5 DISCUSSION

5.1 Status and distribution of elephants

The wider Selous ecosystem is one of the strongholds of elephants in Tanzania, where over half of the country's elephant population is found (Blanc et al. 2003). Like many other elephant populations in Africa, the Selous population has suffered from severe poaching in the 1970s and 1980s. For example, from 1976 to 1986, the Selous elephant population was reduced from 110,000 to 55,000 individuals. By 1989, the population was reduced to about 30,000 individuals (TWCM 1998, Siege 1999). Population size in the Selous-Niassa Wildlife Corridor (SNWC) was unknown until recently (TWCM 1998, CIMU 2001). Given the previous general trend for the wider Selous ecosystem, the strong tradition of elephant hunting in the Corridor, and the wary behaviour of elephants towards people as reported by respondents during interviews and observed during field-work, it is likely that the elephant population in the Corridor also severely suffered. Furthermore, the civil war and political instability in neighbouring Mozambique were certainly not conducive to anti-poaching law enforcement until recently.

This study used several complementary approaches to establish a detailed picture of the current status of the elephant population in the Corridor. The responses from individual questionnaire-based interviews, village discussions, field-work, patrol records of village game scouts, assessment of elephant health status and satellite-based radio-tracking of radio-collared elephants provided a detailed and altogether encouraging picture of the current status:

- At least some elephants in the Corridor, both males and females, are truly resident, non-migratory animals. The Corridor is therefore not just an area of transit for elephants between the two Game Reserves in the north and in the south but it also sustains its own sizable resident population. There are at least 2,400 elephants that are resident or use the Corridor part-time, and the population appears to be currently expanding, with a healthy calf:female ratio and excellent values in terms of the reproductive quality of semen of breeding bulls.
- The over all mean group size of the different age-sex classes observed in the corridor ranged from 4-9 individuals. These values appear to be lower compared to the average group sizes of 9-19 individuals recorded from other protected areas

(Poole, 1989, Tchamba, 2001). The lower group size observed might probably be attributed by the recording technique that permitted single groups only for analysis. It was impossible to sort out the group size and compositions in cases where pooled data were presented. These data should therefore be considered as a rough guide for the age-sex group size of elephant on the southern section of the Selous ecosystem. To accurately describe the elephant population structure in this corridor, further study is needed.

- As the details of radio-tracked movements of individuals particularly in the centre of the Corridor indicated, the biological corridor stretches further in east-westerly direction than initially expected.
- Some elephants make use of large sections of the Corridor by virtue of maintaining very large home ranges. The fact that there are conspicuous and well-established major elephant movement routes that cross the entire Corridor also suggests that some elephants may be entirely transient and use the Corridor to move between the adjacent Game Reserves. Hence, any fragmentation of elephant habitat in the Corridor would be a grave disadvantage.
- Regular movements of animals between the Corridor and the adjacent Game Reserves, the Selous in the north and the Niassa in the south, emphasise the contiguousness of the habitat in terms of its conservation value, and underscores the value of the Corridor for the adjacent Game Reserves.
- Large breeding bulls frequently move between the southern sections of the Corridor in Tanzania and large parts of the Niassa Game Reserve inside Mozambique. Not only does this emphasise the status of the Corridor as a true trans-boundary ecosystem, it also pinpoints the value of the Corridor as a link between the Selous and the Niassa elephant populations in terms of breeding and genetic exchange.

