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**LIVESTOCK DEVELOPMENT AND NATURAL RESOURCES USE:
A CASE STUDY OF BOTSWANA**

by

Leslie Carole O'Connor

MICHIGAN STATE UNIVERSITY
AGRICULTURAL DEPARTMENT
RECEIVED

FEB 14 1991

REFERENCE ROOM

A Plan B Paper

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF SCIENCE

Department of Agricultural Economics

1991

To my parents,
Robert G. O'Connor and Lois T. O'Connor

ACKNOWLEDGMENTS

I would like to thank my committee, Dr. Carl E. Liedholm, Dr. Richard H. Bernsten, and Dr. Carl K. Eicher for their time and assistance during my time in the Agricultural Economics Department. In particular, I would like to thank my major professor, Carl K. Eicher, for his encouragement and his willingness to do more than just assist with the academic side of graduate school. Thanks and appreciation must also go to all the people at River Terrace Church who made East Lansing home for me during my time here. Finally, I thank God for His leading and presence; may I use what I have learned here "to act justly and to love mercy and to walk humbly with my God" (Micah 6:8).

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CHAPTER 1

I. INTRODUCTION

A. Background

Pastoralism and communal livestock production are important economic activities in Sub-Saharan Africa. According to FAO production figures the number of cattle in two countries, Botswana and Namibia, outnumber the human population (FAO, 1989).¹

In Southern Africa, Botswana's agricultural sector is largely dependent on livestock, because most of the country lacks adequate rainfall for arable agriculture. A complicating factor is the unreliability of the rainfall and the potential for recurrent drought. Indeed, drought is considered a normal occurrence and farmers experience crop failure three or four years in every decade. Tyson, points out that the oscillations observed in past rainfall will likely continue into the future and that the rainfall averages would be expected to decline until 1982 or 1983 followed by a dry period lasting until about 1992 (Tyson, 1979, p.51). This proved to be true as the 1982 drought began and it remains to be seen if the rainfall will increase in the next few years.

While diamonds and minerals have superseded beef as the largest export, livestock remains the dominant factor in the agricultural sector and a large portion of the population rely on income from livestock to survive. For these reasons, livestock will

¹Based on FAO Production Yearbook figures for 1989, the ratio of cattle:human for Botswana was 1:9 and the ratio for Namibia was 1:13.

most likely remain an important part of Botswana's economy and culture.

Since independence in 1960, livestock projects have been implemented in almost every country in Sub-Saharan Africa. Unfortunately, few of the projects have been successful and donors are understandably reluctant to continue financing such projects. Because about 80% of the people in Botswana live in rural areas², it is unlikely that national development can be successful, unless there is a growing agricultural sector which generates jobs and employment and an efficient livestock sub-sector. Careful thought needs to be given to the reasons why donor-financed livestock projects have failed in Africa and to the donor experience in Botswana.

An equally important issue that relates closely to the problems of communal livestock is the use and preservation of the natural resources and the environment. It is apparent that future development projects must consider the long term effects of these projects on the sustainability of economic systems such as agriculture. The challenge is to develop productive and environmentally sustainable cropping and livestock systems. The Botswana government recognized this need in the National Development Plan for 1976-1981: "The greatest challenge facing the livestock industry is to develop a system of land use and land tenure

²In the 1981 census 82.3% of the population lived in the rural areas (774,759 of 941,027 total). The projected rural population in 1991 is 74.7% (1,006,419 of 1,347,568. The population figures are de facto population (persons resident in country, including foreign people and excluding citizens outside the country. An area is considered urban if the population is greater than 5000 and less than 25% of the work force is engaged in agricultural activities.

that can achieve sustained long term production from Botswana's range land" (Ministry of Finance and Development Planning, 1977, p.148).

B. An Overview of the Economy

1. Biophysical

Botswana is located in Southern Africa and is bounded by South Africa to the south, Zimbabwe to the east, Namibia to the west, and the Caprivi Strip (part of Namibia) to the North. The country is land locked and includes the Kalahari Desert in the south-west. Botswana occupies 582,000 sq km (224,711 sq miles, 58,173,000 ha). It has a continental and arid to semi-arid climate with highly variable rainfall averaging 450mm (18 in.). Average annual rainfall in the Kalahari Desert is approximately 130mm (5.2 in.) with a gradual increase in rainfall toward the north (635mm, 25.4 in.) and the east 38-500mm, 15.2-20 in.). The vegetation varies similarly with sparse thornveld in the south-west to dry woodland savannah in the north and east. The rainfall pattern in Botswana is one of wet season and long dry season. Ninety percent of the rains come in the summer months from November through April. In addition to the low rainfall there is limited surface water as well. There are few large rivers except for the Limpopo and Chobe Rivers which form a portion of the southern and northern borders respectively. The main interior water is in the Okavango River in the north which drains into Botswana and forms the Okavango swamps and the seasonal Lake Ngami. From there, the water drains into the Makarakari salt pan via the Botletle River. Most of

the water in this system is lost through evaporation and transpiration in the swamps.

