SESSION 08

DEMOGRAPHIC DYNAMICS AND ENVIRONMENTAL CHANGE

TITLE: Population Dynamics and Sustainable Conservation of Protected Areas in Tanzania: The Case of Swagaswaga Game Reserve in Kondoa District

ABSTRACT:

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Population Dynamics and Sustainable Conservation of Protected Areas in Tanzania: The Case of Swagaswaga Game Reserve in Kondoa District

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Abstract: This paper discusses the impact of population pressure on the protected areas in Tanzania. Generally, rapid population growth increases pressures on most protected areas. Evidence from the Swagaswaga Game Reserve illustrates serious land use conflicts due to encroachment and establishment of various human activities. Such conflicts justify need for involving the local communities in the management of protected areas. The paper concludes that unless population dynamics and the needs of local communities are considered strict conservation measures may not ensure sustainability. Local communities need to be regarded as partners in the planning, management and sharing of benefits accruing from the respective protected areas. This will ensure responsibility and a sense of ownership among the local communities

Key Words: *Community participation, environment, natural resources, migration, population pressure, wildlife conservation, agricultural expansion, deforestation, and protected areas.*

Introduction

Population growth and the resultant human activities have been viewed as generating pressures to the natural resource base and environments. This statement is demonstrated by, among others, the rapid decline in tropical forests, global warming, pollution, and increased pressure on protected areas (UN, 1993). In most cases, human population is viewed as being intruders to the environment in general and protected areas in particular.

Although this view dominates, different regions and countries have dealt with protected areas in different ways. However, strict protection measures that include stringent legislation and use of armed guards to keep people out are often used to ensure sustainable resource conservation. Tanzania is one of such countries. Evidence gathered elsewhere suggest that natural resource conservation in protected areas can prosper if the conservation measures are supported by the public, the private sector, and a full range of government and non-governmental agencies (McNeely and Ness, 1996; Kauzeni and Madulu, 2000). This argument demonstrates that natural resource conservation requires the co-operation of a wide range of institutions and individuals.

In Tanzania, the Wildlife Conservation Act No. 12 of 1974 lists a number of human activities that are prohibited in any National Park or Game Reserve (Tanzania, 1974). Section Seven of the Act puts it clearly that no person shall enter a game reserve except by and in accordance with a written authority of the Director previously sought and obtained. Other prohibited activities include possession of firearms or bows and arrows, starting of bush fires, tree felling and removal of plants; digging ditches and putting traps capable of killing, capturing or wounding animals; and grazing of livestock (Tanzania, 1974). Generally, the Act is very weak in relation to community involvement in conservation of natural resources available in the various protected areas. However, community involvement in resource management has been emphasised in the National Forest Policy (Tanzania, 1998a), National Wildlife Policy (Tanzania, 1998b) and in the National Environmental Action Plan (Tanzania, 1994).

Through provision of special permits and hunting blocks, the local communities' right to utilise the natural resources has in some areas being undermined. There is enough evidence to

demonstrate misuse of permits offered and in some cases acting in unsustainable manner to destroy the environment and natural resources (Mollel, 2000). Serious conflicts often occur in relation to resource use between permit holders and the local people. The Loliondo case in Tanzania where the government allocated a hunting block in the Loliondo Game Controlled Area to foreign hunting company in 1993 fits very well in this view. Mollel (2000) reports the continued struggles of the Masai communities to regain their ancestral right:

> The residents of Sambu, Oloosoito-Maaloni and Arash villages near Loliondo, are contemplating a number of actions to be taken against both the government and an Arab company in connection with the plunder of the resources. At the centre of the dispute is Ortello Business Company Limited, a game-hunting firm based in the United Arab Emirates. It is being accused of wanton destruction of the environment and wild animals. .... For those communities, the land invaded by the Arab Company and the animals being hunted for commercial interests to serve international markets are their vital means of survival. …. 'We are shocked, but ready to fight for our land because the company's is acting against the law, destroys the environment and our source of water. Haphazard cutting down of vegetation to clear the land for construction purposes has led to the dwindling prides of lions, leopards, cheetahs and swarms of birds in Loliondo" (Mollel, 2000).

Another example is the prevention of local communities from using the reserves' resources following the establishment of the Mkomazi Game Reserve in Tanga Region. In this case, communities were deprived the resources they were traditionally using such as edible and non-edible natural resources (Homewood et al, 1999). Examples cited from Brazil (McNeely and Ness, 1996) and among the Sandawe people in Kondoa District (Madulu, 1999) demonstrate that local people managed to maintain a system of exploitation that ensured a dynamic ecological equilibrium and the continuous availability of essential forest resources. Traditionally, the Sandawe people are hunters and beekeepers, hence, they needed the forests for their own survival. Other groups like the Sukuma of north-west Tanzania have, for many years, used their local management systems (*Ngitiri*) to protected the environment. Here individuals and local communities established their own protected areas that were managed through local rules and regulations (Meertens, *et. al*., 1995).

Supporting the establishment of the Ngorongoro Conservation Area (NCA) in Tanzania, Prince Bernard of the Netherlands wrote a Preface to Fosbrooke's book by stating that:

> Some problems which face conservationists concern the preservation from extinction of a single species. In other cases national parks are established to preserve an assemblage of animals, a famous national feature or beauty spot, or even a specific bird or plant. But at Ngorongoro an attempt is being made to carry matters a stage further, ... whereby the interests of all those with a stake in Ngorongoro should, as far as possible, be reconciled and developed (Fosbrooke, 1972:7).

These examples suggest that a productive partnership between local people and the protected areas is possible. A compromise that ensures direct benefits to all stakeholders including the villagers is proposed in order to alleviate poverty and conflicts between the game reserve management and the local communities. This is true, especially when the value of the local people's knowledge is recognised.

Community Participation and Biodiversity Conservation

Despite the fact that for a long time many local communities contributed to the conservation and protection of biological resources, only recently their importance in natural resource protection and the need for deriving benefits from protected areas has been recognised. This move is necessary if local communities are expected to support conservation efforts (McNeely and Ness, 1996; Tanzania, 1998a).