5.2 Surveying wildlife: comparing low tech and high tech approaches

Conventional field surveys of wild animal populations are expensive, time consuming and require a high degree of technical expertise. In this study a low technology approach to assess the status and distribution of wildlife of the SNWC was compared with the results of a conventional aerial survey. The low-tech approach consisted of interviewing people and using indigenous knowledge to score the presence or absence of wildlife on village lands. The results showed that elephant, sable antelope, warthog, eland and duiker appeared to be abundant and widespread whereas species such as reedbuck, bushbuck, hippo, Liechtenstein's hartebeest and zebra seemed to be rare and restricted in their distribution. Buffalo and greater kudu were reported to occur in specific parts in both the northern and southern sections of the Corridor. The interviews also suggested that the SNWC supports a large population of Roosevelt's sable antelope, consistent with the general distribution of this species in the greater Selous ecosystem as derived from repeated aerial surveys, where they were present in over 60% of the southern part of the ecosystem (TWCM 1995, 1998).

The qualitative agreement of both "censusing methods" was sufficient to suggest that a preliminary survey using common indigenous knowledge enhanced by additional field-work may quickly reveal the wildlife potential of a particular area. Repeated and sophisticated survey methods may be needed if a quantitative estimate and the tracing of quantitative changes in the status state of wildlife populations is required.

The interviewing technique employed in the present study also had the advantage of identifying the presence of secretive, nocturnal or migratory species that are difficult to record during aerial surveys. For instance, the presence of endangered species such as the African wild dog and large carnivores such as lions, leopards or spotted hyenas were publicly reported and their presence subsequently confirmed from signs encountered during field-work but were absent from aerial census records.

Both long and short-term methods can be employed to study the population dynamics of elephants. The long-term method involves observations of the small population of individuals for over a period of many years. During this time the researcher eventually knows all individual study animals. Such study has been conducted by Cynthia Moss and Joyce Poole in Amboseli NP Kenya and by Charles Foley in Tarangire NP Tanzania (Poole pers. comm, 2002). The short-term method involves acquisition of data from dead elephant and application of mathematical relationships. This method has successfully and extensively been used in Kruger National Park, South Africa where extensive culling operations are practised (Whyte, 1995). By means of these methods, lot of information regarding elephant population dynamics such as the age at which the first mating took place, the age at which the first calf is born, subsequent inter-calving interval, the age at puberty for males and even the first musth, can be predicted (Whyte, 1995). However, these methods are only possible in a limited study area. They are difficult to carry in extensive and bush environment like those of Selous in southern Tanzania. Under such circumstances, the population estimates of elephants can fairly be performed by other methods such as aerial survey, ground counts or dung counts. Again, thick vegetations and undulating landscape have been reported to complicate visibility and introduce observers' biasness during ground or aerial surveys (Caughley et al., 1976, Hoare, 2000). Under these circumstances, the tendency is to under estimate the population of elephants (Jachmann, 1988, Norton et al., 2000). Because of these biases, Jachmann (1988) suggested the use of dung count in areas where visibility is a limiting factor. The dung count method have been described to have advantages as it estimates the population size, accurately describes the distribution by season and identifies possible corridors as used by elephants. It is therefore possible to improve the understanding of the elephant population dynamics in the remote and bushy environments of the SNWC in Tanzania if a combination of ground observations, dung counts and where possible aerial surveys are conducted regularly.

Wildlife monitoring involves a number of different methods including regular game counts and habitat evaluation. A comprehensive assessment of a wildlife population and its status requires the application of several methods to estimate total population size, number of groups, group sizes, male:female ratios, approximate age structure, apparent health status of individuals, reproductive success, home range, movement patterns within the home range, emigration or colonisation of new areas. To achieve this objective, a truly comprehensive commitment in terms of time and resource is inevitable. This has been a limiting factor in many places. Like many other important wildlife corridors in Tanzania, the SNWC is outside the core of protected areas and thus not part of a priority census zone. It is therefore essential to develop a simpler, yet sustainable and effective monitoring method that will enable a reasonable long-term understanding of the population dynamics of key wildlife species and provide the basis for informed management decisions.

Presently, the villages in the northern section of the SNWC near the Selous Game Reserve practise community-based wildlife management. These villages trained groups of village game scouts (VGS) in basic anti-poaching (Mahundi 2001). The game scouts were also trained to collect basic ecological data during routine monthly anti-poaching patrols. Continuous data collection as a basis for wildlife management was therefore feasible in principle. This study was therefore also interested in assessing how valuable such patrol records can be in terms of ecological information.

