor game populations.
- To work closely with anti-poaching units, district game scouts, and management of adjacent protected areas.
- To undertake the village wildlife hunting according to village quota.
- To arrest, search and prosecute law breakers.
- Liaise and work with the VNRC and the relevant law enforcement institutions on matters related to prosecution of law breakers.
- Report all activities related to the above mentioned tasks directly to the VNRC.

4.3.3 Effectiveness of VGS and VNRCs in combating poaching

Responses on various measures taken by the VNRCs included the imposition of fines (60.8%), taking the apprehended poachers to court (15.8%), and manual labour that is equivalent to an offence committed, such as making bricks for school construction, digging pit latrines for the village government offices (15.0%) (Table 13).

The χ^2 test was used to examine the effectiveness of the VGS and VNRC in combating poaching in village wildlife areas. Both VNRCs and VGS were significantly effective more often than the expected frequency in combating poaching (VNRCs: $\chi^2 = 108.30$, DF = 1, $p < 0.001$; VGS: $\chi^2 = 90.13$, DF = 1, $p < 0.001$) (Table 14).

Table 13: Measures taken by the VNRCs against poachers.

Information	Villages				Overall N=120
	Natambiso n=30	Nyichoka n=30	Hunyari n=30	Nyamatoke n=30	
Measure taken:					
Fined	16 (53.3%)	19 (63.3%)	25 (83.3%)	13 (43.3%)	73 (60.8%)
Taken to court	6 (20.0%)	3 (10.0%)	4 (13.3%)	6 (20.0%)	19 (15.8%)
Fined or taken to court	1 (3.3%)	0	1 (3.3%)	8 (26.7%)	10 (8.3%)
Given manual work	7 (23.3%)	8 (26.6%)	0	3 (10.0%)	18 (15.0%)

Table 14: Effectiveness of VNRCs and VGS in combating poaching in village wildlife areas

	Observed N	Expected N	Residual	χ^2	DF	Probability, p
(a) VNRCs				108.300	1	< 0.001
Effective	117	60.0	57.0			
Not effective	3	60.0	-57.0			
Total	120					
(b) VGS				90.133	1	< 0.001
Effective	112	60.0	52.0			
Not effective	8	60.0	-52.0			
Total	120					

4.3.4 Anti-poaching patrols by village game scouts (VGS)

For a period of four years between 1998 and 2001, a total of 464 poachers were arrested in the study villages and fined a total of TAS 1.8 million that contributed to the village wildlife fund. In the same period, a total of 6120 snares were removed from the field that could have killed lots of wildlife (Table 15 and 16 respectively). For example, a trapped lion by a wire snare was found by the Veterinary Unit of the Serengeti National Park in November 2001 a few metres from the boundary between the park and the Robanda village wildlife area (Plate 1).

The Veterinary Unit had to immobilize and operate on the lion to remove the wire snare which had penetrated the body. No radio collaring was applied for monitoring its condition, however, an experienced field veterinary doctor believed that the lion recovered (Kaare, M. personal communication, 2001).

Table 15: Anti-poaching success by village game scouts from 1998 to 2001

Village	Year	Number of poachers Arrested	Fines collected (TAS)
Nyamatoke	1998	48	192 000. 00
	1999	31	160 000. 00
	2000	28	136 500. 00
	2001	21	118 000. 00
	Total	128	606 500. 00
Hunyari	1998	27	174 400. 00
	1999	24	74 000. 00
	2000	57	220 000. 00
	2001	9	82 000. 00
	Total	117	550 400. 00
Nyichoka	1998	19	36 750. 00
	1999	54	141 450. 00
	2000	38	118 900. 00
	2001	14	161 000. 00
	Total	125	458 100. 00
Natambiso	1998	38	125 000. 00
	1999	35	58 000. 00
	2000	16	55 000. 00
	2001	5	10 000. 00
	Total	94	248 000.00
	Overall total	464	1 863 000.00

Source: Village natural resources committee law enforcement records.

Table 16: Wire snares recovered by village game scouts from 1998 to 2001.

Village:	Number recovered
Nyamatoke	2600
Hunyari	239
Nyichoka	2705
Natambiso	576
Total	6120

Source: Village natural resources committee law enforcement records.



Plate 1: A lion wounded by wire snares. (Source: Veterinary Department, SENAPA).

Nyamatoke and Nyichoka villages apprehended many poachers and collected many wire snares compared to other study villages mainly because those villages are situated not far away from their respective district headquarters (Table 15-16). For example Nyamatoke is about 10 km from Bunda district headquarters, and Nyichoka is about 20 km from Mugumu, the headquarters of Serengeti district. There is more demand for wildlife meat in towns due to the increasing urban population and hence poachers respond to the market demand.

Previously VGS were given 1000 TAS per day per patrol, and they are supposed to conduct ten day patrol per month, thus 10 000 TAS per VGS per month. However, most villages have changed that policy by paying them only when they succeed to apprehend a poacher who is fined, and they get paid from the fine and the remaining money goes to

the village wildlife fund. There was a complaint that some VGS after arresting poachers, they fine them and keep the money for themselves. However, this behaviour was only temporary because the undisciplined VGS were sacked from the job, because of the habit of villagers to speak openly and publicly on illegal matters. Fines range from 10 000 TAS to 30 000 TAS per offence committed and revenue collected from 1998 to 2001 is shown in Table 15. However, due to their knowledge of the area, routes commonly used by poachers and people mostly involved in poaching, VGS arrest poachers quite often mainly through surprise attacks.

From the focus group discussions it was learned that apart from the willingness of VGS to practice law enforcement within village wildlife areas, they lack firearms. The district wildlife scout who owns a rifle, is supposed to attend a minimum of four villages at separate patrols and consequently fails to satisfy all village needs. During the hunting season, the same scout supervises tourist hunting and is thus unavailable to VGS for a period of six months. Consequently, poachers undermine them and it becomes difficult to get arrested since they know that VGS are not equipped with firearms.

The SENAPA Law Enforcement Unit is now collaborating with the VGS in patrolling areas close to the National Park bordering the village wildlife areas. VGS have proved successful because they know well their areas, and they are usually used as informers by the National Park law enforcement unit. VGS are given 15 000 TAS for patrols of ten days when conducting joint patrols with rangers from the National Park (Hando, J. Personal communication, 2001).