Many rural communities in Tanzania do regard forests and game reserves as belonging to the government. Analysis of the people's perceptions of the socio-economic pressure on coastal forest resource use and management demonstrate that many people have no direct responsibility for the maintenance of the coastal forests because they don't belong to them and they are denied access to some of their traditional forest utilities. This denial perpetuates negative perceptions that many protected areas are actually a liability rather than an asset.

Although it is generally perceived that local communities destroy the environment, many protected areas are being over-exploited by people from urban areas and even from abroad for commercial purposes (Mollel, 2000, Madulu, 1999). Discussing the importance of the local communities in biodiversity and environmental conservation, McNeely and Ness (1996) argued for the need to respect, preserve, and maintain knowledge, innovations, and practices of indigenous and local communities embodying traditional lifestyles:

In Tanzania, efforts to put this approach into practise are getting momentum although still at a very limited level. The Hifadhi Ardhi Dodoma project (HADO), a land conservation project for Dodoma Region in Central Tanzania, has introduced the concept of partnership management in order to ensure that natural resources are productively utilised and sustainably managed (Nkwilima, 1999). Moreover, the National Forest Policy emphasize that local community and other stakeholder participation in forest and wildlife conservation should be promoted through joint management agreements between all relevant parties (Tanzania, 1998a).

Similarly, the National Wildlife Policy (NWP) has emphasised on the importance of involving local communities surrounding the protected areas in the implementation of laws and regulations of the Wildlife Division (Tanzania, 1998b). This policy has been developed from the realisation of the local community's capacity to conserve and protect their environment and tackle problems of poaching. This approach can flourish if local communities are made protection partners as well as beneficiaries of the revenue accrued from the protected areas (Cruz, 1996; Kauzeni and Madulu, 2000). In a way, this is largely a community-based approach to conservation.

These changes in perception and thinking with regards to local community participation, makes the understanding of the interactions between population dynamics, natural resources and the environment even apparent. Although notable efforts have been made to tackle environmental problems in Tanzania, minimal efforts have been made to identify the implications of demographic factors on the sustainability of conservation activities, especially in protected areas.

Population Expansion and Natural Resource Conservation in Tanzania

Around 10 percent of the total land area of Tanzania is covered by National Parks and Game Reserves (Kurji, 1977; UN., 1993). Over years, new conservation areas have been created, hence, increasing the area demarcated as protected. The expansion of protected areas coupled with expanding population and resource requirements have in a way stimulated much land use conflicts.

To a large extent, human population and its ecological impact is a major subject in wildlife and forest conservation. The underlying assumption here is that increases in human population increases the competition between man and wildlife for the limited resources (Kurji, 1977). Expansions of the ecological threshold of the human population often occur at the expense of the range for the wildlife, hence, decreasing the survival chances of the wildlife. Evidence from

literature demonstrates significant impacts of human expansion into protected areas (Kurji, 1977, 1981, 1985; Meerteens *et al*, 1995).

Rapid population growth around conservation areas of Tanzania has become of great local and national significance due to nation's commitment to promote both conservation and development. Examining the demographic settings around major conservation areas of Tanzania, Kurji (1976) proposed that human settlements should be given priority in any scheme of wildlife ecological study in order to enable the understanding of the dynamics of spatial development of settlements. He argued that:

> The impact of man and his activities upon his own environment and that of other species has emerged as one of the central themes in the quest for East African development. It has translated itself into a new emphasis on planning with ecological integration. The central component of the threat to the continued viability of the ecosystems has been proposed to be the large and rapidly increasing numbers of man; the absence of necessary ecological controls in his activities that are synergetic in their nature. The influence of man on the wildlife populations is through the use of fire; his keeping of livestock; through pollution, poaching and settlement (Kurji, 1976: 1-2).

In the Ngorongoro Conservation Area (NCA), a rapid growth of pastoral population has been documented from 8,500 people in 1966 to over 18,000 in 1978 suggesting a growth rate of 6.5 percent (Kurji, 1981). This rapid population change posed a big challenge of ensuring long-term biodiversity, productivity and stability of the NCA. Human population increases has also been observed in the Maswa Game Reserve from 1.5 million in 1948 to over 3.3 millions people in 1978 (Kurji, 1985). The rapid population growth in this area was mainly influenced by large-scale migrations especially in the 1950s (Meertens *et al*, 1995) and by a high internal population growth momentum due to high fertility (Kurji, 1985). Consequently, there have been settlement expansions into the Maswa Game Reserve.

Recent studies in Tabora Region illustrate that almost all Forest Reserves in the region are encroached (Shishira and Yanda, 1998). The encroachment is in the form of new settlements and clearing of forests for agriculture and livestock grazing. Due to uncontrolled harvesting of fuel wood especially for tobacco curing, deforestation of both the public lands and the Forest Reserves has proceeded at a rapid speed.

The changing population densities and growth rates around the major conservation areas in Tanzania signals the impact of human population and activities on the future conservation of those areas. Trends around the Serengeti-Maswa area demonstrate an increasing potential for conflict between the expanding human population on the one hand, and wildlife population and environmental conservation on the other (Kurji, 1977; Meertens, et al., 1995). Increasing population densities pose a threat to land resources and necessitate an integrated land use management strategy.

The Swagaswaga Game Reserve

The Swagaswaga Game Reserve (SGR) which has an areas of about 871 square kilometres, is located in the south-western parts of Kondoa District, an area that borders Hanang and Singida Districts in Arusha and Singida Regions, respectively (Map 1). It combines the former Songa Forest Reserve (187 square kilometres) and Simbo, Swagaswaga and Handa forests (400 square kilometres) and other forest areas adjacent to these forests.

Map 1: Location of Swagaswaga Game Reserve in Tanzania

The process of gazetting the SGR started as far as 1984 when different stakeholders were consulted through meetings at the district ward and village levels to discuss the issue. Finally, it was officially gazetted in February 1997 through Government Notice No. 72 in accordance to the Wildlife Conservation Act No. 12 of 1974 (Kondoa District Council, 1997; Tanzania, 1974, 1997).

