

## Desertification in Botswana

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### ABSTRACT

In terms of desertification, Botswana is one of the most seriously affected countries in the Kalahari Region of Southern Africa. Problems include overstocking, large-scale vegetation depletion and changes, especially around water points, and accelerated soil erosion by wind, sheetwash and gully-ing. Part of the desertification problem is natural in such a semi-arid and drought-prone environment. But the greater part is due to pressure of commercial exploitation of a fragile ecosystem. Owing to the increasing pressure of the already crowded communal grazing areas of the east, owners of large herds have, in the last three decades, been moving westwards, establishing permanent cattle posts in the Kalahari sandveld and spreading conditions of overstocking and degradation of vegetation on a large scale. The move into the Kalahari sandveld has been facilitated by the Tribal Grazing Lands Policy (TGLP), introduced in 1975, which encouraged owners of large herds to move them out of the crowded settlement areas, to the sandveld where they would be given exclusive rights to land to establish fenced commercial ranches. Impetus was also provided by the impact of modern science and technology that provided veterinary care and new sources of water by means of deep drilling boreholes. Recent satellite imagery reveals that there has been considerable uncontrolled development of cattle posts in areas set aside for wildlife management, resulting in the emergence of land use conflicts and extensive degradation of the tree savannas.

**Key words:** Botswana, desertification, Kalahari ecosystem, rangeland degradation.

### GENERAL FEATURES

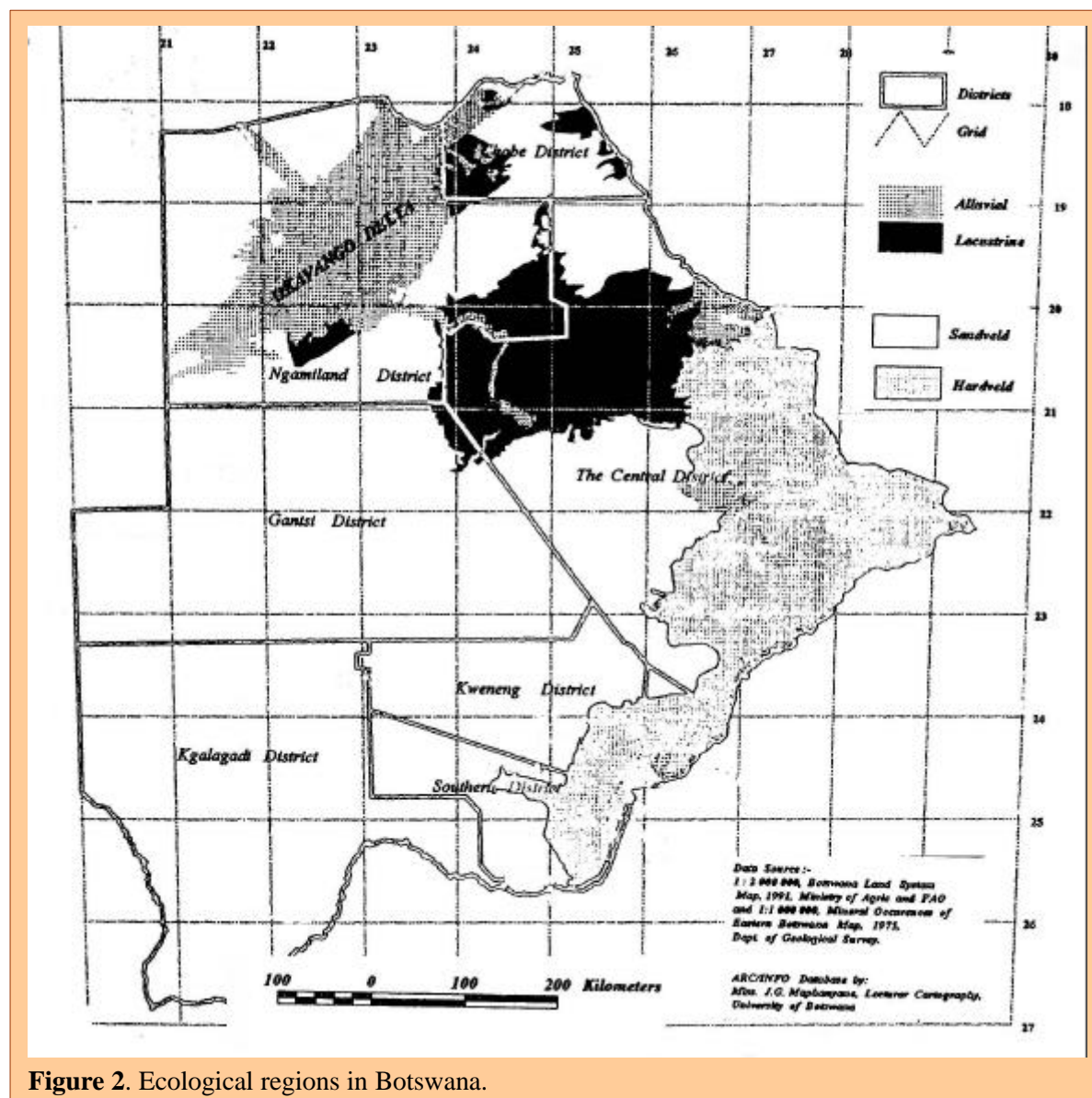
Botswana straddles the Tropic of Capricorn (Figure 1). It is a land-locked country with an area of 582,000 km<sup>2</sup>, 80% of which is covered by the Kalahari Desert. The dominance of the latter gives a misleading impression of Botswana as a country covered by an unproductive and expansive desert. The Kalahari, however, is not a true desert. It is in fact covered by a vegetation mantle that ranges from woodland and close-tree savannah in the north, to low tree and shrub savannah in the south and west. Four main ecological regions are recognized in the country: the hardveld occupying most of the eastern part of the country, the sandveld covering most of the Kalahari desert, the alluvial plains of the Okavango-Chobe system; and the lacustrine plains of the Makgadikgadi Pans (Figure 2 and Table 1). There is no true desert in Botswana, but areas covered with sand dunes do occur, especially in the west and south-