Apart from the rangers of SENAPA who pay VGS immediately when they conduct joint anti-poaching patrols, the situation is different with wildlife officials from the

government, mainly the Anti-poaching Unit based in Bunda district, and the wildlife authorities of the IGGR. They do not pay them anything, and when they happen to arrest poachers, all fines obtained are taken by the government authorities on the grounds that all revenue goes to the central treasury.

As they expressed during group discussions, in one occasion in Nyichoka village while carrying out a joint patrol with the Anti-poaching Unit of Bunda, the VGS managed to apprehend two poachers and impounded two bicycles. The poachers were prosecuted by the Anti-poaching Unit, which also appropriated the bicycles, while the VGS went empty handed. One poacher could have been fined not less than 20 000 TAS, and one bicycle for another 20 000 TAS, so the VGS lost about 80 000 TAS. The only benefit they got was to use a government vehicle to patrol large village wildlife areas, a thing they were happy with since they cover only small areas during foot patrols.

4.3.5 Decline of poaching incidences in study villages

Regarding poaching trend, 98.3% of the respondents claimed there has been a decline in poaching in their villages since the establishment of natural resources committees and the VGS, while only 1.7% implied that poaching is still the same (Table 17). However, from a list of poachers arrested in SENAPA between July 2000 and July 2001 (Appendix 4), 7 villages out of 14 SRCP pilot villages, appeared on the list. The villages were Robanda, Nyichoka, Nyamatoke, Mugeta, Mihale, Kyandegge, and Hunyari.

Table 17: Response towards poaching trend in study villages.

Information	Villages				Overall N=120
	Natambiso n=30	Nyichoka n=30	Hunyari n=30	Nyamatoke n=30	
Poaching trend:					
Decreasing	29 (96.7%)	30 (100%)	30 (100%)	30 (100%)	118 (98.3%)
Constant	0	1 (3.3%)	0	1 (3.3%)	2 (1.7%)

Similar findings on the success of VGS have been reported in Lupande Development Project in Zambia, where village scouts programme enabled a decline of elephant poaching by 90% compared with 1985 levels (Lungu, 1990 cited by IIED, 1994). Also the Kunene region in Namibia experienced continual poaching such that by 1982, the elephant population had been reduced to about 250 from an estimated 1200 in 1970. Black rhino numbers had been reduced from 300 in 1970 to about 65 in 1982. Other large mammal populations declined by 60 to 90% (Jones, 2001). Through the appointments of community game guards (CGG), they played an important role in reducing poaching (Owen-Smith, 1996; Jones, 2001).

Good co-operation between the village government leaders, VNRCs, and traditional elders in the study villages has enabled to reduce poaching within village wildlife areas. For example if a child is arrested conducting poaching, the parent is required to pay for the offence committed. As a result parents are continuously warning their children to forget poaching and engage themselves in other productive activities. Traditional elders (Ritongo) have a lot of powers and influence on communities, and have powers to confiscate property from offenders. They are involved in conflict resolutions among members of the village, such as theft cases. The District Commissioner of Serengeti (Mr. T. Sabaya) has strengthened the powers of the traditional elders in resolving conflicts and passing judgement especially with matters concerning cattle theft, cattle rustling, and now it has been successful. Usually they are not involved in natural resources issues, but if the offender has refused to pay fines to the VNRCs, or is threatening to harm VGS, or is a common poacher who despite punishment, continues to poach, the person is reported to the chairman of the traditional elders.

Ritongo has twelve elderly respected people in the village and fifteen youths, responsible for conducting corporal punishment under an order from the elders. A meeting with his

fellow elders will be convened, and judgement passed. This has helped to reduce enormously the amount of poached game meat in study villages. Previously meat from community wildlife hunting had poor market due to abundant supply of illegal meat in villages.

4.4 Community wildlife hunting

The introduction of schemes by which local people can receive tangible benefits from the protected areas is crucial in motivating local communities to support the protected areas and to respect the wildlife resource (MNRT, 1991; Leader-Williams, 2000). In each hunting season each village under SRCP receives a quota of animals from the Wildlife Division based in Dar es Salaam. The quota are allocated basing on size of the area, type of the habitat, density of specific species, off take in previous years (Hurt and Ravin, 2000). Hunting is conducted by the VGS in collaboration with the SRCP staff who have vehicles and rifles. The carcass is delivered to the VNRCs who sell the meat and bank the revenues.

For a period of four years, from 1998 to 2001, a quota of 1840 animals were allocated to 14 SRCP pilot villages. This included 930 wildebeest, 600 zebra, and 310 topi. Quotas utilized were 572 wildebeest (61.5%), 374 zebra (62.3%), and 193 topi (62.3%), with an average of 62% quota utilization for all animals (Table 18). A total of 11 million TAS (equivalent to 13.7 thousands USD) were obtained for the sale of game meat in the study villages at a cheaper price of 300 TAS per kilogram from year 1998 to 1999, and 400 TAS per kilogram from year 2000 to 2001 (Table 19). A total of 36 million TAS (equivalent to 45.5 thousands USD) was realised from the community wildlife hunting under SRCP pilot villages from year 1998 to 2001 (Appendix 5a-d).

Table 18: Wildlife quota utilization by pilot villages under SRCP from 1998 to 2001

Year	Animals	Quota allocated	Quota utilized	Percentage utilized
1998	Wildebeest	300	93	31
	Zebra	180	48	26.7
	Topi	100	38	38
Total		580	179	30.9
1999	Wildebeest	210	144	68.6
	Zebra	140	65	46.4
	Topi	70	26	37.1
Total		420	235	56
2000	Wildebeest	210	134	64
	Zebra	140	121	86.4
	Topi	70	65	93
Total		420	320	76.2
2001	Wildebeest	210	201	96
	Zebra	140	140	100
	Topi	70	64	91.4
Total		420	405	96.4
Overall total		1840	1139	62

Source: SRCP community hunting records.