The main objectives of protecting the SGR include reducing and avoiding soil erosion on hill slopes; and protecting pasture and habitat of various wildlife species that are found in the area. Other objectives include protection of salt water spring for future use, conservation of the *Miombo (Brachystegia spciformis) and Migunga (Acacia tortilis)* woodlands for the benefit of the future generations; and preparation of the areas for recreational purposes like hunting, research and training activities photographing, and tourism; and to create a reserve forest that can be a source of fuel wood for Kondoa town (Kondoa District Council, 1984). Moreover, the game reserve will enable regeneration of vegetation cover in depleted areas and protect catchment forests in order to conserve water.

Establishment of the game reserve was also made to tackle the rapid expansion of human activities, especially into the Swagaswaga, Simbo and Handa forests, hence, threatening the flora and fauna specific to that area. This deliberate move was supported by the Kondoa District Commissioner (DC) who announced the conversion of the Swagaswaga forests into a Game Controlled Area in 1986 (Kondoa District Council, 1986a).

Although the problem of population encroachment into the protected areas has been identified in Kondoa District, most reports lack empirical support that indicate the magnitude of the problem and its impacts. That is, the extent of population encroachment into the game reserve and the implications of the various human activities to the ecosystem of the SGR have not been documented. This study aimed at tackling this bottleneck through identification of various human activities, examining their threats, documenting the impacts to the to the SGR ecosystem, and suggesting possible approaches for the sustainability of the reserve.

Discussing the importance of effective protection, Cruz (1996) argued that many of the protected areas are actually paper parks in the sense that although the zoning and enforcement of restrictive rules has been implemented, illegal poaching, hunting, grazing and farming still occur even when areas have been legally demarcated. These features are very relevant to the current situation in the SGR, where rapid expansion of settlements and agricultural activities into the game reserve is observed. Though the SGR area was pronounced protected since 1996, many people still live and work inside the game reserve. Official communications between the District Natural Resources Officer (DNRO) and the District Commissioner raised this issue of human invasion into the protected forests (Kondoa District Council, 1986a). Despite repeated threats of evicting people living within the SGR area since 1987 (Kondoa District Council, 1987b), no serious action has been taken towards that direction probably due to lack of resources in terms of personnel, finance and transport. Such weaknesses need to be given priority by the SGR management in future.

Research Methods and Materials

A number of methodologies were employed to identify the linkages between population dynamics and environmental conservation in the SGR. Special attention was directed to sub-villages that are located within the game reserve and the ones that are adjacent to reserve. Sampling of households for interviews was done by using a list of all heads of households in each sample sub-village. All households located inside the game reserve were interviewed and about 40 percent of the households in the peripheral sub-villages were randomly selected for the

interviews. This purposeful selection of villages was adopted to allow comparison of observations on the basis of location and intensity of human activities within the game reserve. Six villages that are adjacent to the game reserve were selected for the study. These include Mongoloma, Chololo, Ndoroboni, Poro-Banguma, Lahoda, and Handa. The population size of these villages ranged between 836 in Handa and 5359 people in Mongoloma. The population growth rates also varried from under one percent in Lahoda to about 12 percent in Ndoroboni.

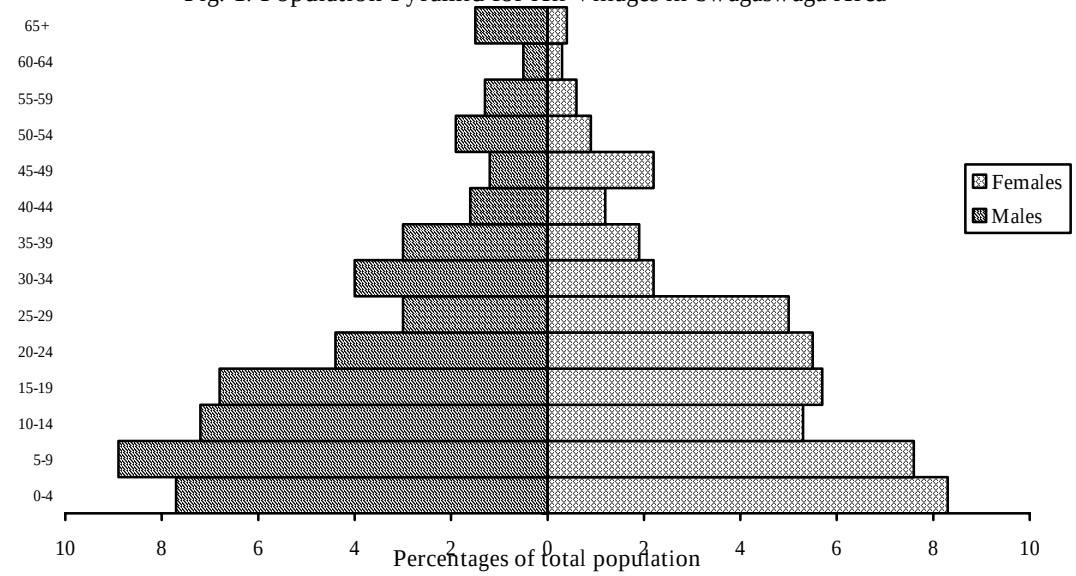
Quantitative data were collected through structured questionnaires that were administered to heads of households. This tool gathered economic, demographic information and the people's perceptions and implications of human activities on the game reserve's ecosystem. In total 183 households were interviewed. Secondary data were gathered through documentary reviews, direct observations, and focus group interviews. A checklist was prepared and used to guide informal discussions with village leaders and other key informants.

Data Presentation and Analysis

Household Size and Population Structures

The mean household size in the study area is 5 persons. This average is obtained from the 183 households interviewed that had a total number of 940 persons. However, Chololo village recorded an average size of 6 persons and Poro-Banguma village had 4 persons.
About 45 percent of the population is under 15 years. This high concentration of population in age group 0-14 is common to all villages ranging between 36 percent in Ndoroboni and 53 percent in Handa. One possible explanation for this feature is the presence of high fertility in the population as observed in other parts of Kondoa District (Madulu, 1996). The proportions of old people (65 years and above) are insignificantly low in all villages. Figure 1 shows the age structure of the population in the villages adjacent to the SGR.

Fig. 1: Population Pyramid for All Villages in Swagaswaga Area



The population dependence ratios were below 100 in Mongoloma, Ndoroboni, Lahoda and Poro-Banguma and higher than 100 in Chololo and Handa. The low dependence ratios in most villages may be explained by the fact that most of the settlers in the surveyed areas have actually two or more homes, one in the new settlements near the game reserve, and another one outside. Some household members including children are left behind in the later homestead or places of origin. Another explanation is that most smaller households are new and hence are have fewer children and less established. The high dependence ratio in Chololo and Handa villages may be explained by past and current fertility and migration trends in those villages.