Figure 1. Republic of Botswana.

**Table 1.** Ecological regions. (Source: Ringrose 1996).

Ecological region/subregion	Elevation (m above sea level)	Rainfall (mm)	Average temperature (°C)
Hardveld	850–1489	400–500	20.6 (Gaborone)
Sandveld	800–1200	250–690	22.4 (Maun)
Okavango Delta	990–1030	400–500	22.0 (Shakawe)

**Figure 2.** Ecological regions in Botswana.

west. However, except for the Okavango-Chobe area in the north, the country suffers from a general absence or paucity of surface water.

Rainfall varies from an average maximum of over 650 mm in the northeast to an average minimum of about 250 mm in the south-west (Figure 3). It varies considerably from year to year and it is extremely unpredictable over space and time. Much of it falls in scattered showers. Because of the prevailing high daytime temperatures,

evaporation is generally high. Daily rates of open-water evaporation may reach 7.5 mm. Drought is endemic and tends to occur with a quasi 10–12 year periodicity.

In view of the frequency of drought and the paucity of surface water in the country, groundwater assumes a special importance. About 75% of the country's human and animal population are dependent on it (Cooke 1983). It is estimated that groundwater has an extractable volume of 100,000 million cubic metres with only 1% rechargeable by rainfall (Khupe 1994). Access to groundwater has been made

possible by modern technology of water prospecting and deep borehole drilling. Thus, it is only recently with its availability in the country that groundwater has assumed major significance as a key resource. It has made possible, as we shall later observe, a significant shift in the direction of grazing pressure.

Another effect of the endemic drought and surface water scarcity is the limited potential of the greater part of the territory for settled agriculture. In fact, less than five per cent of the country is suitable for rain-fed agriculture. Farming activities entail mixed cultivation in addition to cattle and smallstock grazing which extends from the outskirts of towns and villages (Ringrose et al. 1997). In the remaining 95% of the country, livestock raising is the main economic activity. Most of the land (71%) is under communal or tribal grazing tenure, 23% is Stateland, while a small proportion (6%) is freehold lease for large-scale commercial ranching. Over 50% of all households in Botswana own cattle, which is presently the largest single source of rural income. However, this percentage is slowly declining (Arntzen et al. 1994, 1996).

In the rangelands which cover 95% of the country, a number of land use categories can be identified. These include village-based communal grazing and borehole-based cattleposts which are owned by individuals or syndicates. In both cases, livestock graze freely in the available range and often return to the kraal for watering at night. The third category is freehold government leased ranches which are fenced and under individual management. The country's rangelands also include extensive areas of National Parks and Game Reserves (18% of the surface area of Botswana) which are coming under increasing pressure because of conflicting land uses.