Table 19: Revenue accrued by villages from community wildlife hunting from 1998 to 2001

Year	Information	Villages				Overall total
		Nyamatoke	Hunyari	Natambiso	Nyichoka	
1998	Animals harvested:	15	10	12	13	50
	Total weight: (Kg)	1 097	2 143	1 346	911	5 527
	Price per Kg: (TAS)	300	300	300	300	
	Revenue obtained: (TAS)	329 100.00	642 900.00	403 800.00	282 300.00	1 658 100.00
1999	Animals harvested:	15	25	20	13	73
	Total weight: (Kg)	1 354	2 040	1 442	1 221	6 057
	Price per Kg: (TAS)	300	300	300	300	
	Revenue obtained: (TAS)	406 200.00	611 900.00	432 600.00	366 300.00	1 817 000.00
2000	Animals harvested:	36	34	22	17	109
	Total weight: (Kg)	2 277	2 748	1 867	1 546	8 438
	Price per Kg: (TAS)	400	400	400	400	
	Revenue obtained: (TAS)	910 800.00	1 099 200.00	746 800.00	618 400.00	3 375 200.00
2001	Animals harvested:	31	35	28	27	121
	Total weight: (Kg)	2 806	2 996	2 204	2 407	10 413
	Price per Kg: (TAS)	400	400	400	400	
	Revenue obtained: (TAS)	1 122 400.00	1 198 400.00	881 600.00	966 800.00	4 169 200.00
	Overall total: (TAS)					11 019 500.00

Source: SRCP community hunting records.

Community wildlife hunting has helped the communities under SRCP to get access to wildlife meat legally as compared to other villages that are not under the programme. They are privileged and are appreciating. The neighbouring villages come to buy wildlife meat in the study villages and bring income to the study villages. In the previous years fewer animals were harvested because few households used to buy meat from community

hunting and the rest of the meat were left rotting. Recently all meat gets finished immediately, leaving most villagers complaining. The main reason given during group discussions for an abrupt change of attitude was that poachers' meat was not only more expensive (700-900 TAS) than legal meat (400 TAS), but also unhygienic. Poachers' meat is expensive because of the risks involved such as being arrested (Appendix 4) or killed by dangerous game. These factors have contributed to the decline in illegal game meat in the study villages.

The reasons given for engaging in poaching include subsistence (35.0%), traditional hunting (12.5%), and to raise cash for tax and other contributions (10.8%) (Table 11). Community wildlife hunting has succeeded to address the above mentioned issues, where the community benefits in getting protein diet from game meat at an affordable price which they set themselves without external influence. The revenue obtained is used to rehabilitate social services infrastructure like schools and health centres, which could have demanded their meagre cash for contributions.

In the year 2001 each study village received a total of 200 000 TAS by selling hides from game hunting to Mwanza Tanneries Company (Muya, J., personal communication, 2001). The price per animal hide was 20 000 TAS (equivalent to 22 USD) for zebra skin, 10 000 TAS (11 USD) for topi, 5000 TAS (6 USD) for wildebeest. Cattle, sheep, and goat hides were sold at 3 000 TAS (4 USD) each. This surprised most villagers because they did not expect these free ranging animals with no appropriate protection could be of such value. As explained by one villager, he could not expect that one zebra skin is worth five goats. He was wondering why the government did not take efforts to curb the rampant poaching taking place in the whole region.

During focus group discussions it was observed that a problem in centralized ownership of the natural resources in village wildlife areas does exist. Local resident hunting takes place in village wildlife areas and the hunters pay nothing to the village government or the natural resources committee. As a result communities get disappointed.

4.5 Tourism

4.5.1 Photographic tourism

In 1996, Robanda village, entered into a contract with the Ikoma Bush Camp to pay the village 10 US dollars per adult and 5 US dollars per child for one night stay in the camp. In 2001 two more camps, the Abercombie and Kent, and Kibo Guides Safari joined the contracts in establishing camps within the same village wildlife areas. The camps have to pay cash 1 500 000 TAS annually regardless of whether they receive visitors or not.

For a period of six years commencing from 1996 to 2001, Robanda village earned about 44 million TAS (equivalent to 48 113 USD) from non-consumptive photographic safaris (Table 20) besides revenue realised from community wildlife hunting, and the sale of hides from game hunting (Appendix 5).

Table 20: Revenue from photographic camps operating in Robanda village

Tourist camps	Year	Revenue obtained (TAS)
Ikoma Bush Camp	1996	4 276 737.00
	1997	6 116 073.00
	1998	1 350 000.00
	1999	5 899 784.00
	2000	13 499 700.00
	2001	10 552 302.00
Abccombic & Kent	2001	1 866 400.00
Kibo Guides	2001	525 000.00
	Total	44 085 996.00

Source: Robanda village government records.

Sustainable community wildlife management can only occur if the benefits accruing to the community from maintaining a wildlife population outweigh the costs (Adams and Thomas, 1996 cited by IIED, 2000c). Wildlife inflicts a cost on the communities both directly through damage caused to crops (Table 12), risk of injury or death from wildlife attacks, and indirectly through the opportunity costs presented by restrictions on land use. Involvement of the private sector in wildlife management depends to a large extent on the degree to which an individual or a company can capture the profits from wildlife resources.

In the Serengeti ecosystem wildlife resources are abundant and easily accessible compared to other parts of Tanzania. What is required is the real commitment in the sustainable utilization of the resources for the well-being of the adjacent communities. For example Serengeti National Park contributed to the national economy by 15.6 billion TAS (equivalent to 17 million USD) from photographic tourism for a period of five years from 1996 to 2001, which is an average of about 3.12 billion TAS annually (3.4 million USD) (Table 21).

Table 21: Serengeti National Park tourism statistics from July 1996 to June 2001

Year	Non – Residents	Residents	Revenue obtained (TAS)
1996/1997	62 723	39 561	2 272 342 484.00
1997/1998	60 809	30 957	2 465 354 274.00
1998/1999	65 647	37 522	2 906 770 690.00
1999/2000	71 754	43 870	3 674 205 069.00
2000/2001	78 590	50 152	4 336 751 840.00
Total	339 523	202 062	15 655 424 360.00

Source: Serengeti National Park tourism records.

4.5.2 Tourist hunting

The VIP Safari Camp is one of the tourist hunting camps operating in the village wildlife areas of the study villages. For Tanzania, the concession fees per area per annum is US dollars 7 500.00 and is paid for a five year period. However, no village receives revenue from tourist hunting despite hunting being conducted in their village wildlife areas. The contracts with the hunting safari operators are concluded by the central government and the fees are paid there. The 25% of the hunting revenue to the treasury accruing from tourist hunting is paid to the districts and the money has to be passed on to the villagers for development purposes, but this money does not reach the villages. Instead the money is used at district headquarters (Siege, 2001; Warento, M., personal communication, 2001).