Migration Patterns

Table 1 shows the distribution of respondents by places by birth. It is observed that most of the village residents are born outside the places they are currently residing.

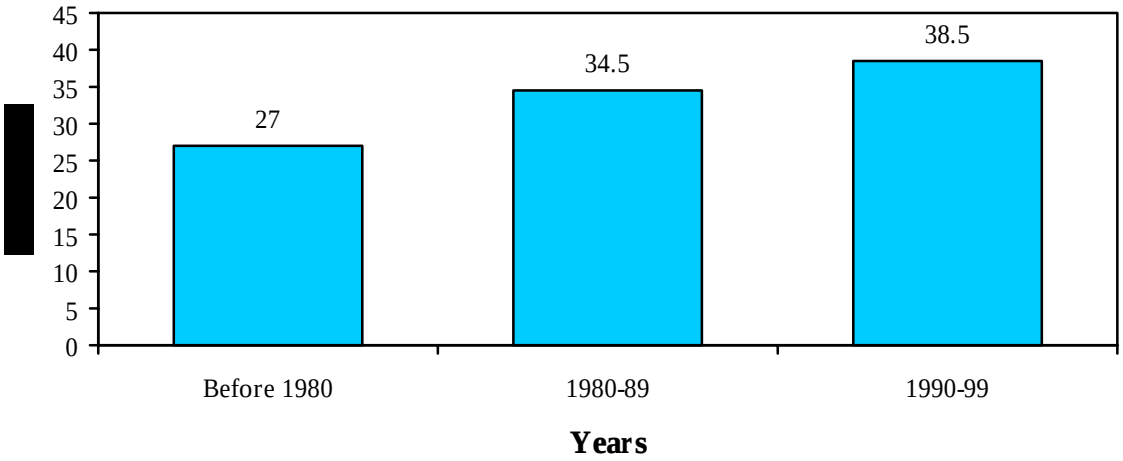
Table 1: Distribution of Respondents by Place of Birth and Village

Age Groups	Percent of Respondents by Villages						Total	
	Chololo	Mongoloma	Ndoroboni	Lahoda	Handa	P/Banguma	Percent	Number
Same Village	4.3	-	-	-	-	-	1.1	2
Same Ward	15.2	-	-	-	57.1	5.0	10.9	20
Same District	69.6	88.2	93.9	83.3	38.1	85.0	78.1	143
Same Region	-	-	-	8.3	-	-	0.5	1
Other Regions	10.9	11.8	6.1	8.3	4.8	10.0	9.3	17
Total (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-
Total No.	46	51	33	12	21	20	-	183

Source: Survey data (1999).

In almost all villages the largest proportion of the population were born in other areas within the same district. Handa village is an exceptional because it shows a migration pattern that is largely dominated by movements from within the ward. These observations suggest a dominance of intra-district population movements. However, the dominance of people born within Kondoa District may conceal some essential features that were not mentioned. For example, one needs to take into consideration the fact that some residents may hesitate to mention the actual place of birth due to fear of being repatriated. This might be the case for villages like Chololo and Handa where migrants from Hanang and Singida Districts have settled. Nevertheless, this situation poses a challenge to the district authorities to institute mechanisms and strategies to minimise the impact of intra-district migrations on the game reserve. Another important feature of migrant in the study area is that most of the migration streams are recent. Almost two-fifth of the migrants actually moved to present residence between 1990 and 1999. Figure 2 shows the proportion distribution of the migrants by year of migrating.

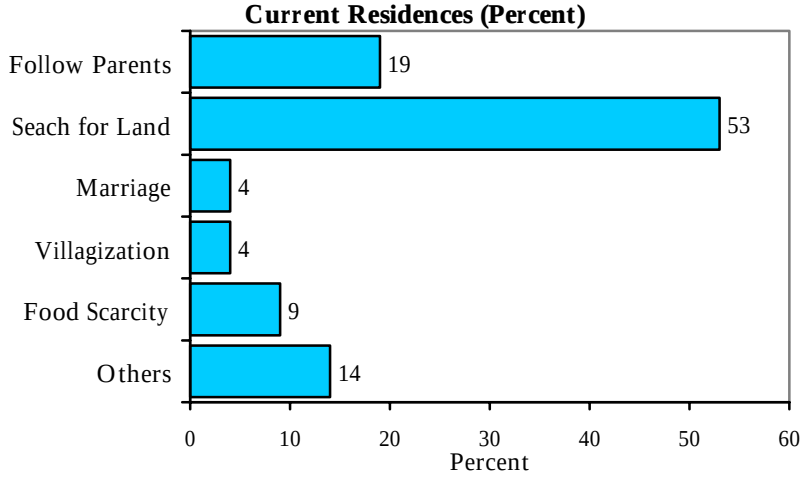
Distribution of Migrant Population by Year of Migrating



However, this situation cannot be generalised because there are variations between villages. Movements into villages like Ndoroboni and Handa on the one hand, occurred before 1980. From the village history it is observed that the Ndoroboni area was cleared around 1976 to minimise tsetse flies. Thus, settlement in this area started around those years. Similarly, Handa village was established in 1971. These observations justify the presence of old migrants in those villages. On the other hand, most of the migrations into Lahoda, Mongoloma and Poro-Banguma villages occurred in 1980-85 and 1985-89 periods, respectively. In Lahoda village, the initial clearing of forests to establish new farms and settlements in the Kiramboo area started in 1984. In Mongoloma village, the Mantembo sub-village was established around 1987 when the Barbaig people were voluntarily repatriated from the Simbo area which is located within the SGR (Kondoa District Council, 1987a). In Poro-Banguma, residents of Thawekwa and Qayaase sub-villages were evicted from these areas during the villagization exercise of 1974. However, they started to return especially after the relaxation of the villagization regulations during the late 1980s. The proportion that migrated during the 1990-99 period in Poro-Banguma was 48 percent. The most recent migrations are those found in Chololo village where almost three quarters of the respondents (74 percent) migrated during the 1990-99 period. As observed earlier, most migrants are from within Kondoa District and are basically moving from one village or ward to another in search for arable land.