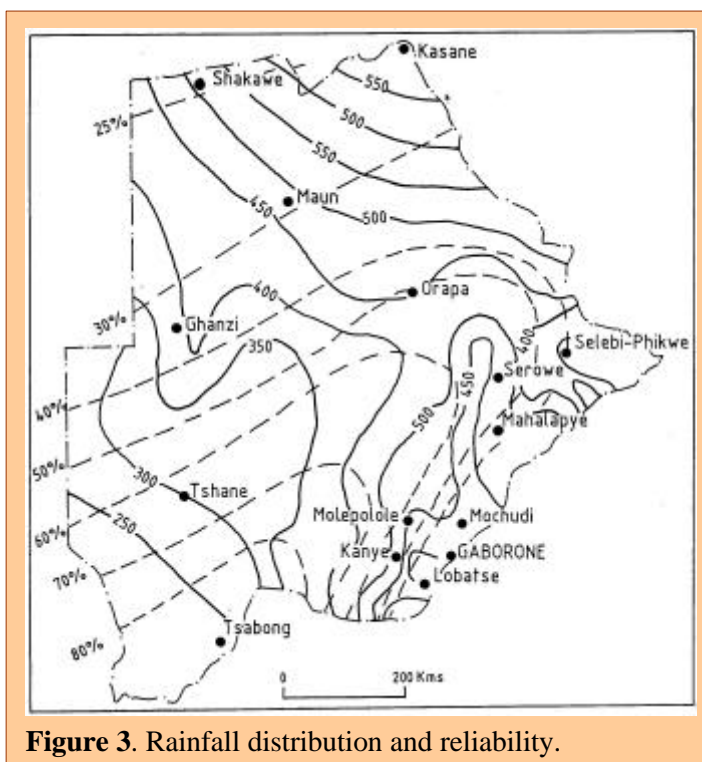
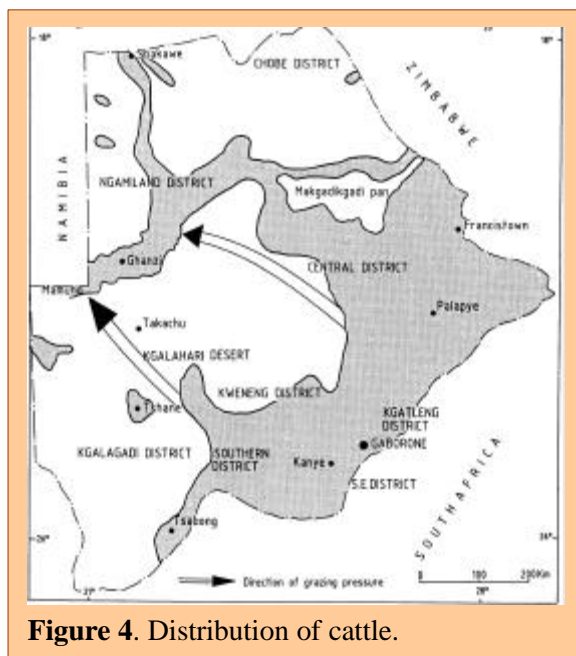


Figure 3. Rainfall distribution and reliability.

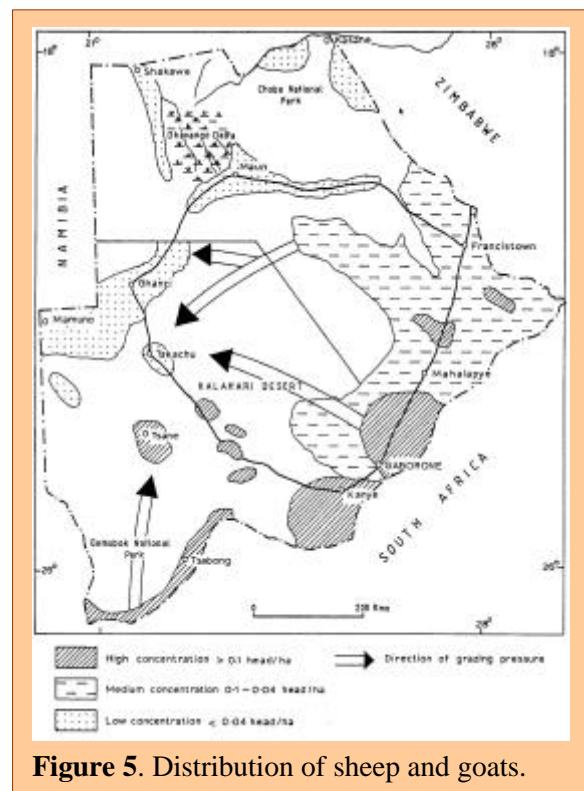
### DIMENSIONS OF THE DESERTIFICATION PROBLEM

In addition to the ever present threat posed by a marginal and drought-prone environment, the current ecological problems in Botswana can be explained by certain fundamental socio-economic changes which have occurred in recent years in man's relationship to the land. This is especially with regard to the keeping of livestock and the utilization of grazing resources. These changes are associated with three major developments (Cooke 1983):

- An alarming increase in human and livestock population.
- The development of a market-oriented economy which has given cattle a high monetary value.
- Water prospecting and borehole drilling (Perkins 1991) which have enabled livestock raising to push further west to utilise the Kalahari sandveld grazing resource (Figures 4 and 5).