The patrol records provided reasonable information on average group sizes and basic information on population structure (age-sex classes) in highly conspicuous species such as elephants. However, some of the VGS elephant sighting data lacked consistency and were difficult to interpret. This was because the initial training emphasised anti-poaching activities. Records can be improved by designing a protocol that combines the direct observation of encounters with elephant groups with indirect methods (dung count) of elephant monitoring, as suggested by Burnham et al. (1985) and Kangwana (1996). Such data can be regularly collected throughout the year by the village game scouts.

The patrol records also do not constitute a comprehensive survey of the relevant habitats, since the likelihood of patrolling an area depends on accessibility in terms of terrain topography and the distances involved, as acknowledged by the scouts themselves. In that sense, patrols can be considered transects in some but not all habitats, and are unlikely to provide a reliable estimate of total wildlife species diversity.

5.3 Elephant capture, immobilization and assessment of physical status

The routine qualitative evaluation of physical conditions, together with sex and age classification of wild animals are very important whenever immobilization is to be attempted. The American Society of Anesthesiology has come out with elaborate physical status classifications for domestic animals (Lumb and Jones, 1984). Such classifications are difficult to adopt in a free ranging wild animals. However, external body condition scores together with a number of other ecological factors such as population density, habitat condition and rainfall can be used to predict the physical status of wild animal population (Albl, 1971). During the present study, the habitat condition was considered good and none of the immobilized elephant was cachexic or debilitated based on lumber depression criterion (Albl, 1971). In addition, most examined animals were sexually active.

There was no serological or molecular evidence from elephants of infection with endotheliotropic herpes virus and foot and mouth disease.

The blood chemistry values from immobilised elephants were within clinically normal values for cholesterol, triglycerides, creatine, sodium, iron and total protein while slight increases were noted for alkaline phosphatase (AP), lipase, urea, potassium and calcium and a slight decrease was noted for α-amylase, bilirubin and aspartate amino transferases (AST). Sex, age and seasonal variations have been reported to induce minor variations in elephant blood parameters (Brown and White 1980). However, leucocytosis and substantially lower values for PCV (25%) and Hb (8 g/dl) were observed in the elephant that died. Its total RBC counts could not be determined as the sample haemolysed. The definite cause of the lower PCV and Hb were not established. However, trauma and some disease conditions have been reported to lower the PCV and Hb values in a variety of domestic animals (Doxey 1983; Benjamin 1986). Persistently low PCV coupled with normal plasma protein is usually suggestive of deficient erythropoiesis as a result of inflammation (Jones 2003). In humans, chronic bleeding and trauma are characterized by leucocytosis and a decrease in both PCV and Hb (Claudia Kühn, pers. comm. 2003). Other conditions associated with change in PCV and Hb includes time of sampling in relation to the period of anaesthesia or death (Richard Kock, pers. comm. 2002). In the present case, the changes in PCV and Hb values were unlikely to be caused by neuroleptoanalgesia or death as sampling was done at approximately the same time interval as for other individuals. The type of anaemia was not established due to the lack of total RBC count values. Other than leucocytosis and low PCV and Hb values, parameters were within clinically normal limits.

The use of M99 for elephant immobilization is a standard procedure and mortalities are rare. However, there are certain risks, which range from mild physical trauma to death. Physical reasons such as trunk obstruction and positional problems are the leading causes of hypoxia and death (Kock MD et al. 1993; Coetsee 1996; Elkan et al. 1998). Other reported causes of death during elephant capture and immobilization include acidosis associated with the consumption of lush vegetation (Njumbi et al. 1996) and viral infections weakening the heart, as has occurred with elephants in Kruger National Park, South Africa (Richard Kock, pers. comm. 2002). From experience, bullet traumas to vital organs may also pose a risk. Under such circumstances, the wounded animal appears not to withstand the stress caused by neuroleptoanalgesics. Unfortunately, it is difficult to identify in advance by visual observation such a compromised individual. It is therefore important to investigate properly all mortalities including a thorough post-mortem examination, haematology and biochemistry.