There are many reasons that influence the decision to migrate and also to the selection of the place of destination. In the study area, the main reason for encroaching into the SGR is the search for new farmland especially for finger millet cultivation. Other reasons include charcoal making, lumbering and beekeeping. Figure 3 summarises these reasons as reported by the migrants themselves.

Fig. 3: Summary of Reasons for Migrating into Current Residences (Percent)



Generally, many migrants moved into current residences due to search for land. A significant proportion of respondents (19 percent) moved to follow their parents. Even for this group, it might also be true that the parents moved in search for land. Table 2 shows the village variations in terms of the reasons of moving to current residence.

At the village level, over 50 percent of the migrants in Chololo, Lahoda, Ndoroboni and Poro-Banguma villages moved due to search for new farmlands. These observations can lead us to a generalisation that agricultural reasons are the major causes of migration and encroachment into the SGR. In almost all villages, agricultural reasons dominated among the pull factor for encroachment into the SGR. Even the other reasons that cause population movements like following parents, food shortages, and better settlements may be associated with agriculture in one way or another.

Table 2: Distribution of Migrants by Reasons for Migrating (Percent)

Reasons for Migration	Village						Total	
	Chololo	Mongoloma	Ndoroboni	Lahoda	Handa	P/Banguma	Percent	No.
Follow parents	6.1	23.6	17.4	16.7	25.0	28.5	18.5	34
Marriage	3.4	-	4.3	-	16.7	-	3.8	7
Villagization	3.4	5.5	4.3	-	-	9.5	4.3	8
Food shortage	9.4	12.8	-	-	16.7	4.8	9.3	17
Search for land	70.8	38.1	60.9	83.3	25.0	52.4	53.0	97
Others	5.2	20.0	13.1		16.6	4.8	13.7	25
Total (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
Total (No.)	46	51	33	12	21	20		183

Source: Survey data (1999).

Other pull factors considered to influence migration into the SGR include, hunting, beekeeping, charcoal making and lumbering. All these factors act to influence the decision to move and start various human activities within and around the SGR, hence, encroachment. Linking the various reasons for migrating to year of migration one observes that search for land and agricultural reasons are recent factors in Chololo village, hence, search for land is associated with recent

migrations that occurred during the 1990s. In Mongoloma village, search for land started even before 1980. This factor is in supported by the presence of many migrants (24 percent) who moved to follow their parents or relatives on later dates.

Strategies for Accessing Land:

Different strategies are used to access land in villages adjacent to the SGR, especially among the migrant population. Unlike in many other areas where land is mostly inherited (Madulu, 1999), the most common strategy for accessing land in the villages surrounding the SGR is through forest clearing. Almost two-thirds of the households in the study area acquired land through forest clearing, and most likely the forest clearing is done in the SGR and its peripheries. Other strategies include inheritance and hiring or purchase. Table 3 summarizes the different strategies used for accessing land in various villages.

Table 3: Percent Distribution of population by Various Means of Accessing Land

Strategies for Accessing Land	Percent Distribution by Village						Total	
	Chololo	Mongoloma	Ndoroboni	Lahoda	Handa	P/Banguma	Percent	No.
Clear forest	50.0	72.5	78.8	75.0	38.1	90.0	66.1	121
Buying/ hiring	23.9	13.7		25.0			11.5	21
Inheritance	13.0	7.8	15.2		57.1	5.0	15.3	28
Others	13.0	5.9	6.1		4.8	5.0	7.1	13
Total (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-
Total (No.)	46	51	33	12	21	20		183

Source: Survey data (1999).

The dominance of forest clearing as a strategy for accessing land can be explained by the fact that interviews were done in sub-villages that are located either completely inside or are on the peripheries of the SGR. In these areas, the more land is cleared for agricultural purposes, the higher the pressure on the SGR ecosystem. Hiring or purchase of land is experienced in villages where the frontiers of the game reserve have been pushed far to the extent that it becomes convenient for villagers to hire or purchase farms nearby. This is also an indication of increased population pressure in terms of family and village size. The increase of population in this case necessitates high demand for land, hence, increases in its market value.

These observations suggest that availability of forests nearby is a good pull factor for migrants from different parts of the district. The presence of recent migrants in the peripheral village suggests that migration is still going on, hence, forest clearing will continue if no intervention measures are put in place to reverse the situation. Thus, the pressures on the SGR can be expected to increase as more migrants come. Many villagers do believe that there are still large areas of forests for agricultural expansion. This response was given by over a quarter of the respondents in all villages. In fact, the areas that are referred to be available are those located within the SGR. If these perceptions are allowed to continue, the speed of encroachment into the game reserve will be accelerated significantly.

Concerning the land situation in the villages, the majority of the respondents (more than half) were of the view that land has increased. While one third of the respondents reported no change in the amount of land available to them, one-tenth confirmed a decrease in land availability. The

thinking that land is increasing is particularly dominant in villages that are adjacent to the SGR or have sub-villages located inside the game reserve. Most of these villages have already been served with eviction orders. In Lahoda village, for example, the land increase was reported from Kiramboo settlement that is located completely inside the game reserve some 18 kilometers from the main village. In Poro-Banguma, land increase was reported in the Qayasee sub-village which is located about eighteen kilometres from the main village along the game reserve boundary. In Handa village, Mnang'ana sub-village borders the game reserve and expansion of farms into the SGR is obvious. In Mongoloma village, Serya sub-village border the game reserve and Mantembo sub-village has already been disbanded because it is considered to be inside the game reserve. The explanations given for the case of Mantembo is that villagers were reallocated by the district authorities without knowledge of the actual boundaries of the game reserve.

Economic Activities

Crop Cultivation

The main economic activity conducted in villages adjacent to the SGR is subsistence crop cultivation. This activity is done through slash and burn methods. Shifting cultivation is widely practice whereby new farms are cleared, burnt and planted with crops for two or three years. The farms are then abandoned as their soil fertility decline and new farms are cleared. The main crops grown are maize, finger millet, sorghum, and cassava. Other crops include sunflower, green peas, millet, and beans.