**Figure 4.** Distribution of cattle.



**Figure 5.** Distribution of sheep and goats.

Though cattle numbers vary significantly depending on the incidence of drought, good rain and disease, Botswana has generally experienced an accelerated livestock population growth especially during the past three decades. In 1966, the total livestock population (cattle, sheep and goats) was 1.7 million. By 1981, this had grown to over 4.5 million, an increase of 265%. During the same period, the cattle population alone increased from 1.2 million to 3.5 million, an increase of 292%. In 1991, the latest year on which there are reliable estimates, the total livestock population was 5.5 million with cattle alone being 2.8 million.

The human population has also grown at an accelerated rate, from 574,000 in 1971 to 936,000 in 1981, an increase of 63% in the 10-year period. The population in 1995 was 1.5 million, an increase of about 300% since 1971. The average density, however,

is low, 2.2 p/km<sup>2</sup>, with district densities ranging from 0.5 in the west to 66 p/km<sup>2</sup> in the east.

The greater part of the human and livestock population is traditionally concentrated in the eastern part of the country. The Kalahari sandveld has, until recently, remained largely unoccupied (except for straggling communities of hunter-gatherers such as the San and the BaKgalagadi) because of the absence of easily accessible, permanent water. The region was historically used by Tswana herdsmen for seasonal and temporary grazing, while its large wild animal herds provided game for hunting and supported a valuable trade in skins, ivory, furs, feathers and trophies. These hunting and grazing activities were controlled by the Tswana chiefs and their local overseers (*badisa*).

This situation changed radically with the introduction of colonial rule and imposition of a cash economy, and especially with the establishment of world beef export markets since the 1960s. Until that time, the beef industry was confined to the regional market outlets of the mining complexes of the Witwatersrand and Central African Copperbelt from which it faced frequent exclusion as these areas tended to utilize their domestic cattle whenever possible (Perkins 1991).

The development of overseas beef export markets, especially after independence in 1966, has given cattle a high market value which has increased ever since. Aggressive efforts by the Botswana Meat Commission (BMC), an export, slaughter and marketing parastatal, to maximise supplier price and bolster overseas exports of beef, have paid off. They have yielded generous European Union (EU) concessions which have raised the price of Botswana beef up to 32% above world market price (Arntzen 1990). According to Morrison (1986) as cited by Perkins (1991), the aggressive marketing stance taken by the BMC led to a 90% subsidy levied on beef exports by the European Union (then the EEC) and increasingly privileged access to their markets since 1972. Further assistance also came from the World Bank and various European donors. Because of these favourable developments, there has been a remarkable surge throughout Botswana to exploit this high-income grazing industry.

Some recent studies (e.g. Silitshena et al. 1997) have linked the rapid increase in cattle numbers to the EU beef subsidy or the so-called Beef Protocol. This subsidy has given herdowners, both small and large, the opportunity to make more money and the government to gain the needed foreign exchange from the sale of beef for export (see Opschoor 1985, Darkoh 1989). Owing to the increasing pressure of the already crowded communal grazing areas of the east, large herd owners have in the last three decades been moving westwards, establishing permanent cattle posts in the Kalahari sandveld and spreading conditions of overstocking and degradation of vegetation on a large scale in this rangeland of low potential. The move into the Kalahari sandveld has been facilitated not only by the lucrative EU subsidy, but also by the good rainfall years of the 1970s and by the Tribal Grazing Lands Policy (TGLP), introduced in 1975. This policy encouraged larger cattle owners to move their herds out of overcrowded communal areas, and into area where they would be given exclusive rights to land allowed to establish fenced commercial ranches. Additional impetus was provided by the impact of modern science and technology that provided veterinary care and new sources of water by means of deep drilling boreholes. As a result of the movement, livestock numbers and the area accessible to grazing allegedly increased

by about two and a half times between 1965 and 1976 (Perkins 1991). Recent satellite imagery reveals considerable uncontrolled expansion of cattleposts into areas set aside for wildlife management, resulting in the emergence of land use conflicts and extensive degradation of the tree savannas. Examples of land use conflicts are (Arntzen et al. 1996):

- Conflicts between cattle and wildlife: competition for land, water and grass, predation, disease risks.
- Conflicts between cultivation and cattle/wildlife: crop damage, experienced by up to 80% of the cultivators.
- Conflicts between cattle/wildlife and gathering of veld products, such as mokola palm in the north; however, most changes in gathering opportunities are undocumented.