The IGGR earned a total of US dollars 501 040.00 from tourist hunting for a period of five years from 1997 to 2001 as fees for wildlife hunted by tourists (Table 22). This amount does not include the concession fees of US dollars 7500.00 per block.

Table 22: Ikorongo-Grumeti Game Reserve revenue statistics from 1997 to 2001

Year	Revenue obtained (USD)
1997	85 750.00
1998	86 290.00
1999	107 400.00
2000	115 275.00
2001	106 325.00
Total	501 040.00

Source: Ikorongo-Grumeti Game Reserve tourist hunting records.

Tourist hunting is a viable form of wildlife utilization that can provide tangible benefits to rural communities living with wildlife for centuries. For example, in Zimbabwe between 1989 and 1996, a total of 8 653 211.00 US dollars were obtained from tourist hunting leases under CAMPFIRE (Bond, 2001). The CAMPFIRE guidelines for wildlife-derived revenue require that at least 50% of gross income is devolved to communities living with wildlife. The devolution of these benefits to communities is intended to stimulate both collective and individual resource management, thereby providing rural communities with an alternative or complementary land use to agriculture and livestock (Taylor, 2001).

The situation in Tanzania is different from that of Zimbabwe where land for agriculture and livestock is very little (Patel, 1998). In the present study, 98.3% of villagers own land for agriculture and the remaining do not have land of their own but borrow it from their relatives. The only problem here is the lack of agricultural farm implements and extension services to increase crop production for each household. Therefore revenue from wildlife, however small, can easily be appreciated in supplementing other sources of revenue.

4.6 Community involvement in wildlife management and relationships with wildlife authorities

Regarding community participation in wildlife management, 87.5% of the households indicated that they were fully involved, and only 12.5% were partially involved (Table 23). The relationship with wildlife authorities was stated to be good by 69.2%, excellent by 29.2%, and poor response only by 1.7%. The acceptance of SRCP was claimed to be excellent by 45.8%, good by 52.5% and poor by 1.7% (Table 24). The study show that 97.5% liked p rotected a reas while only 2.5% d isliked p rotected a reas (Table 25). The reasons provided for liking protected areas were provision of game meat and revenue for village development (66.7%), conserving wildlife for future generations (10.0%), generating foreign currency to the nation (8.3%), recreation and curbing cattle rustling (0.8%).

Table 23: Responses towards community involvement in wildlife management

Information	Villages				Overall N=120
	Natambiso n=30	Nyichoka n=30	Hunyari n=30	Nyamatoke n=30	
Fully involved	25 (83.3%)	29 (96.7%)	27 (90.0%)	24 (80.0%)	105 (87.5%)
Partially involved	5 (16.7%)	1 (3.3%)	3 (10.0%)	6 (20.0%)	15 (12.5%)

Table 24: Responses on the relationship with wildlife authorities and acceptance of SRCP by study villages

Information	Villages				
	Natambiso n=30	Nyichoka n=30	Hunyari n=30	Nyamatoke n=30	Overall N=120
(a) Relationship with wildlife authorities:					
Excellent	6 (20.0%)	4 (13.3%)	9 (30.0%)	16 (53.3%)	35 (29.2%)
Good	23 (76.7%)	26 (86.7%)	20 (66.7%)	14 (46.7%)	83 (69.2%)
Poor	1 (3.3%)	0	1 (3.3%)	0	2 (1.7%)
(b) Acceptance of SRCP by study villages:					
Excellent	9 (30.0%)	8 (26.7%)	15 (50.0%)	23 (76.7%)	55 (45.8%)
Good	20 (66.7%)	22 (73.3%)	15 (50.0%)	6 (20.0%)	63 (52.5%)
Poor	1 (3.3%)	0	0	1 (3.3%)	2 (1.7%)

Table 25: Responses on attitudes towards protected areas

Information	Villages				
	Natambiso n=30	Nyichoka n=30	Hunyari n=30	Nyamatoke n=30	Overall N=120
(a) Attitude towards protected areas:					
Like	29 (96.7%)	28 (93.3%)	30 (100%)	30 (100%)	117 (97.5%)
Dislike	1 (3.3%)	2 (6.7%)	0	0	3 (2.5%)
(b) Reasons for liking protected areas:					
Provide game meat, revenue accrued contribute to village development	12 (40.0%)	21 (70.0%)	20 (66.7%)	27 (90.0%)	80 (66.7%)
Provide game meat	6 (20.0%)	1 (3.3%)	5 (16.7%)	1 (3.3%)	13 (10.8%)
Conserve our wildlife for future generation	4 (13.3%)	4 (13.3%)	2 (6.7%)	2 (6.7%)	12 (10.0%)
They bring foreign currency to the nation	4 (13.3%)	3 (10.0%)	3 (10.0%)	0	10 (8.3%)
Provide game meat, bring foreign currency	3 (10.0%)	0	0	0	3 (2.5%)
Recreation	0	1 (3.3%)	0	0	1 (0.8%)
Assist to curb cattle rustling	1 (3.3%)	0	0	0	1 (0.8%)

SRCP has managed to address some of the underlying reasons for villagers to engage in poaching by facilitating community wildlife hunting where the annual quota is announced to all project villages. Villagers decide on the number of animals to harvest

per month for the whole hunting season. Hunting is conducted by communities themselves, and the price of game meat is set by the community, and revenue expenditure is decided by the whole community. The burden on various individual contributions for development projects is minimised by the presence of the village wildlife fund. This is a move towards active participation where the aim is to propagate a sense of ownership, and a strong internal motivation to contribute to sustainable use of wildlife (IIED, 1994). Local communities are treated with respect, as equal partners, not as targets of conservation or education projects. Decision-making power is shared, and the role of the outsiders (project staff) is not primarily to make decisions but to act as catalysts and intermediaries. The participatory approaches used by SRCP rather than top down approaches has contributed in improving the relationship between wildlife authorities and the local communities resulting into the majority of the respondents appreciating that they are fully involved in wildlife management (Table 23). This has also enabled the project to become accepted by the majority (Table 24). The role of local institutions is emphasised by the project and the formation of local groups, or strengthening of existing ones is encouraged (IIED, 1994).