Finger millet is the main cash crop grown which is sold within and outside the district. Finger millet is used for local beer brewing purposes. Finger millet cultivation is usually preceded by tree felling and burning before seeds are broadcasted in the remaining ashes. Thus, the absence of forests for clearing and burning facilitates abandonment of the crop in some areas that are far from forests. Although bulrush millet and sorghum used to be the main staple food crops in the past, these crops have largely been abandoned and replaced by maize due to various reasons. The main reason for the abandonment of millet is the presence of large herds of *Quelea quelea* birds, which are very destructive to the crop.

There is also a belief among the local communities that there is no land deterioration in terms of soil fertility loss. Local people believe that the land will continue to have the same fertility over time. Almost two-thirds of the respondents indicated that soil fertility in their farms has not changed. This view is probably instigated by the fact that most of the farms are new, and some peasants do practice shifting cultivation and bush fallowing to restore soil fertility. Even with this mentality, various strategies are used to regenerate soil fertility in the farms. The most common strategies include the use of animal manure, composite manure, fallowing, and ridge cultivation. Fallowing is widely practised in Chololo and Handa villages, and ridge cultivation was reported in Chololo and Mongoloma. Use of animal manure is common in almost all villages, but use of composite manure is limited to Mongoloma and Chololo villages with some insignificant proportions in other villages. The limited use of these strategies might be a reflection of poor education and lack of know-how among the local communities. Similarly, low use rate might be caused by the practice of shifting cultivation especially in areas where finger millet cultivation is dominant. These observations call for expanded awareness creation efforts to educate the local communities on the necessity of replenishing soil fertility in their farms in order to minimise land degradation.

Forest Products

The local communities in village adjacent to the SGR are aware of various forest products that are obtained from the game reserve. These products include fuel wood, charcoal, building poles, honey, timber, medicinal plants, thatches and fruits. Generally, honey is most famous forest product in most villages probably because it is a source of income and food. Being located near Kondoa town, Mongoloma village has become a major source of charcoal, fuel wood and timber to the Kondoa urban market. These forest products are harvested from the SGR and sold in town. Due to depletion of the most favoured tree species for timber like *mninga (Pterocarpus angolensis),* people have turned to the less favoured species like the *miombo (Brachystegia spciformis)* for the timber business. The *miombo* are the only large trees left in big numbers in the forest. The observed change in preference threatens the survival of the *miombo* in the near future.

People's Perceptions of the Swagaswaga Game Reserve

Although the SGR have been officially gazetted, there is need to examine the people's perception and knowledge of the game reserve. Such perceptions may have influence on the people's actions and behaviour in relation to natural resource exploitation and environmental conservation within and around the game reserve. This can also influence the community's adherence to existing laws and regulations guiding the operations and management of the game reserve.

It is surprising to note that more than half of the people are aware that protected areas in the Swagaswaga area have existed for quite a long time. More than half of the local people the history of the SGR which started long time ago. Although the SGR was officially declared a game reserve in 1997 (Kondoa District Council, 1997), its history goes back to the creation of the Songa Forest Reserve during the colonial times. Since 1984 the process of converting these areas into a game reserve was going on through consultations and involvement of various stakeholders.

The high awareness on the start of the SGR is particularly noticed in Poro-Banguma (80 percent) and Ndoroboni (70 percent) villages, which borders the former Songa Forest Reserve. While such high awareness is prevailing in some villages, there are significant proportions of the population, especially in Chololo (44 percent), Handa (43 percent) and Lahoda (42 percent) who believe that the SGR is a new entity that started during the 1990s. This feature is an indication of lack of awareness and poor community involvement in the management of the SGR. It also suggests that although the majority of the people have lived in these areas for quite a long time, there were limited enforcement of rules and regulations that guide the exploitation and use of natural resources, especially in protected areas. The abrupt change from laizes-faire to strict enforcement of regulations may influence perception changes making the area a new entity that is interfering with people's way of life they are used to. The lack of awareness is further demonstrated by the fact that about four-fifth of the respondents were not aware of the official boundaries of the SGR. This observation is even worse in villages that border the former Simbo, Swagaswaga and Handa forests that were annexed to the Songa Forest Reserve to form the SGR. Though a map and an explanatory letter of the boundaries were provided to most Ward and Village Executive Officers (Kondoa District Council, 1986b; 1987c), no official follow up has been made to demarcate the physical boundaries and put permanent signs to ensure that the local communities see the reserve boundaries.

Another aspect that reflects the local community's perceptions is related to the size of the game reserve. Responses on this issue can be divided into four categories. The first category consists of villagers who consider the SGR to be too big, hence, there is need to reduce it by allocating farms to the villagers (19 percent). The second category considers the size of the SGR to be

adequate and should be maintained (16 percent). This group insist that clear boundaries should be put in place and people living inside the game reserve should be evicted immediately. The third category views the SGR as too small and should be expanded (14 percent). The fourth group consisted of respondents who had no opinion, they just don't know (70 percent). This is the largest category especially in Handa, Poro-Banguma, Lahoda and Ndoroboni villages where more than half of the respondents fall in this category. These perception variations reflect different responses as demonstrated by the rate of encroachment into the game reserve from different angles of the game reserve. Different perceptions among the local communities necessitate the use of different approaches and support the call for community participation in the management of the SGR.

Advantages and Disadvantages of the SGR

From the local communities' point of view, there are many benefits that are perceived from the SGR. These include availability of various forest products like honey, beeswax, timber, building poles, fruits, vegetables, charcoal, firewood, and building materials. Some of these forest products can be a source of income to the local communities if they can be obtained for sale. Other benefits include availability of rainfall and conservation of wildlife and protection of indigenous tree species for future use. The SGR is also viewed as a potential area for tourism and agricultural activities. However, most peripheral villages see no immediate benefits that have accrued from the game reserve at the time being. Villagers predict significant benefit in future, especially if tourism activities are expanded to boost the villager's economy.

Residents of Ndoroboni village, for example, are aware of the benefits with regards to beekeeping and lumbering, which are their traditional income generating activities. Using the example of India, McNeely and Ness (1996) argues that local communities can be allowed to utilise the resources in the protected areas to graze, farm and collect forest products. Such an approach can be used to increase the rights and access of the local communities to the natural resources and benefit from the protected areas. This approach will help to develop a sense of ownership and responsibility.