Conflicts tend to increase during droughts when the ecosystem is under stress, when resources are more limited and people traditionally move in search of “reserve” resources. Desertification in Botswana generally takes a variety of regressive forms including (Cooke 1983, Darkoh 1989):

- The deterioration of land or reduction in grass cover and herbaceous biomass radially outward from watering points caused by excessive grazing, concentrated trampling by cattle, and uncontrolled veld fires.
- Large-scale vegetation changes resulting in some species becoming rare, and other, usually useless or inedible species, invading the area.
- Loss of topsoil by wind and by sheet and gully erosion.

These conditions are particularly common in areas under communal land tenure and land-use systems and can be seen all over eastern Botswana. One example of this progressive land degradation can be seen in the Kgatleng district in the south-east, where, between 1960 and 1981, grass basal cover has dropped from 6–15% to 0–2% (Van Vegten 1981).

In the communal areas, the main vegetation changes consequent upon heavy (or excessive) grazing are bush-encroachment and changes in the species composition of grasses mainly from perennial to annual species (Ringrose et al. 1996). A further problem lies in the increase of bare soil areas which are increasingly subject to wind or water erosion or alternatively may lose viability through compaction (Ringrose and Matheson 1987a,b). Rangeland degradation is widely blamed upon the ‘tragedy of the commons’ (Hardin 1986), an open access problem held to be the result of the grazing of individually-owned livestock on communally-held rangelands (Abel 1992). Under this regimen, individuals are said to maximise benefits by putting extra animals on the rangeland while relegating the costs in reduced grazing and range degradation to the whole community. There is often reluctance to reduce numbers, even in times of drought (Stanford 1983, Abel and Blaikie 1989). This is partly due to the fact that traditional herd management is prestige-oriented (animals being considered as a stock of wealth, bringing with it social standing in society). However, many farmers aiming at increasing their herd size, are opportunistic about grazing on either communal pasture or on their own farms for economic reasons other than prestige (Rampha 1996). Ranch owners find it convenient to let their cattle graze in the communal area, taking them back into the ranches once grazing conditions become degraded in the commons

(Republic of Botswana 1996). The lack of alternative investment opportunities may also have led many people to invest in cattle and other livestock and hence the continued increase in stock levels.

Rangeland degradation or desertification is regarded as the reduction in land productivity as a result of overstocking and overgrazing or as a result of veldproduct gathering for commercial use (Ministry of Agriculture 1995). Degradation is exacerbated by the effects of drought and climate change (Warren and Agnew 1988).

Whilst there is general agreement on these impacts, rangeland degradation in arid and semi-arid lands in general has become a contentious issue in recent literature (see for example, Perkins 1991, White 1992, Dahlberg 1994, Dalal-Clayton 1997), with protracted disputes among 'experts' over the resilience of rangelands and their ability to recover from perturbations (Westoby et al. 1989, Mace 1991). In Botswana, for example, where the perturbations include the extreme seasonal and cyclic variations in rainfall and also fire and herbivory effects, it has been argued that the territory's ecosystems (especially those of the Kalahari) have evolved within such a framework; suggesting that their component plant and animal species, are variously adapted to persist, that is, remain within the systems, despite the fact that their respective population sizes may fluctuate dramatically over-time or show little constancy (Perkins 1991).

The inference, therefore, is that these arid and semi-arid ecosystems in Botswana (and in particular, the Kalahari ecosystem), by being characterized by recurrent perturbations such as droughts, are extremely resilient, and because of this, there is no desertification or dryland degradation in Botswana. The truth of the matter is that the arid and semi-arid ecosystems in Botswana are both rainfall – and man – driven. Through the combined effects of increasing pressure from conflicting land uses (including intensive grazing, wood harvesting, veldproducts gathering and crop production), urbanization and the expansion of human settlements and recurrent or cyclical disturbances such as droughts, dryland degradation is occurring in the rangelands throughout Botswana. As a result of rapid increases in population and accelerated demand for natural resources, the country's water, vegetation and possibly soil resources in the limited areas of arable lands (where mouldboard ploughs are in extensive use) are being exploited at unsustainable levels. Reduced productivity of natural resources as a result of overuse or misuse constitutes resource degradation and damages production systems. Growing human influences and current institutional arrangements restrict the effectiveness of traditional adaptive and coping mechanisms. It would seem that because of the rapidity of socio-economic changes occurring in the country and the eroded traditional and imposed centralized resource management systems, it has become increasingly difficult for disempowered local communities to adapt or respond effectively to change in land use dynamics to ensure environmental sustainability. The situation has been aggravated by the commodity-biased and growth-focused policies of the past, and to some extent the present, which are governed more by the imperatives of production and consumption than by the principle of environmental sustainability. Herein are some of the root causes of the protracted land degradation problem in Botswana and other arid and semi-arid countries in Africa.