However, there were complaints during group discussions concerning the local resident hunters who pay their licence fees in the districts, and conduct resident hunting in village wildlife areas without paying any levy or tax to the village government. The same applies to the harvesting of trees in village wildlife areas, where prison officers harvest trees for firewood to be used by prisoners. They clear the village of trees, without paying any tax or providing tree nurseries for the afforestation programmes. It is worth noting that resource tenure is very important in involving local people in community wildlife management and not land tenure (Jones and Murphree, 2001).

The reasons advanced for liking protected areas indicate that providing support to development projects has had a positive impact on community attitudes towards wildlife conservation (IIED, 2000b). This shift from hostility to friendliness and partnership has created opportunities for other community conservation arrangements with communities, thereby increasing potential benefits flows and contribution to the rural livelihood. Providing tangible benefits to rural communities who bear the cost of living in proximity with wildlife should go hand in hand with the provision of the conservation education in order for them to understand the importance of conserving wildlife. As was already shown (Table 25), only 10.0% of respondents understood the importance of conserving wildlife for the benefits of future generations, rather than the overexploitation of wildlife resources for short term benefits, leading to the extinction of wildlife.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The study demonstrated that local people could work and provide the means for sustainable management and conservation of wildlife. Local people can be easily incorporated in wildlife law enforcement, through strengthening the existing or establishing new local institutions such as the village game scouts and the village natural resources committees. These institutions together with the traditional elders in villages can serve as entry points in search for more participatory management approaches in wildlife management. The study demonstrates the need for more participation of various stakeholders related to wildlife in order to bring about a collaborative anti-poaching network in the Serengeti region, since poachers come from different corners of the National Park, some of them originating from a neighbouring country.

According to Murphree (2001b), there is a remarkable evolution in wildlife conservation from the *conservation against the people* during early colonialism with a strategy of taking large tracts of land away from rural people for the establishment of protected areas and removing their jurisdiction over the natural resources. Later followed the *conservation for the people* where African governments introduced legislation governing the use of land and natural resources, and the creation of the government agencies to provide extension services and enforce good practice. Recently a new strategy emerged that seeks to involve local communities in wildlife management known as *conservation with the people*. Community based conservation was never designed as a substitute for

protected area approaches, but it was designed to be part of a suite of conservation approaches within national conservation strategies.

Providing effective incentive packages for community based conservation usually requires significant transfers of power, of rights and resources. The reason lies fundamentally at the value of natural resources and the importance of power to control and benefit from them. The success of the approaches will depend on use rights over wildlife to be devolved to local communities through current legislation that allows the minister to recognize authorised associations which will identify economically viable forms of wildlife use and eventually practice in a sustainable manner.

5.2 Recommendations

5.2.1 More support to VGS

Village game scouts work under very hard conditions, but the village government provides them allowances only when they apprehend poachers. Poachers can easily escape without being arrested. Since VGS abandon some of their duties for viable livelihood activities and go on anti-poaching patrols, they need to be given some incentives, otherwise they will despair while SRCP has invested a lot of money in training them. It is recommended that whenever wildlife authorities plan joint patrols with VGS, they should consider allocating some allowances to VGS for motivation due to the demanding nature of the job and the risk involved.

5.2.2 Integration of crop-livestock production systems

As the human population increases, farmers need to intensify production of crops and livestock, and the two activities often become integrated. Such integration provide

farmers with opportunities to diversify the risk from single crop production, use labour more efficiently by employing draught animal power, and have a source of cash. Livestock manure has been shown to improve cation exchange, absorption of water and prevention of runoff and soil surface crusting (Toulmin, 1983). Dung is a preferred cooking fuel in many countries and if applied in study villages, could reduce pressures on fuel wood collection.

In order to attain that objective, there is a need to increase the number of livestock/agricultural extension officers in study villages to provide awareness of the importance in integrating crop-livestock systems. There is also a need to establish more markets for livestock to aid an increase in offtake and eventually reduce grazing competition with wildlife. Water supply for livestock in study villages need to be improved. The current use of Rubana River in Ikorongo-Grumeti Game Reserve by livestock keepers during dry season for improving the relationship with wildlife authorities has more effects on wildlife since it results into increased poaching mainly by setting wire snares.

5.2.3 Wildlife conservation education to be added in primary school syllabus

The majority of the primary school leavers in study villages do not go further education due to limited secondary schools in the area. They join their parents and relatives in villages to engage in agriculture. Having a wildlife conservation education syllabus in their studies covering the importance of establishing protected areas, poaching as an offence against the community and the government, will assist in educating other members of the village. This will also reduce the costs of mobile education units in protected areas which, sometimes suffer from budget shortages and do not cover all villages.

5.2.4 Use of non-lethal deterrents for crop protection

Due to an increase in elephant incidences of crop destruction in study villages for the past three years starting from 1999, there is a need to introduce non-lethal deterrents for crop protection rather than the conventional method of killing animals as means of vermin control. In the Selous Game Reserve (Masunzu, 1998) found that a combination of shotgun blanks and flares were effective in chasing animals especially elephants and buffaloes. It is recommended that a similar study be conducted in the Serengeti ecosystem.

5.2.5 Establishment of more photographic and tourist hunting camps in village wildlife areas

In the Serengeti ecosystem, wildlife resources are abundant and easily accessible compared to other parts of the country. Photographic tourism and tourist hunting are viable forms of wildlife utilization that can provide tangible benefits to rural communities living with wildlife for centuries. It is recommended that villages with wildlife areas should be assisted in looking for potential investors in the tourism sector, in order to obtain the most needed revenue for improving their standard of life.

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APPENDICES

APPENDIX 1: HOUSEHOLD QUESTIONNAIRE

1.0 GENERAL INFORMATION

- 1.1 Date.....1.2 Name of Division.....
- 1.3 Name of ward.....1.4 Name of the village.....
- 1.5 Respondent number.....
- 1.6 Age.....
- 1.7 Sex.....
- 1.8 Marital status
 (1) Single (...)
 (2) Married (...)
 (3) Divorced (...)
 (4) Widowed (...)
- 1.9 Family size.....
- 1.10 Level of education
 (1) No formal education (...)
 (2) Adult education (...)
 (3) Primary education (...)
 (4) Secondary education (...)
 (5) Others (specify).....