Several important requisites have been suggested for successfully immobilizing elephants. Osofsky and Hirsch (2000) summarized some of these factors as 1) behaviour, social structure and the social status of the subject; 2) environment, such as ambient temperature, humidity, wind, terrain, amount of daylight; 3) animal welfare issues, including the type of drug to be used and dose selected, the species-specific response to different capture drugs, the availability of antagonists for the selected restraint drug, the proper assessment of the health status of individual animals, and measures to reduce stress associated with capturing and immobilization. The combination of these factors thus determines the scouting method, dosage protocol and type of follow-up to be undertaken. Therefore, the capture protocol for elephants in open savannah or semi-wooded habitats differs from that used in the dense miombo woodland and riverine vegetation of Selous. The latter is characterized by low visibility, high variability of terrain and difficulty of locating individuals at a safe distance. These situations create unique and challenging situations, which require much flexibility during capture operation.

5.4 Elephant home ranges and movements

Previous status survey of African elephants by Said et al. (1995) and Barnes et al. (1998) mentioned the possibility of cross-border movements of elephants between Tanzania and Mozambique. The ground observations and the satellite-based tracking confirmed nine such crossing points at which elephants from either side were observed to cross the Ruvuma River.

The three groups of elephants radio-collared in the northern, central and southern sections of the Corridor showed distinct and different home range characteristics. The northern individuals had predominantly small home ranges, showed substantial degree of home range overlap and a modest overlap of their home range core areas. The central group had medium-sized home ranges, overlapped substantially but showed no overlap of the core areas of their home ranges. None of the four bulls radio-collared in the central section of the SNWC had its core area within the Sasawala Forest Reserve. The southern individuals had the largest home ranges, and yet showed the greatest overlap of their core areas.

Previously recorded home range sizes of African elephants varied from 15 to 8,700 km^2, a 600-fold difference, recorded in a wide variety of habitats by several methods across a range of African countries (Table 22). Discussions on explaining such variation considered differences in methodology, the absence or presence of what were considered migratory movements as a consequence of marked seasonal environmental changes, differences in the productivity of habitats, and the protected status of some of the areas where elephants were tracked. For instance, all elephants previously reported to have small home ranges were only found in protected areas. In comparison, the results from this study demonstrate substantial range variation within the same study population, namely a 20-fold variation in range size, from fairly small (328 km^2) to large ranges (6,905 km^2), in one habitat, and that was a habitat – miombo woodland – not previously studied. Whether such variation in one study area was a consequence of improved technology, studying elephants in a novel habitat type or an increased sample size remains presently unclear. Alternatively, it may reflect differences in space use strategies between individuals that by the standards of other studies would be classified as resident and migratory, respectively.

In terms of movement patterns, elephants in the present study might be classified as residents (in the northern and central sections of the SNWC), and partially migratory in the case of individuals moving extensively between Tanzania and Mozambique in the southern section. The results from satellite-based telemetry demonstrated extensive movement of elephants towards the end of dry season and limited mobility during the wet season. During this time, elephants appeared to stay at specific locations. For example, the core areas of the wet season home ranges of some individuals were localized near agricultural fields, suggesting an interest in crop raiding in these animals.