Desertification or dryland degradation is a function of any factor or combination of factors which damage the land, water and vegetation resource base and thereby restrict or inhibit their use or productive capacity (United Nations 1994). In other words, it is a manifestation of natural resource decline and management failure (Darkoh 1998) which is causing unemployment and poverty especially in the rural areas of Botswana (Ringrose et al. 1997). As the case study of the Mid-Boteti area described in the next section will illustrate, significant features of desertification or dryland degradation are evident in the Kalahari sandveld region. Also, any traveller through Botswana would observe that the hardveld landscape has been turned into a mosaic of fields and abandoned fields interspersed by grazed bush and occasional water sources (Ringrose et al. 1997). Rocky uplands (plateaus and pediments) are being increasingly used for livestock/smallstock grazing as forage on adjacent plains becomes depleted (Ringrose and Matheson 1995). Soil erosion problems are becoming increasingly significant in the hardveld especially adjacent to ephemeral streams and downslope from adjacent plateau/pediment. Land degradation around villages has intensified as a result of large scale bush clearing aimed at stimulating crop production in both hardveld and sandveld areas. Near larger settlements, an incipient problem is the slow diminution of fuelwood resources (Republic of Botswana 1996). Bare soil areas are conspicuous around boreholes and water points in the eastern hardveld as well as in the Kalahari sandveld as a result of heavy grazing. Areas in the vicinity of National Parks and Game Reserves from which migrating herbivores are trapped behind fences also show signs of heavy grazing and vegetation depletion. And, as we have noted, rangeland resources are becoming scarce and conflicts are increasing. However, whether the degradation noticeable in Botswana today is temporary or pointing towards more severe (that is, permanent or irreversible) forms is another matter calling for further research. However, there is evidence in at least one case (the mid-Boteti area) of problematic ecosystem recovery (Sefe et al. 1996). Livestock raising on a large scale and clearing of large expanses of land for crop production have been introduced into the Kalahari over a period too short (since the 1960s) and under generally good rainfall conditions for any definitive conclusions to be reached about the 'resilience' of the Kalahari ecosystem. In fact, while at this stage we must admit that the total picture is not clear, there is no basis to contend that dryland degradation does not occur or is not an important issue in Botswana today. As Ringrose (1996) has put it, dryland degradation is taking place irrespective of the stability/resilience of the Botswana ecosystems. Corollaries of the degradation process in Botswana include the decline in wildlife population; reduction in groundwater; loss of biodiversity; all of which are symptomatic of environmental decline.

The extent of desertification or dryland degradation in Botswana is not known. Work on this is presently on-going (e.g. Ringrose et al. 1997). Preliminary results from Ringrose et al. (1997) using GIS/Remote sensing estimates that in the 1994 post-drought transitional period, the area classified as degraded was about 38,000 km<sup>2</sup> or 6% of the surface area of Botswana (Figure 6). In the drought period (1984) about 147,000 km<sup>2</sup> or 25% of Botswana was classified as degraded.