With regards to the disadvantages, the main issue raised by the local communities in peripheral villages is loss of land. There is a deep-rooted fear that people will be evicted from their farms that are located in or near the game reserve. This fear has left many villagers with an uncertain future given the fact that until now the boundaries of the game reserve are not clearly defined and marked on the ground. The fear for eviction is even strengthened by the fate of residents of Mantembo sub-village in Mongoloma village who already have been evicted. This experience can be repeated elsewhere if there is no clear demarcation of the game reserve boundaries.

There is a general feeling among the local communities that no human activities are permitted in any game reserve. However, the Wildlife Act allows for some human activities such as hunting for the purpose of providing meat to the local communities, beekeeping, and fishing to take place provided that a special permits is sought and obtained (Tanzania, 1974). In recent years, the district authorities encouraged local communities to form beekeeping associations or groups that could be registered and given permits to conduct their activities within the game reserve. This step is a positive beginning towards involving the local communities in both the protection and sharing of benefits from the game reserve.

With regards to restricted activities, there is no doubt that all the local communities are aware that tree felling, setting of fire, illegal hunting, illegal logging, and beekeeping are strictly restricted. Although cultivation is one of the most destructive human activities in the game

reserve, it is rarely regarded as a restricted activity. The reason behind this neglect is the fact that cultivation is the main pull factor that has instigated encroachment into the game reserve. In most cases, cultivation inside the game reserve is viewed as a survival strategy, especially during drought years. This situation is narrated by one of the residents of Kiramboo settlement in Lahoda village

> Look here my brother! Do you expect us to leave all these foodstuff (while showing his cassava farm and a pile of harvested finger millet) and go to live in Lahoda. If they want to kill us (the government officials) let them come. After all we have been feeding Lahoda village throughout last year when they had severe drought. Many villagers were coming here to buy cassava from us. I would be pleased to invite the District Commissioner to come and visit us here. I think he will praise us for implementing the district ruling that people should invest much in drought resistant crops like cassava, millet and finger millet. If the district authorities visit us regularly, they will finally understand us and probably give us advise on the most appropriate agricultural practices that can be used here to ensure environmental sustainability (Translated from direct conversation with a villager in Kiramboo, July, 1999).

However, there is a big contrast between what the villagers say and what they actually practice. While tree felling has been highly ranked as the most restricted activity, villagers practice slash and burn farming and shifting cultivation practices that necessitate tree felling. Such practices are largely environmentally unfriendly.

Discussion of Observations

One of the biggest environmental impacts of population pressure on the protected areas is deforestation. Clearing of forests is to a larger extent, instigated by agricultural expansion, brick burning, lumbering, and charcoal making activities. Other main environmental problems include bush fires and pouching. The consequences of deforestation in many villages are reflected by accelerating soil erosion processes, especially along the hill slopes like the Swagaswaga and Bolisa Hills. Due to poor management and lack of control, encroachment into the game reserve has continued randomly. Selective cutting of the most preferred tree species like the *Mninga (Pterocarpus angolensis)* is observed almost everywhere in the game reserve. This tree species has almost been exhausted leading to a change into the less preferred species like the *Miombo (Brachystegia spciformis)*. In order to curb this situation there is need for close collaboration between the SGR management, the
District Councils and the local communities adjacent to the game reserve.

Similarly, poaching is severe especially in areas where there are permanent water sources for the wildlife. Bush fires are common almost everywhere. Generally, the status of the game reserve has continuously been degraded because many people are left to act without strict checks and control. The ongoing resettlement process through encroachment is accompanied by expansion of human activities such as agriculture, charcoal burning, brick making and lumbering which are increasing threats to the survival of wildlife. These experiences have a negative impact on some animal and tree species that are specific to the SGR. This situation calls for deliberate measures to intervene the processes of degradation.

To demonstrate the increasing pressure of population on the SGR, evidence is drawn from Chololo village which was started in 1976. Chololo demonstrates the speed and extent of the deforestation process. According to the local informants, the village was started on a densely forested area covered with flourishing *miombo* trees**.** Slowly the forests disappeared as the slash and burn agriculture took its course. Just within a period of about twenty-five years, the forests are no more and the frontiers of the remaining forests have been pushed by more than ten kilometres. Today we just hear stories of herds of elephants, giraffes, buffaloes and zebras etc.

that were plenty in this area just two decades ago. Yet, more migrants are still entering the area to assist in pushing further the frontiers of the forests, hence, the game reserve. Similar observations were made in Walanga, Gisambarang and Diroda villages bordering the SGR but located in Hanang District, Arusha Region. It is generally believed that there is less weeding work in new farms that are established after clearing and burning trees and grasses. Most of the new farms are located within the protected areas and are used to cultivate finger millet and maize. Large areas of forests are being cleared every year in the process of establishing new farms whereby a virgin land is cleared, burnt and cultivated for two or three years and then left to fallow or regenerate.

Several directives from the District Natural Resources Officer (DNRO) have been given to evict people from the protected areas. However, there are no signs at the moment that people are moving out of those areas like Kiramboo, Bolisa, Mtiryangwi, and Kolimba in Lahoda, Mongoloma, Chololo and Gisambalang villages, respectively. There are allegations that some government officials own farms and conduct illegal lumbering and hunting activities in the area. These allegations need to be followed up in order to establish their validity. If true, these are the same staff who are supposed to educate villagers on the government directives and policies, and supervise the eviction of people from the protected areas. Experiences noted around the SGR are not unique, they are also found in many other protected areas in Tanzania (Kurji, 1976, 1977, 1981, 1985; Homewood *et.al.*, 1995).

Population increase in the villages adjacent to the SGR is mainly due to migration and high fertility. People from different parts of Kondoa and Hanang Districts have migrated into the villages leading into large-scale deforestation. Most of the migrants have moved in to search for new farms. There are neither village regulations nor procedures at the moment that guide acquisition of land or tracking and monitoring activities of new migrants in the villages. Individuals are left to identify unoccupied areas or parts of the forest where they can start clearing and establishing settlements and new farms. This evidence is clear in Chololo village. There are settlements like Kiramboo that are located right at the heart of the game reserve. Similar settlements have been reported in Tabora (Shishira and Yanda, 1998) and in the Pugu and Kazimzumbwi Forest Reserves (Shishira, *et.al.*, 1998) whereby the inner parts of the reserves have been cleared, cultivated and settled. Settlements like these will continue to emerge in other protected areas if there are no measures to reverse the trend.