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Table 22: Home range sizes of African elephants

Study area	Country	Study method	Home range size (km^2)	Reference
Lake Manyara NP	Tanzania	Individual recognition	15-52	Douglas-Hamilton (1971, 1973)
Tarangire NP	Tanzania	Individual recognition	330	Douglas-Hamilton (1971)
Serengeti NP	Tanzania	Individual recognition	> 330	Douglas-Hamilton (1971)
Tsavo West NP	Kenya	Individual recognition	350	Leuthold & Sale (1973)
Kruger NP	South Africa	Individual recognition	436	Hall-Martin (1984)
Tsavo NP	Kenya	Individual recognition	1,532	Leuthold (1977)
Tsavo East NP	Kenya	Individual recognition	1,580	Leuthold & Sale (1973)
Northern Namib Desert	Namibia	Individual recognition	1,763-2,944	Viljoen (1989)
Laikipia Samburu	Kenya	VHF radio collars	102 – 5,527	Thouless (1996)
Amboseli NP	Kenya	VHF radio collars, aerial surveys	2,756; 3042; combined 3,588	Western & Lindsay (1984)
Waza NP	Cameroon	Argos satellite collars, VHF radio and visual observations	785-2,534	Tchamba et al. (1994)
Etosha NP	Namibia	Argos satellite collars	5,800-8,700	Lindeque & Lindeque (1991)
Tarangire NP	Tanzania	GPS satellite collars	159-660 (N) 2,104-3,314 (S)	Galanti et al. (2000), TMCP (2002)
Selous-Niassa Wildlife Corridor	Tanzania	GPS/ARGOS satellite collars	328 – 6905	This study

NP – National Park; N – north; S – south

The extensive movements of elephants during the late dry season have previously been associated with a search for new growth and fruiting plants (Haltenorth and Diller 1986).

During interview and village meetings, elephants were reported to proceed from south to north between March and April and from north to south between June and December. However, this idea did not conform to the results from the satellite-based tracking where southward movements of elephants were observed during March. Movements were also reported to be influenced by the peak fruiting period of major stands of marula (*Screlocarya birrea*) trees along the Ruvuma River between March and June. Again, the satellite-based tracking did not reveal the predicted large-scale movements during this period. Movements towards marula stands by local groups of elephants were, however, repeatedly confirmed by ground observations and frequent sightings by village game scouts, officials from the SGR and the district game office (Nakambale & Madatta, pers. comm.).

5.5 Habitat use by and preference of elephants

The Selous-Niassa Wildlife Corridor is characterised by the presence of many permanent rivers and streams that provide food, water and shelter during the dry season. During the wet season, water and forage were available ad libitum and elephants do not depend on rivers or riverine vegetation, and favour instead the nutrient-rich plants in bushed grassland. Interestingly, radio-collared elephants avoided cultivated areas. Three reasons might explain this phenomenon:

- During the peak-harvesting season (March to May), many people stay on guard on their farms and fields. This may stop elephants potentially interested in agricultural crops.
- The bushed grassland highly preferred by elephants is not used by people and occurs at long distances from villages, thus reducing the chance of encounters with people and increasing the cost for elephants to move to cultivated areas.
- The presence of natural river barriers close to the villages in the southern section of the Corridor reduces the chance that elephants cross during the wet season, as water levels are high. For instance, three bulls (Ndalala, Mkasha and Msanjesi) crossed the Ruvuma River to Mozambique only during dry season when the water level was low, whereas during the rainy season at high water levels they remained on the Tanzanian side.

These factors are consistent with the sporadic nature of crop raiding incidences by elephants reported during questionnaire surveys and village discussions and the low incidence of apparent crop damage caused by elephants.

The results suggest that bushed grassland, rivers and riverine vegetation, seasonally also woodland, forests and swamps are likely to be habitats crucial for the continued existence of elephants in the Corridor. Conservation effort should therefore be focused towards protecting these habitats as core protected areas supported by surrounding buffer zones or dispersal areas of woodland and forest habitats (Sarunday & Ruzika 2000). Bushed grassland and riverine habitats constituted only 3.4% of the total habitat available to elephants in the Corridor, yet their highly preferred nature makes it likely that encroachment of these areas by human settlement, cultivation or other development activities may result in intensified human-elephant conflict in future.