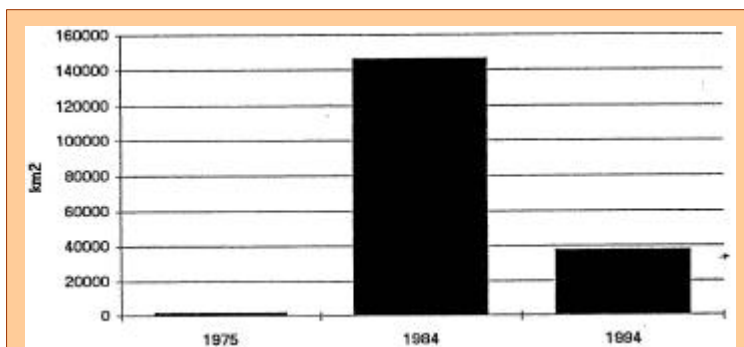


### THE MID-BOTETI AREA – A CASE STUDY

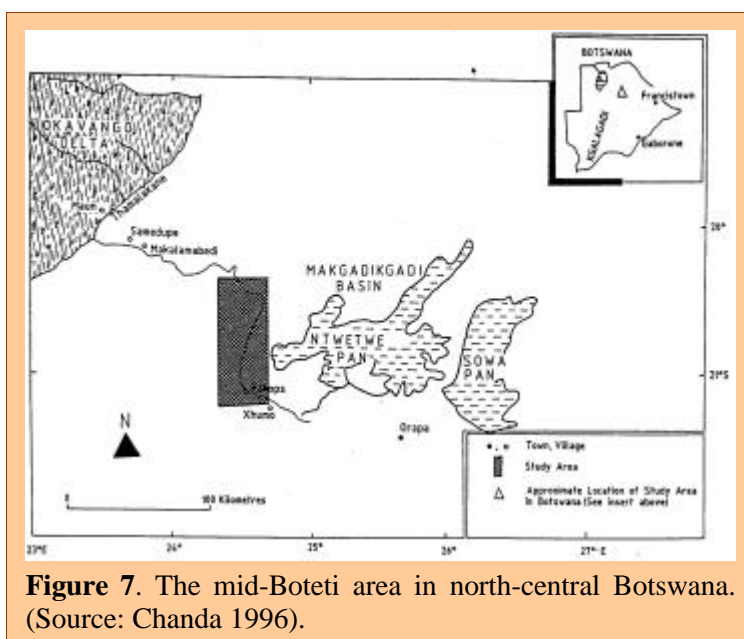
An area where desertification has been intensively studied in recent years is Mid-Boteti (Figure 7), one of the most remote parts of the country (Arntzen et al. 1994, Chanda 1996, Ringrose et al. 1996, Rampha 1996, Sefe et al. 1996). The area is located in the Kalahari sandveld region which has a low natural productivity due to low rainfall and poor sandy soils. It is drained by the Boteti, an ephemeral river which at times flows during the dry season, fed by water originating from Angola (via the Okavango). The area is inhabited mostly by poor pastoralists. Because of the nutrient deficient sandy soils and persistent seasonal and cyclical drought, only a marginal agricultural activity can be sustained. Despite this, land use pressure is relatively high, as people have been attracted to the area since historical

times, because of the availability of surface water and the absence of the tse-tse fly. In recent decades, human pressure has rapidly increased to cause increasing resource management problems, particularly during drought and in years when the river does not flow (as has been the case in most of the last decade). The area has come to be regarded in recent years as one of the most degraded areas in Botswana (Ringrose and Matheson 1978, Ringrose et al. 1996).

Desertification was found to occur at a significant rate in the Mid-Boteti area (Arntzen et al. 1994, Ringrose et al. 1996). Symptoms which occurred or increased since the 1970's include: large areas of bare soils, recently formed sand dunes, the removal of up to 2–3 cm of the topsoil through wind erosion, changes in the composition of vegetation, a high proportion of dead trees, a declining ground water table, increasing salinity of wells, and a substantial reduction in wildlife numbers. Particularly affected areas include the zone along the river, areas around villages and around boreholes, where pressure tends to be relatively high. Since the area has suffered no decline in average rainfall during the past decades, resource depletion has been attrib-



**Figure 6.** Change in extent of area classified as 'degraded' through non-drought period (1975), mostly drought (1984) and the post drought recovery period (1994). (Source: Ringrose et al. 1997).



**Figure 7.** The mid-Boteti area in north-central Botswana. (Source: Chanda 1996).

uted to intense resource use particularly during early drought years (Sefe et al. 1996). Evidence from satellite imagery shows that since the mid-1980s much of the area has suffered in terms of decreased vegetation cover with increased areas of exposed soil (Ringrose et al. 1996). The local people have degraded their environment through intensive grazing by livestock and intensive use of the natural vegetation cover for fuelwood and other veld products. A survey undertaken by Chanda (1996) reveals the existence of a crisis in the traditional economy of the area and that the local population seems to be keenly aware and have a good sense of its temporal and spatial dimension. Human activities, rather than climatic factors, are seen to be at the core of the desertification process. Some significant features of desertification in the Mid-Boteti area include (Arntzen et al. 1994, Chanda 1996, Sefe et al. 1996):

- The frequent flood failures of the Boteti river, which seriously affect flood recession cultivation as well as watering of livestock and wildlife.
- Decreasing availability of fresh water.
- Vegetation changes on rangelands, affecting the regrowth potential of trees and veld-products (including veld-foods).
- Species decline with changes to unpalatable cover.
- Increasing scarcity of fuelwood and browse resources.
- The reported crop damage by livestock and wildlife, indicative of land use conflicts.
- A decrease in the ground water table, mostly affecting livestock and trees.
- Veld supply problems in areas close to settlements, suggesting depletion in accessible zones over the years.
- Wind-erosion, which blows away the top soil, exposing the underlying calcrete layer, and reducing the soil fertility.