2.0 LAND USE AND TENURE

- 2.1 Do you own land for agriculture?
 (1) Yes (...)
 (2) No (...)
- 2.2 If the answer (Q 2.1) is yes what is your total farm size?.....
- 2.3 Is the land own enough for agriculture? (Yes / No).
- 2.4 Is it possible to get more land?
 (1) Yes (...)
 (2) No (...)
- 2.5 If the answer (Q 2.4) is yes how ?
- 2.6 What is the trend of harvests in your farms for the last five years?
 (1) Constant (why).....
 (2) Increasing (why).....
 (3) Decreasing (why).....

- 2.7 Do you face problem animals in your farms?
 (1) Yes (....)
 (2) No (....)
- 2.8 If the answer (Q 2.7) is yes what are the animals involved and the crops destroyed?

Animals	Crops destroyed
(i)	(i)
(ii)	(ii)
(iii)	(iii)
(iv)	(iv)
(v)	(v)
(vi)	(vi)

- 2.9 Do you get compensations for the crops lost?
 (1) Yes (....)
 (2) No (....)
- 2.10 Do you keep the following animals?
 (1) Cattle (Yes / No). If yes how many cattle?.....
 (2) Sheep (Yes / No). If yes, how many sheep?.....
 (3) Goat (Yes / No). If yes, how many goats?.....
- 2.11 Where are your livestock graze and obtain water?
- 2.12 Is the grazing area enough?
- 2.13 How about water for your livestock?

3.0 WILDLIFE MANAGEMENT

- 3.1 Do you have a wildlife management area in your village? (Yes / No)
- 3.2 If the answer (Q 3.1) is yes how are the villagers using the area?
- 3.3 How are villagers involved in wildlife conservation?
 (1) Fully involved
 (2) Partially involved
 (3) Not involved
- 3.4 Do you like / dislike Game Reserves and National Parks?
 (1) If you like them, why?
 (2) If you dislike them, why?
- 3.5 How is the relationship between the villagers and wildlife authorities?
 (1) Excellent
 (2) Good
 (3) Poor
- 3.6 Do you understand the Serengeti Regional Conservation Strategy (SRCP)?
 (Yes / No).

- 3.7 If the answer (Q 3.6) is yes, what are their activities?
- 3.8 How is SRCP accepted by the villagers?
(1) Excellent
(2) Good
(3) Poor
- 3.9 Are you practising community wildlife hunting? (Yes / No)
(1) If the answer is yes, do you like the program?
(2) What are weaknesses of the community wildlife hunting program?
(3) Are the villagers participating fully in the program?
- 3.10 What benefits do you get from conservation authorities?
- 3.11 Do you have poachers in your village?
- 3.12 If the answer is yes, what is the poaching trend?
(1) Increasing (...)
(2) Decreasing (...)
(3) Constant (...)
- 3.13 What are the reasons for villagers to poach?
- 3.14 What are the measures taken when a poacher is arrested?
- 3.15 Are the measures taken effective?
- 3.16 Are the traditional elders involved in giving judgement to the arrested poachers?
- 3.17 Is the incorporation of the traditional elders effective in reducing poaching levels?
- 3.18 What are the indigenous attitudes towards poaching?
(1) Like (...)
(2) Dislike (...)
- 3.20 What method do you think if used can be effective in curbing poaching levels?
- 3.21 Do you have the village natural resources committee (VNRC)?
(1) If yes, what are their activities?
(2) Are they effective in curbing poaching threats in the village?
(Effective / Not effective).
- 3.22 Do you have the village game scout (VGS)?
(1) If yes, what are their activities?
(2) Are they effective in curbing poaching threats in the village?
(Effective / Not effective).

- 3.23 Rank the following threats to wildlife management from the most threat to the least threat as it appears/appeared in your village.
- (1) Increasing agriculture close to wildlife areas
 - (2) Increasing livestock numbers close to wildlife areas
 - (3) Poaching
 - (4) Lack of community participation in wildlife management

Appendix 2a: Participants who attended during group discussion sessions in the study villages

Date	Village	S/N	Name of participant	Occupation
26.10.2001	Nyamatoke	1	Sayi Gulinja	Village Executive officer (VEO)
		2	Joseph M. Njangi	Chairman, Village government
		3	Moshi Maduhu	Chairman, VNRC
		4	Elias Mgiu	Member, VNRC
		5	Robert Malya	Accountant, VNRC fund
		6	Jackson Kisiroti	Member, village government
		7	Mchina Girigoi	Prominent livestock keeper
		8	Mkama R.K.	Secretary, VNRC
		9	Mitanda Ndegelehe	Prominent livestock keeper
		10	Pius .K. Mbusi	Prominent livestock Keeper
		11	Mchana Mguasa	Prominent farmer
		12	Isaya Bitla	Prominent farmer
		13	Phabian Pius	VGS
		14	Pascal Pusi	VGS
		15	Juma Pamba	VGS
		16	Mchana Mugwasa	Prominent farmer
3.11.2001	Hunyari	1	Fred B. Marobi	Chairman, VNRC
		2	Eliund T. Manombo	Chairman, village government
		3	Francis M. Nyausha	Prominent livestock keeper
		4	Joseph Sitime	VGS
		5	Daud K. Iramba	Accountant, VNRC
		6	Juma G. Monzo	VGS
		7	Kiboko Shoto	Prominent farmer
		8	Boniface Bozeze	Prominent farmer
		9	Gonda J. Kimumbe	Village Executive Officer (VEO)
		10	Charles Kavango	Member, village government
		11	Zawadi Saidi	Member, VNRC
		12	John M. Marwerwe	Secretary, VNRC
		13	Mariam M. Sindano	Member, VNRC
		14	Mwesa A. Ngonde	Prominent livestock keeper