5.6 Corridors and population persistence

Where critical areas for survival of wild animals outside protected areas such as breeding sites, movement corridors, dispersal areas and foraging grounds have been neglected, land-use conflicts have intensified and considerable loss of biodiversity has occurred (Kideghesho 2000). Degradation within and around protected areas may therefore affect the rate of extinction of some populations and species, particularly large mammals and other animals that require habitats beyond protected areas (Sarunday & Ruzika 2000). In Tanzania, the areas of Serengeti, Ngorongoro, Lake Manyara, Tarangire, Arusha and Kilimanjaro are reported to have lost most of their wildlife movement corridors and dispersal areas (Mwalyosi 1991, Kideghesho 2001a-c, 2002), and as a result a number of large mammal species have been reported to become locally extinct in some places (Newmark 1996, Gamasa 1998, Silkiluwasha 1998).

Many human development activities are reported to be detrimental to elephant habitats. Construction of roads, railways and human settlements are activities that are likely to impede the movements of elephants (Johnsingh & Christy-Williams 1999). Already the Songea–Tunduru main road crosses the SNWC. Its impact, however, is currently minimal as elephants traverse the road at different sites. Human habitation and expanded agricultural activities between Mchomoro and Kilimasera and between Kilimasera and Hulia have already increased the number of incidents of conflict between people and elephants (Hahn 2001, N. Madatta pers. comm.). Similar phenomena are very likely to occur between Magazini and Amani, Magazini and Likusanguse and between Ligunga and Amani at the southern end of the corridor. Uncontrolled wildfires, poaching, fishing and encroachment along the Ruvuma River will ultimately prevent the movement of elephants and other wild animals between Tanzania and Mozambique. The long-term effects will include genetic isolation, habitat degradation within reserves by large herbivores such as elephants and intensify the conflicts between people and wild animals in adjoining areas. Genetic isolation of wildlife populations may also increase the likelihood of inbreeding and reduce the chance of population persistence (Soulé et al. 1979, Hudson 1991, Burkey 1994, Newmark 1996, Hanski & Gilpin 1997), even for wide ranging species such as the African wild dog and elephants that live at comparatively low densities (Cross & Beissinger 2001).

5.7 People and wildlife

The results from this study provide a sketch of the extent and likely development of human- elephant conflict (HEC) in Songea Rural (Namtumbo) District, including the western section of the SNWC. However, it should be noted that the data presented here were not systematically collected and may underestimate the real problem of HEC. Recently, a comprehensive and standardized protocol for collecting HEC data and analysis has been developed (Hoare 1999) that is currently being tested in some areas of the Selous Game Reserve in Tanzania (Dublin 2003). It is therefore appropriate to adopt a similar protocol to permit an in-depth analysis of the HEC situation in future work. Such a protocol has the advantage that it provides a basis for comparison with other data collected elsewhere and eventually may be integrated with a GIS (Hoare 1999b).

In the present study, the major causes of reductions in crop yield were weeds, crop diseases and “small animal” pests (rodents and birds). Damage by elephants and other larger mammals appeared to be minimal. However, elephants were feared because of their principal ability to sweep an entire farm in one attack and because they were not deterred by most traditional methods of deterrence. This appeared to be the reason for regular reports of elephant raiding to the district game office. Crop damage by small mammals appeared to be tolerated partly because the farmers themselves easily managed them and partly because when small mammals were caught they served as a source of protein in an area where livestock is rarely kept.

Presently, a large proportion of villages appear to have no clear guidelines on how people may acquire land for subsistence farming. Land is typically acquired by bush clearing or inheritance. People are also increasingly returning to their old hamlets (mavunduni) from where they were moved away during the villagisation process (ujamaa) between 1973 and 1974 (Malocho 1997). As a result, management of crop raiding mammals in mosaics of isolated plots is often uncoordinated and complicated.