In order to survive in the harsh environment with recurrent droughts, the local people have traditionally developed several adaptations such as (Arntzen et al. 1994):

- The practice of flood recession (or 'molapo') cultivation, which makes use of the seasonal river flow in an otherwise semi-arid environment.
- Combining molapo and dry-land cultivation to reduce the risk of the outright crop failure; with the same objective, farmers practice mixed cropping techniques.
- Mobile livestock management strategies, largely determined by available water resources.
- Replacement of cattle by goats during droughts.
- Engagement in a combination of agricultural and non-agricultural activities to reduce vulnerability to the large agricultural risks.

In recent decades, however, many of these adaptations have become less feasible due to population increase and changing conditions. Extra molapo land is no longer available, while livestock mobility has been reduced by the demarcation of wildlife reserves (Arntzen et al. 1994). According to Chanda (1996), a passive and fatalistic attitude prevails among the local population over environmental degradation because of their over-dependence on external solutions. Chanda (*ibid*) advocates measures to

be taken to break the dependency syndrome to ensure the right attitude and environmental sustainability.

### COMBATING DESERTIFICATION IN BOTSWANA

Botswana has shown a clear appreciation of the problems of drought and desertification and is making tremendous efforts to combat them. Research and open discussions have been encouraged. The government has evolved and adopted new land use and land tenure policies. There are large scale and long-term action programmes such as the Second Livestock Development Programme, the Tribal Grazing Lands Policy (TGLP), the Arable Lands Development Programme (ALDEP), and the Remote Area Resettlement Scheme. These projects, many of which are on-going, are described in this author's compendium on *Combating Desertification in the Southern African Region* (Darkoh 1989, see also Kwerepe 1995, 1996). They are sectoral in nature and deal with issues such as soil conservation, livestock production, rangelands and wildlife management, water and land management. Their basic aim is to introduce ecologically sound and cost-effective land management practices which are socially acceptable. In addition to large scale projects, numerous small scale action projects have been initiated which address, among other things, irrigation and water resources development, energy needs, drought relief and institutional capacity building. To date, government policies, programmes and institutional structures aimed at desertification control focus on the growing pressure on water resources, rangeland degradation, depletion of wood resources, over exploitation of veld products and pollution in rural areas (Republic of Botswana 1992, Sefe and Acquah 1995).

In a major attempt to address environmental problems comprehensively, the government introduced the National Conservation Strategy (NCS) in 1990. Under this initiative, it is hoped to elicit local community participation in containing desertification and other environmental problems through encouragement of economic diversification, incentives and disincentives, enforcing legislation, introducing new legislation where appropriate, improving the planning and administrative procedures, expanding facilities directed at improving environmental education, training and research activities, and developing integrated multisectoral conservation projects. (Republic of Botswana 1990a,b). An NCS Coordinating Agency now coordinates environmental matters in Botswana. It collaborates with the line ministries on environmental issues. It is at present involved in the preparation of an NCS Action Plan based on the measures outlined above.

Despite government enthusiasm and substantial investments in anti-desertification programmes, the progress in combating desertification has not been spectacular. Constraints against combating desertification include climate, government policy on economic growth, rapid population growth, poverty and lack of highly trained personnel. However, given the strength of the economy, the political will, the democratic governance, and the environmental consciousness prevailing in the country at present, there are good prospects for containing desertification in Botswana.

### CONCLUSION

The arid and semi-arid lands of Botswana have undergone marked socio-economic and environmental change. This paper has pointed out that as a result of the develop-

ment of the livestock sector and the utilization of the country's grazing resources, a complex relationship between people and environment has developed, giving rise to dryland degradation or desertification. While considerable progress has been made in combating desertification, the results of most anti-desertification efforts have not yet achieved the expected results. The constraints against combating desertification include climate, government policy and population growth. But, perhaps, the greatest constraint is the void and confusion created by the breakdown of traditional structures and the lack of adequate institutional capacity and mechanisms for implementing community based natural resource projects (Pilane 1997). Also, there are influential sceptics who currently believe that the nature and extent of desertification in the country have been exaggerated, a factor that could influence the pace of development, especially, of government's action in fully implementing appropriate policies such as those outlined in the country's blueprint, the National Conservation Strategy (NCS). However, given the strength of the economy, the political will, the democratic governance and the environmental consciousness prevailing among the political leadership and educated elite at present, there appears to be good prospects for sustained effort and possible success in containing the desertification problem in the country in the near future.

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