Date	Village	S/N	Name of participant	Occupation
8.11.2001	Natambiso	1	Fort R. Segera	Chairman, village government
		2	Felix Mosi	Chairman, VNRC
		3	Samora Manyarange	Prominent livestock keeper
		4	Chuba Mosi	Prominent farmer
		5	Mangoha Mugabo	Prominent livestock keeper
		6	Bageni George	Prominent farmer
		7	Cecilia Yusuph	Member, VNRC
		8	Regina T. Zacharia	Member, VNRC
		9	Agnes Mchahogo	Member, VNRC
		10	Lucas D. Chama	Accountant, VNRC
		11	Fabian Manyanya	VGS
		12	Wambira George	VGS
		13	Musoye Marobe	VGS
		14	Julius G. Samgi	Member, village government
		15	Christina Nyamasagi	Member, village government
		16	William Waryoba	Prominent livestock keeper
		17	Stanislaus Magoto	Prominent farmer
		18	Elias Chama	Prominent farmer
		19	Andrew Nyakibohe	Secretary, VNRC
23.11.2001	Nyichoka	1	Emanuel Nyangaka	Chairman, village government
		2	Juma K. Wambura	Village Executive Officer (VEO)
		3	Joseph R. Ntibani	Member, village government
		4	John Mahiti	VGS
		5	Paolo M. Kereng'anya	Prominent livestock keeper
		6	Maro Marongoli	Prominent livestock keeper
		7	Emanuel Jackobo	VGS
		8	Gunai Nyambacha	Prominent livestock keeper
		9	Jumapili Joseph	VGS
		10	Petro M. Manyaki	Member, VNRC
		11	Mugoye J. Bwanana	Member, village government
		12	Mtiro Mtiro	Member, village government
		13	Nyahenga S. Simora	VGS
		14	Proscovia N. Gambahewa	Member, VNRC
		15	Maria Maro	Member, VNRC
		16	Herman J. Kinyariri	Chairman, VNRC
		17	Mangasa Wiranga	Prominent farmer
		18	Mekacha Kinyangombe	Prominent farmer
		19	Makuru C.N.	Agriculture extension officer
		20	Zacharia Kisiroti	Prominent livestock keeper

Appendix 2b: Group discussion topics

- (a) The presence of village wildlife areas (VWA).
- (b) Land problems.
- (c) Agricultural problems.
- (d) Livestock problems.
- (e) Presence of poachers in the village.
- (f) Reasons for people to engage in poaching.
- (g) Measures taken against poachers.
- (h) Effectiveness of VGS in combating poaching.
- (i) Effectiveness of VNRC in wildlife management.
- (j) Possible strategies to stop poaching.
- (k) The community wildlife hunting.
- (l) The success/failure of SRCP in the involvement of local communities in wildlife management.

Appendix 3: Checklist for key informants**(a): SENAPA officials**

- Main activities
- Main objectives
- Management problems
- Involvement of local communities in wildlife management

(b): SRCP officials

- Main activities
- Main objectives
- Management problems
- Involvement of local communities in wildlife management
- How are the communities accepting the project

(c): IGGRs officials

- Main activities
- Main objectives
- Management problems
- Involvement of local communities in wildlife management

Appendix 4: Poachers arrested in Serengeti National Park from July 2000-July 2001

District	Village	Number caught
(a) Serengeti	Nyamakendo	56
	Machochwe	43
	Melenga	36
	Miseke	28
	Nyambuli	27
	Mbirikili	24
	Bisalala	23
	Mugumu	24
	Mbalibali	10
	Grumcti	4
	Kolci	9
	Kibeyo	3
	Nyansulura	5
	Kisangura	4
	Kcbosongo	3
	Matare	2
	Ngarawani	2
	Nyigoti	2
	Manchira	1
	Nyichoka	2
	Kitunguruma	2
	Rung'abore	13
	Kibanchebache	3
	Gesalya	5
	Kitembele	9
	Isenye	4
	Kono	9
	Bonchungu	13
	Sedeko	5
	Bwitengi	19
	Rwamchanga	2
	Burunga	3
	Masinki	1
	Robanda	6
	Nyambuleti	4
	Nyamatoke	14
	Maburi	11
	Kemugesu	1
	Ligicha	3
	Nyamoko	1
	Ling'wani	1
	Total	437

(b) Bunda		
	Nyamatoke	27
	Changuge	9
	Mugeta	4
	Nyagaranga	1
	Kunzungu	23
	Mihale	9
	Balili	22
	Tamau	12
	Bukore	25
	Sarawe	2
	Rigaramba	5
	Manchimweru	10
	Kyandege	4
	Nyamuswa	2
	Salama A	1
	Hunyali	5
	Monuna	4
	Nyatwari	5
	Total	170
(c) Tarime		
	Ketawasi	5
	Mangucha	10
	Gong'ora	7
	Karakatonga	9
	Kegonga	25
	Kenkuru	1
	Nyabugege	1
	Mang'ora	3
	Mika	1
	Masanga	27
	Gibaso	57
	Total	146
(d) Bariadi		
	Ikinabushi	1
	Matongo	40
	Mascwa	55
	Igaganuro	1
	Gibeshi	17
	Igwata	2
	Ihusi	6
	Harawa	13
	Sagata	6
	Mwasinasi	13
	Ngwaswale	5
	Mwantani	2
	Nyawa	3
	Nkuyu	3
	Longo la mbogo	3
	Mwalali	2
	Lung'wa	5
	Selya	1
	Mwagungu	1
	Total	179
(e) Magu		
	Mwabayanda	6
	Mwamalole	13
	Total	19
(f) Ngorongoro		
	Maaloni	2
	Total	2

(g) Narok (Kenya)	Oldregesi	1
	Naikira	1
	Subukya	1
	Total	3
Overall total poachers arrested		956

Source: Serengeti National Park law enforcement records

Appendix 5: SRCP community wildlife hunting in all project villages in the year 1998

(a) SRCP community wildlife hunting in all project villages in the year 1998

Bunda district					
Village	Animals hunted	Number harvested	Total weight (Kg)	Price per Kg(TAS)	Revenue obtained(TAS)
Nyamatokc	Zebra	3	1097	300	329 100.00
	Wildebceest	8			
	Topi	4			
Mihale	Zebra	3	927	300	278 100.00
	Wildebceest	4			
	Topi	4			
Hunyari	Zebra	3	2143	300	642 900.00
	Wildebceest	5			
	Topi	2			
Kihumbu	Zebra	3	1249	300	374 700.00
	Wildebceest	5			
	Topi	2			
Mariwanda	Zebra	5	1668	300	500 400.00
	Wildebceest	10			
	Topi	3			
Mugeta	Zebra	2	1168	300	350 400.00
	Wildebceest	10			
	Topi	7			
Kyandege	Zebra	3	878	300	263 400.00
	Wildebceest	5			
	Topi	3			
	Total	94			
Serengeti district					
Robanda	Zebra	5	1196	300	358 800.00
	Wildebceest	7			
	Topi	3			
Iharara	Zebra	4	1394	300	418 200.00
	Wildebceest	9			
	Topi	3			
Motukeri	Zebra	4	1209	300	362 700.00
	Wildebceest	7			
	Topi	4			
Singisi	Zebra	1	1145	300	343 500.00
	Wildebceest	9			
	Topi	0			
Natambiso	Zebra	4	1346	300	403 800.00
	Wildebceest	7			
	Topi	1			
Nyakitono	Zebra	4	1269	300	380 700.00
	Wildebceest	3			
	Topi	0			
Nyichoka	Zebra	5	941	300	282 300.00
	Wildebceest	4			
	Topi	4			
	Total	85	8500		2 550 000.00
	Grand total	179	17 630		5 289 000.00