Previous wildlife censuses (TWMC 1995, 1998, CIMU 2001) reported large numbers of wildlife outside the Selous Game Reserve (SGR). This increase might be due to the recent strengthening of anti-poaching surveillance inside the SGR by the SCP programme and outside the SGR by the village game scouts in their respective Wildlife Management Area (WMA) pilot projects in the buffer zone. As a result, animal populations (1) may be expanding and (2) individual animals may have lost some of their fear of people and thus move more freely into areas where they have not been sighted for many years (SCP/GTZ 1999, Siege 1999, Siege and Baldus 2000). At the same time the human population expands (Mwamfupe 1998, SDDP 1998) and thus the demand for land for development activities at the expense of wildlife habitats may increase. If wildlife populations are currently expanding in size and moving into new habitats and the human population does the same, competition for resources between people and wildlife will undoubtedly increase, and thus we are more likely to see cases of human wildlife conflicts in the future.

Recently, the Wildlife Policy of Tanzania (WPT) published by the Government of Tanzania in 1998 presented elaborate strategies for community participation in the management and utilization of wildlife resources outside core protected areas (Severre 2000). The objectives of the WPT for community participation included the promotion of conservation of wildlife and its habitats outside core protected areas by establishing WMAs, transfer of management responsibility of WMAs to local communities, thus taking care of corridors, movement routes and buffer zones, and to ensure that local communities obtain substantial and tangible benefits from wildlife conservation. Concerning the problem of conflicts between people and wildlife, the WPT stated that the responsibility of solving such conflicts should be devolved to local communities. The WPT (1998) also committed itself to encourage alternative strategies that reduce conflicts between people and wildlife, thereby opening avenues for research and the implementation of other methods deemed appropriate for Tanzanian conditions. Such methods could include

- Incorporating the numbers of animals shot on problem animal control into hunting quotas for the communities so that they provide a greater economical benefit to the community;
- Ensuring that the individuals most affected by the problem animal are the main beneficiaries of the revenue earned from wildlife, as suggested by the current CBC

statutes since equitable distribution of costs and benefits (including revenue) should be clearly defined by the village constitution (Severre 2000);

- Exploring the use of control methods, which rely on mechanical and electrical deterrents and are non-lethal, including, where practical, capturing and translocation of high value wild mammals.

In line with the WPT (1998), the Ministry of Natural Resources and Tourism launched Wildlife Management Area (WMA) regulations in 2003 to enable participation by local communities in the conservation of wildlife. These regulations prescribe the procedures and criteria for the establishment of WMAs. An important element to ameliorate possible conflicts between people and wildlife is a land use plan, since a key factor promoting conflict between people and wildlife is improper land use. Shifting cultivation and unplanned settlements may become a major problem where there is no such land use planning. Therefore a land use plan is a requisite component for the establishment of a WMA; it makes it binding for communities to carry out development activities only in areas set aside for that particular purpose. Proper land use planning should also encourage the establishment of buffer zones in areas adjacent to already existing core protected areas and that set aside appropriate wildlife corridors and dispersal areas will greatly reduce the likely contacts between people and wildlife and thus contribute to a decrease in human-elephant conflicts and other forms of conflicts with wildlife. If properly implemented, WMA schemes have the potential to make communities important partners in conservation, and communities will likely benefit when they declare wildlife conservation as a form of land use of their designated village land.