2. Demographic

The population of Botswana at the last census in 1981 was 941,027; the population estimate for 1989 was 1,347,568 (Botswana Central Statistics Office, 1989). The annual growth rate of the population in 1987 was estimated at 3.4% (World Bank, 1989). Approximately 80% of the population live in the eastern strip which is the most developed and the most favorable land area. The rest of the country is largely uninhabited. Botswana has a rapid rate of population growth and a young population. Over 50% of the population is under 15 years of age. A substantial number of Botswana (estimates of at least 50,000) work in South Africa. Their absence eases pressures on resources in Botswana and contributes to the national economy through remittances. But these remittances are offset by several countervailing factors such as fragmented family life and the lack of access to productive resources.

3. Political

Botswana's political history is unique in Sub-Saharan Africa. Until 1988 it was the only country that has maintained the constitution under which power was transferred from a colonial government (Gifford and Louis, 1988).³

³A great deal has been written about Botswana's path to independence and the reasons why the country has not followed the more typical slide into totalitarian dictatorship which is so common in Africa. See Gifford and

Botswana, which was known as Bechuanaland until independence, was declared a British protectorate at the request of the local rulers in 1885. It was assumed that Bechuanaland would become part of the Union of South Africa, but that local leaders would continue to rule their own people. In 1948, the National Party came to power in South Africa with its policy of apartheid. Incorporation with South Africa under this policy was not acceptable to the Batswana people or the British. The push for independence began at this time and independence was achieved in September 1966 (Halpern, 1987).

4. Economic

At independence in 1966, Botswana was one of the least developed and poorest counties in the world with a predominately subsistence economy. The beef sub-sector was the only apparent prospect for development and it was largely dominated by a few large scale ranches. Shortly after independence the country was found to be rich in diamonds, coal, copper-nickel, soda ash, potash, and sodium sulphate (Turner, 1987). As a result of the rapid expansion of the beef industry and the development of the mineral resources, the real gross domestic product (GDP) rose in real terms by 10.5% between 1974 and 1981, and by 15.3% between 1981 and 1986 (Asefa, 1989).

The importance of the mineral sector is reflected in the change in the decline in the importance of agriculture in the economy since independence. The contribution of agriculture has fallen from 45.3% of GDP in 1968/69 (Colclough and McCarthy, 1980) to 8.5% of GDP in

1982/83 (Asefa, 1989). Drought in 1981/82 and onward also contributed to this decline. Since independence there has been rapid growth in the livestock sector despite the decline in the share of agriculture's contribution to the national economy. In 1980, 84% of the population was living in the rural areas; by 1991 75% of the population is estimated to live in rural areas (Botswana Central Statistics Office, 1989). Agriculture is dominated by livestock, particularly cattle, and livestock contributes 80% of agricultural GDP.

C. The Role of Livestock in the Botswana Economy

Historically, livestock, and cattle in particular, have been central in the economy because of the semi-desert climate in the country which makes arable agriculture unreliable*. Cattle are useful for using extensive areas and provide a more reliable source of meat than wildlife (Isaksen, 1984).

Mixed pastoral and arable production provides some security against the extreme uncertainties of Botswana's rainfall. Livestock rearing, which depends more on the total rainfall in any year than on its seasonal variation is a more resilient activity in the face of climatic uncertainty than is arable farming (Colclough and McCarthy, 1980, p.110).

Cattle are also important for milk production and particularly for ploughing. "Most [Botswana] aspire to own cattle, both for reasons of security and for use as draught animals (Tordoff, 1988, p.185). In Botswana, the ox-drawn plough is used in crop production and access

*Beef production remains important to the present; in 1984 20% of exports were meat and hides shipped primarily to the EEC. The sector, including the Botswana Meat Commission (BMC) contributes greater than 20% of GDP.

to oxen is essential for arable farmer (Colclough and McCarthy, 1980, p.110).

In 1978, the Botswana Society held a Symposium on Drought because of the dilemma of recurrent drought and the effects of drought on the natural resource base of the country. The message of the symposium was that drought has always been and will always be a factor in Botswana and that the country must consider drought a normal occurrence and should plan accordingly. Some participants thought that drought was caused by excess pressure on natural resources. While it is true that drought conditions can be exacerbated by use, several papers (Tyson, 1978; Webster, 1978) showed that some droughts can be ascribed solely to climatic fluctuations. There have been droughts long before man and livestock over-used the land. The symposium brought the environment and natural resource use to the attention of the Government of Botswana and convinced the government that environmental concerns needed to be considered in future planning and development.