To ensure that the environment is adequately protected, the local communities have devised various strategies. Many villages have enacted village by-laws that are specifically geared towards tackling incidences of bush fire. However, there are no similar by-laws to limit people from practising rampant tree felling. This issue is largely left to individuals. Concerning pouching, several incidences have been reported though not regularly. However the rate of poaching has declined significantly probably in accordance with the declines in the wildlife population.

Community Involvement in the Management of the SGR

There are several reports that various meetings were conducted in the villages to educate communities on the boundaries and the importance of the SGR. Evidence of such communication from the DNRO's office was available in some villages (copy of the SGR boundary map and explanation letter). To improve people's participation in the management of the SGR, there is need for expansion and enhancement of public education services on the advantages of the SGR to all adjacent villages. Moreover, the boundaries of the game reserve need to be clearly demarcated and permanent signs installed around the game reserve. Similarly, all people living inside the game reserve should be evicted immediately and the security

responsibility of the game reserve should be shared between the game reserve management and the adjacent communities. This arrangement can be implemented through special agreements in which local communities can be entrusted with the responsibility of looking after certain areas of the game reserve with regards to bush fire, illegal tree felling, poaching and expansion of agricultural activities.

From the villagers' point of view, community involvement into the management of the game reserve can be effected through people's direct involvement in the clearing and marking of the permanent boundaries and fire breaks, putting off bush fires, and netting of poachers and other trace passers. Community participation can also be in the form of involvement in afforestation programs, provision of environmental education, and through sharing the benefits of the game reserve by financing some of the social service programs like education, health, water and transport in the adjacent villages. Such arrangements have proved positive in Serengeti District where the Serengeti Region Conservation Project (SRCP) is in operation (Kauzeni and Madulu, 2000). For these arrangements to take place, there is need for harmonisation of the relationships between the local communities and the management of the game reserve. This can be implemented by initiating dialogue and joint assignments that can ensure full participation of the local communities through a partnership approach.

Contradicting Decisions

Although it is right to evict people who are living or operating within the game reserve, the issue becomes complicated and confusing when contradicting decisions are made by the entrusted authorities. One example of such contradictions is the removal of the Barbaig community from Simbo to Mantembo in 1987. The decision to repatriate the Barbaig people was reached through an agreement between district officials and the community (Kondoa District Council, 1987b). Although the Barbaig were settled in the Mantembo, this area is now declared to be inside the game reserve. This decision is contrary to the earlier decision to move the Barbaig from Simbo to a location outside the SGR. Recent reports from Mongoloma village indicate that the Mantembo sub-village has been disbanded all together and the residents have been ordered to move out immediately! The question here is whether these people have been given an alternative place to go. This situation has occurred just over 10 years after the voluntary repatriation in 1987. Such contradicting decisions deny the local communities the opportunity to develop and plan their future. They also stimulate resistance among the local communities to co-operate with the game reserve management especially when there is unexpected events like bush fire or pouching.

Similar contradicting decisions have been reported in other villages like Ndoroboni where villagers were given hope of doing beekeeping activities in a sustainable manner through formation of beekeeping groups. However, the situation turned to be frustrating when the villagers were denied identification cards to enable them inspect their beehives regularly and freely. Contradicting decisions have also been observed in relation to the district environmental conservation by-laws (Kondoa District Council, 1990) whereby new decisions in relation to livestock keeping were made contrary to the existing environmental conservation by-laws (Mbegu, 1996). Similarly, various actions are been taken to allow forest harvesting for timber and logging without following the laid down procedures and regulations.

It is on the basis of these uncertain decisions that local communities have found loopholes for encroachment into the game reserve. Such decisions discourage local people's morale for taking an active role in the protection and management of the game reserve. The challenge to the

district administration is to ensure good governance so that good and timely decisions are made basing on the existing laws, regulations and procedures.

Conclusion

This paper has examined the relationships between population pressure and environmental conservation in and around protected areas in Tanzania. It also examined the factors that influence encroachment into protected areas with specific reference to the Swagaswaga Game Reserve. Moreover, the consequences of population pressure on the ecosystems and environments of the protected areas have been documented. The paper has also exposed the changing nature of migration and settlements patterns within and around the protected areas and documented the environmental implications of these behaviours. These observations provide lessons for future conservation strategies, especially in most of the protected areas of Tanzania. A study of this nature is significant in the sense that the findings can be useful in the implementation of a Partnership Approach in natural resource management. This approach allows the local communities to participate in the planning and implementation of conservation activities that can be extended to cover the wildlife sector.

The observed linkages between population and the environment illustrate the importance of addressing the population factor and human settlement within and around protected areas. This can be accomplished through incorporation of some demographic considerations into the management and land use plans of the protected areas. It is important to emphasise here that the future growth of the human populations in and around protected areas in Tanzania is of considerable importance in defining management policies and strategies for the conservation of the protected areas. In many cases, changes in population size significantly affects the structure of settlement and land use patterns in adjacent villages.

A review of the various human activities in the villages adjacent to the SGR indicates that the major activities that are linked to population expansion include tree felling for agricultural expansion, livestock keeping, lumbering, bee-keeping, charcoal making, and fuelwood gathering. Although poaching didn't feature prominently, it is an activity that needs to be examined. One of the main factors that influence people's encroachment in the protected areas is land scarcity. There is a strong association between land scarcity in the villages adjacent to protected areas and the rate of encroachment.

In order to harmonise population pressure with natural resource management in the protected areas, this paper advocates for a strong community involvement in the management of the protected areas. To facilitate full community participation, it is proposed that provision of environmental management education to the villagers should be mandatory. This will assist in increasing awareness and a sense of responsibility among the local communities. Local communities should be considered as partners in both the planning and management, and in sharing the benefits accruing from the protected areas. Such actions can be a good starting point for the harmonisation process between the local communities and the management of the protected areas. The target here should be the positive involvement of the local communities through instituting a partnership that will ensure sustainability and benefit to all stakeholders.

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