5.8 The future conservation status of the SNWC in southern Tanzania

The SNWC is an important biological area and has great potential for wildlife and its conservation. One line of evidence is that the SNWC harbours important populations of two species on the IUCN Red List, the African elephant (Vulnerable) and the African wild dog (Endangered). At present, the Selous Game Reserve and the adjoining village wildlife management areas protect the northern section of the SNWC. The larger, southern section of the SNWC currently lacks any kind of official protection, and hence may be vulnerable to all sorts of unsustainable use of wildlife. In recent years, human activities such as cultivation and tree felling have expanded in the central and southern part of the SNWC (personal observations; CIMU 2001). New villages also emerge in some important sections of the Corridor and close to elephant ranges and movement routes and human activities along the Ruvuma River are on the increase (personal observations). These are mainly unlicensed fishermen and illegal hunters that are thought to operate freely in the area. The same apparently also applies in some parts on the Mozambiquan side despite law enforcement efforts and the protected area network there. These activities are likely to continue to exert constant pressure on elephant groups, which range in the central and southern sections of the SNWC. There is also some evidence that elephants and key movement routes are affected by the continuous and nearby presence of people in the central and southern sections of the SNWC.

Despite these worrying signs, the current situation in this corridor is considered to be much better than in many other corridors in Tanzania (Noe 2003). At the end of this study, most recognised movement routes and important elephant crossing points in key locations are still intact and frequently used by elephants. If, however, the utilization of wildlife resources continues unhindered and perhaps even expands in some areas in the southern and central sections of the Corridor, that use must be considered unsustainable and may in the long run jeopardize the continued existence of the SNWC as an intact ecological system.

The current initiative of the WPT (1998) is to encourage all stakeholders, particularly local communities, in the conservation and management of wildlife resources, by establishing wildlife management areas as a new category of protected area, where local people have a full mandate of managing and benefiting from conservation efforts. The WPT also emphasised trans-boundary cooperation with neighbouring countries in conserving migratory species and trans-boundary ecosystems. During this study, all critical elephant movement routes along the Songea–Tunduru main road were identified. Through the efforts made by the Selous Conservation Programme, a workshop including all stakeholders was conducted in Ruvuma Region to include the two districts falling within the SNWC. The district commissioners of Songea and Tunduru, and the district game, forestry, bee, fishery, agriculture and livestock officials and the councillors, village chairpersons and other district and village officials from villages in the SNWC attended the workshop. Other delegates came from the United Nations Development Programme (UNDP), its Global Environment Facility (GEF) and the Niassa Game Reserve in

Mozambique. During this meeting it was agreed that areas already identified as important elephant movement routes should be protected and kept free from human development activities (Figure 19). It was further agreed to incorporate this decision in village bylaws. Through this decision, the Litungula elephant route was saved from total obstruction, as encroachment was already severe, and inhabitants of Mwembenyani village shifted voluntarily to the nearby villages of Hulia, Kilimasera, Pachani near Milonde, and Matemanga.

Figure 21: One of the signboards showing where the SNWC (Malimbani Route) Crosses the Songea-Tunduru main road between Mchomoro and Kilimasera in Songea Rural District (Namtumbo). Four such signs have been placed in places identified as important elephant crossing areas along the main road to alert people not to carry out activities that will prevent elephant movements.

This study was part of a wider assessment of the SNWC to provide baseline data for planning and implementing a conservation and development project for the SNWC with the aim to protect and manage the southern part of the corridor through a network of village Wildlife Management Areas. A project by the Wildlife Division of the Ministry of Natural Resources and Tourism, GTZ, the Global Environmental Facility (GEF) and UNDP has been jointly planned. The project has recently been agreed and accepted, and implementation is envisaged to start in May 2004. This study has been instrumental for the preparation of this corridor project. Insofar, the research has been directly useful for the long-term conservation and management of elephants and other wild animals in the SNWC.

The goal of the conservation and development project is to protect the wildlife corridor by having the local communities participate and benefit from sustainable utilization, and to combat trans-boundary elephant poaching. Benefits could include

- A legal supply of game meat obtained through annual hunting quotas for each participating village;
- The empowerment of participating villages to protect themselves and their property against problem and crop-raiding wild animals;
- Generating cash income for community projects from sustainable use of wildlife through photographic or hunting tourism;
- The provision of employment for youths as village game scouts.