(b) SRCP community wildlife hunting in all project villages in the year 1999

Bunda district					
Village	Animals hunted	Number harvested	Total weight(Kg)	Price per (Kg)	Revenue obtained(TA S)
Nyamatoke	Wildebceest	13	1354	300	406 200.00
	Topi	1			
	Zebra	1			
Mihale	Wildebceest	12	1440	300	432 000.00
	Topi	1			
	Zebra	3			
Hunyari	Wildebceest	14	2040	300	611 900.00
	Topi	3			
	Zebra	8			
Kihumbu	Wildebceest	14	1588	300	476 400.00
	Topi	1			
	Zebra	4			
Mariwanda	Wildebceest	15	1764	300	529 200.00
	Topi	2			
	Zebra	7			
Mugeta	Wildebceest	13	1807	300	542 400.00
	Topi	1			
	Zebra	6			
Kyandege	Wildebceest	5	1209	300	362 700.00
	Topi	5			
	Zebra	5			
	Total	134	11 202		3 360 800.00
Serengeti district					
Iharara	Wildebceest	6	1048	300	314 400.00
	Topi	3			
	Zebra	3			
Singisi	Wildebceest	6	836	300	250 800.00
	Topi	3			
	Zebra	2			
Motukeri	Wildebceest	7	1444	300	433 200.00
	Topi	1			
	Zebra	7			
Natambiso	Wildebceest	13	1442	300	432 600.00
	Topi	1			
	Zebra	6			
Nyakitono	Wildebceest	7	1134	300	259 500.00
	Topi	2			
	Zebra	4			
Nyichoka	Wildebceest	7	1221	300	366 300.00
	Topi	2			
	Zebra	4			
Robanda	Wildebceest	12	1569	300	470 100.00
	Topi	0			
	Zebra	5			
	Total	101	8694		2 526 900.00
	Grand total	235	19 896		5 887 700.00

(c) SRCP community wildlife hunting in all project villages in 2000

Bunda district					
Village	Animals hunted	Number harvested	Total weight (Kg)	Price per Kg	Revenue obtained (TAS)
Nyamatoke	Wildebceest	12	2277	400	910 800.00
	Zebra	16			
	Topi	8			
Mihale	Wildebceest	15	2208	400	883 200.00
	Zebra	9			
	Topi	2			
Hunyari	Wildebceest	14	2748	400	1 099 200.00
	Zebra	13			
	Topi	7			
Kihumbu	Wildebceest	10	2473	400	989 200.00
	Zebra	11			
	Topi	5			
Mariwanda	Wildebceest	15	2191	400	876 400.00
	Zebra	9			
	Topi	6			
Mugeta	Wildebceest	15	2319	400	927 600.00
	Zebra	8			
	Topi	5			
Kyandege	Wildebceest	9	1633	400	653 200.00
	Zebra	6			
	Topi	5			
	Total	200	15 849		6 339 600.00
Serengeti district					
Robanda	Wildebceest	10	1880	400	752 000.00
	Zebra	7			
	Topi	4			
Nyichoka	Wildebceest	3	1546	400	618 400.00
	Zebra	9			
	Topi	5			
Nyakitono	Wildebceest	3	1339	400	535 600.00
	Zebra	6			
	Topi	5			
Natambiso	Wildebceest	8	1867	400	746 800.00
	Zebra	9			
	Topi	5			
Motukeri	Wildebceest	9	1745	400	698 000.00
	Zebra	7			
	Topi	3			
Singisi	Wildebceest	8	1644	400	657 600.00
	Zebra	7			
	Topi	2			
Iharara	Wildebceest	3	1209	400	483 600.00
	Zebra	4			
	Topi	3			
	Total	120	11 230		4 492 000.00
	Grand total	320	27 079		10 831 600.00

(d) SRCP community wildlife hunting in all project villages in 2001

Bunda district					
Village	Animal hunted	Number hunted	Total weight (Kg)	Price per (Kg)	Revenue obtained(TAS)
Nyamatoke	Wildebceest	12	2806	400	1 122 400.00
	Zebra	11			
	Topi	8			
Mihale	Wildebceest	11	2764	400	1 105 600.00
	Zebra	11			
	Topi	10			
Hunyari	Wildebceest	16	2996	400	1 198 400.00
	Zebra	14			
	Topi	5			
Kihumbu	Wildebceest	14	2435	400	974 000.00
	Zebra	9			
	Topi	4			
Mariwanda	Wildebceest	21	2820	400	1 128 000.00
	Zebra	12			
	Topi	3			
Mugeta	Wildebceest	16	2346	400	938 400.00
	Zebra	8			
	Topi	5			
Kyandegge	Wildebceest	15	2555	400	1 022 000.00
	Zebra	10			
	Topi	5			
	Total	220	18 722		7 488 800.00
Serengeti district					
Iharara	Wildebceest	12	2509	400	1 003 600.00
	Zebra	10			
	Topi	7			
Singisi	Wildebceest	11	2653	400	1 061 200.00
	Zebra	11			
	Topi	5			
Motukeri	Wildebceest	12	2553	400	1 021 200.00
	Zebra	10			
	Topi	4			
Natambiso	Wildebceest	16	2204	400	881 600.00
	Zebra	10			
	Topi	2			
Nyakitono	Wildebceest	12	2357	400	966 800.00
	Zebra	10			
	Topi	1			
Nyichoka	Wildebceest	16	2407	400	966 800.00
	Zebra	7			
	Topi	4			
Robanda	Wildebceest	17	2535	400	1 014 000.00
	Zebra	7			
	Topi	1			
	Total	185	17 218		6 915 200.00
	Grand total	405	35 940		14 404 000.00
Total revenue accrued in all pilot villages under SRCP from 1998-2001					36 412 300.00