2. LITERATURE REVIEW

2.1 Overview of elephant population in the Selous

Tanzania like many other elephant range state experienced a period of severe poaching episode and for many years, the elephant numbers were reported to decline. In 1976, the Selous elephant population was estimated at about 110,000 individuals (Douglas-Hamilton, 1976). Poaching was reported to intensify in the late 1970s that affected much of the country's elephant range (Blanc et al., 2003). By 1986 poaching was estimated to have decreased the Selous elephant population to about 55,000 individuals. By 1989, the Selous population was further down to about 30,000 individuals (TWCM, 1998, Siege, 1999). In recent times, the Selous elephant population has been reported to increase making the SGR the strong hold of elephants in the world (Blanc et al., 2003). The latest recorded increase in the elephant population is being attributed to good management plans instituted by the government and the international community in the early 1990s. The internal management measures included the countrywide elephant conservation programme and "Operation life" which resulted in the arrest of many poachers and confiscation of large numbers of weapons used for poaching (SGRGMP, 1995). The current Tanzanian elephant population estimate is over 92,000 individuals over 60% of these individuals are found in Selous (Blanc et al., 2003).

In many places, the current threat to the survival of elephant is loss of suitable habitats. The increase in human population and expansion of human-related activities has drastically reduced the elephant ranges. Elephants are therefore forced to live in isolated pockets of protected areas. In most cases, these areas are surrounded by densely populated human settlements and contact between people and elephants in these areas are common (Runyoro, 2000, Campbell and Hofer, 1995, SGRGMP, 1995). Because of this association, many forms of human wildlife conflicts are at large.

2.2 Corridor concept and definition

Elephants are extremely versatile in their habitat requirements occupying diverse landscapes from desert to rainfall forest. They occupy home ranges that vary in size depending on the availability of water and food (Douglas-Hamilton, 1971 & 1973, Lindeque and Lindeque, 1991). It is therefore likely that the smaller protected area may not have sufficient resources to support viable elephant populations year round or during periods of scarcity, such as droughts. The small elephant ranges are characterized by having large ratio of perimeter to area, which makes domicile animal more vulnerable to human pressure. For example, during the period of adverse poaching in 1970s and 1980s elephants occupying small reserves had a low probability of survival compared to those in larger ranges (Barnes, 1999). Isolated groups may have trouble maintaining their genetic diversity and likely to experience in breeding depression (Fahig and Merriam, 1994). In breeding in mammals has been found to cause reduction of fecundity and survival, especially for infants. Such situation is likely to happen when there are no corridors of appropriate habitat for the migratory mammalian species to move through (Fiedler and Jain, 1992).

Several other factors can lead to decline in number of individuals even lead to local extinction. Globally, the loss of species has been attributed by changes associated with the process of fragmentation namely the overall loss of habitat, reduction in size of habitat fragments, and increased insularazation of habitats brought about by human development activities (Diamond, 1981, Newmark, 1996, Bennett, 1999, Hanks, 2003). However, it is difficult to directly attribute specie losses to an overall decline in habitat because of other potentially contributing factors such as excessive hunting or poaching as was the case for the major decline in East African elephant population (Siege, 1999, Dublin and Douglas-Hamilton, 1987), excessive retaliations following livestock depredations (Woodroffe et al., 1997) and disease epidemics (Ginsberg and Cole, 1994, Ginsberg et al., 1995, Kamenya, 2000).

In recent times, maintaining connectivity of several habitat patches by corridors is believed to decrease the deleterious consequences of habitat fragmentation (Saunders and Hobbs, 1991). Corridors are essential in the survival of wild animals as they migrate from one ecosystem to another in search of food, water, shelter and space (WPT, 1998). The major challenge to the corridor concept lies on sustaining both increasing wildlife and human population. In Tanzania, wildlife corridors have been vulnerable due to land use changes adjacent to them. The increase of human activities such as settlement and farms in areas previously used by wild animals for migrations has led to more and more traditional migration routes being cut off. Protected areas in Tanzania are therefore in danger of becoming isolated islands (Borner, 1985, Mwalyosi, 1991, Newmark, 1996, Kamenya,2000, Noe, 2003).

Wildlife corridors can broadly be classified in two types, the first type may be called migration corridor and consists of strip of habitat that links two patches or reserves. This type of corridor promotes the movement of animals between reserves and therefore reduces the effects of genetic isolation and allows access to a wider range of resources. The second type may be called conservation corridor and comprises a portion of landscape embracing several different land uses that are managed to achieve specific conservation objectives. When such conservation corridor spans an international boundary, they are called trans frontier conservation area (IUCN, 2003, Hanks, 2003). Corridors that are large enough to allow elephant movement may also benefit other species having smaller home ranges. Examples of trans frontier elephant conservation corridor in Southern Africa include the Okavango/Upper Zambezi, Lubombo conservation and resource area between Mozambique, Swaziland and South Africa (Hanks, 2003, Osborn and Parker, 2003, TFCAs, 2003). Trans frontier elephant conservation corridors in northern Tanzania include; the Serengeti-Masai Mara, Kitendeni elephant corridor and Mkomazi-Tsavo corridor between Tanzania and Kenyan border and in southern part is the Selous-Niassa and Selous-Masasi corridors that link the SGR in Tanzania and NGR in northern Mozambique.

Despite of the fore mentioned benefits, corridors have been associated with some detrimental effects in that, they may transmit contagious diseases, fires and other catastrophes, and they may increase exposure of animals to predator, domestic animals and poachers. Corridors also bear some economical costs. It may be cheaper to manage some species by moving individuals between refuges rather than maintaining corridors (Simberloff and Cox, 1987).

2.3 Corridor identifications and design

Corridors are dynamic and they change with time and seasons. The best method to identify corridors is to carry out long term study on movement patterns of species at local and regional scale, study the ecology and behaviour of domicile species and determine their population dynamics. Such studies are necessary in order to identify and understand the functions of the corridor. However, such studies are costly, labour intensive and time consuming (Saunders and Hobbs, 1991).

The design of a particular corridor will vary depending on the habitat patches it is supposed to connect as well as the primary species it will benefit. The idea is to protect from further fragmentation the existing habitat remnants by corridors of similar habitats that are buffered from intensive human activities. Wildlife corridors function properly if they are wide enough to allow movement of interior species and provide the right type of cover to ensure safe travel for the wildlife that will use them. However, if the corridor is too wide, it may not act as channel but allow the individual to move in an unconstrained manner and end up trapped in the corridor (the sink function). Again, if the corridor is too narrow, interior species that depend on cover during movement may avoid it or may be exposed to increased predation (Saunders and Hobbs, 1991). Corridors that are too long relative to vagility and mortality rate of a given specie may act as sink, draining individuals from the habitat patches, hence doing more harm than good to the source population (Soule and Gilpin, 1991). Regarding corridor shape, two contrasting suggestions has been put forward, Soule and Gilpin (1991) suggested parallel sides to prevent moving individuals from striking bulges which may trap or confuse the animals while Lynch and Saunders (1991) encouraged the bulges especially in long corridors. Bulges may help to provide sufficient habitat to allow successful breeding, which may further act as sub-population. In addition, bulges may provide additional recruitment to the patches linked by the corridor.