D. Problem Statement

The purpose of this paper is to assess the performance of livestock projects in the communal areas of Botswana since independence. Special attention will be given to the impact of these livestock projects on the natural resource base of the country, with emphasis on the environmental and range management issues. The goal is to suggest possible implications for policy and donor assistance to the livestock subsector in the future.

Livestock ownership is an important activity in most of Sub-Saharan Africa and is firmly entrenched in the cultural and social framework of many people. The World Bank's first livestock project in Sub-Saharan Africa was in Kenya in 1967. In the decade that followed a large number of livestock projects were begun.⁵ The total cost of the audited projects was US\$ 682 million (World Bank, 1985a). Despite the vast sums of money spent on livestock projects in Sub-Saharan Africa, donor-financed projects have not been successful. By 1980 there were only a few livestock projects in operation in Africa.

In 1987 the World Commission on Environment and Development published the "Brundtland Report" entitled Our Common Future (World Commission on Environment and Development, 1987). The report repeatedly emphasized the need to incorporate environmental concerns in every area of life. This includes the area of sustainable development and environmental issues in development. The report brought the issues of natural resource use and the environment to the attention of donors. This prompted the World Bank and other donors to devote greater emphasis to environmental issues in project and program support, including livestock projects. Thus, donors came to the same conclusion that the Government of Botswana had come to a decade earlier because of the symposium on drought.

Eventually, donors will need to return to the livestock sector,

⁵Approximately 125 projects were implemented, and 52 were completed and audited, as of 1985. Three were canceled after little or disbursement. Sixteen of the projects were livestock only projects and 36 had livestock components.

particularly in countries such as Mali, Mauritania, Somalia, Ethiopia, and Botswana where pastoralism dominates the agricultural sector. There is a need to analyze what was learned from past livestock projects in light of environmental considerations in order to improve future projects.

This paper investigates the livestock sector in Botswana and the potential for donor assistance in the 1990's. The success of the sector is greatly influenced by the climate, recurrent drought, and the environment on which it is based. The interaction of these factors must be understood if realistic goals are to be set.

E. Objectives

The objectives of this paper are to:

- 1) discuss the historical role of livestock in the economy of Botswana from 1966 to 1990,
- 2) review recent developments in environmental and range management theory,
- 3) analyze past livestock development projects in Botswana, and,
- 4) discuss the implications of these changes on the design of future interventions in the livestock subsector.

F. Plan of Paper

Chapter 2 contains an overview of land policy and ownership, the development of livestock since independence in 1966, and the competing uses for the resources that the livestock sector uses.

Chapter 3 reviews the common assumptions in environmental theory that have traditionally been the foundation of range management and the ramifications of recent developments in the field

of range management.

Chapter 4 presents a historical review of livestock projects in Botswana. The first, second, and third Livestock Projects and the Tribal Grazing Land Program are scrutinized.

Chapter 5 summarizes the conclusions of the paper, discusses the policy implications, and points out areas for further study.

CHAPTER 2

II. OVERVIEW OF LAND AND LIVESTOCK IN BOTSWANA

A. Background

1. Natural Resources Base

Botswana can be divided into three broad ecological zones. The first is the eastern belt consisting of the Limpopo catchment where the soils are relatively good and the average rainfall is between 550-650mm (22-26 in). This area is generally known as hardveld. The second is the Okavango swamp in the northwest which covers 15,000 km². The Okavango and the Chobe drainage system form the only perennial surface water system in the country. It supports a large and diverse population of wildlife. The third is the Kalahari sandveld which is semi-arid and arid. Two-thirds of the country is Kgalagadi sand which supports low, savannah-type vegetation.

Five to six percent of the land area of Botswana is suitable for cultivation. Of the 3 million ha which is suitable for cultivation, only ten percent was used for cropping in the late 1970's. Almost all of the arable activity occurs in the hardveld.

Water is generally obtained from boreholes, seasonal pans and small dams. Sandy rivers are also an important source of surface water. Almost all of the country is in natural vegetation which is an important source of grazing and browse. The grasses are characterized by low productivity and are categorized as poor,

intermediate, or undesirable. The rangeland is bush and tree savannah.⁴

2. Evolution of land policy

There have been many changes in the allocation of land as the country moved from a traditional system, through colonialism, and into independence.

Two researcher observe that "since pre-historic times Botswana society has functioned with strong tribal chiefs who determined settlement patterns in and around villages established on the tribe's communally held land" (Odell and Odell, 1980). "The Chief allocated blocks of fields to specific wards, whereupon the headmen of these wards allocated fields to individuals within their ward. For grazing areas, the Chief appointed overseers, controlling the number of cattle in their area" (Arntzen, 1984, p.98). In this manner control over land was exercised and overuse was curtailed. The land allocation granted usufruct rights but not the right of sale (IFAD, 1979).

During the colonial period, there were three different categories of land: state, tribal, and freehold. State land was generally parks and reserve areas, the majority of the land was tribal, and the freehold lands were farms owned by expatriates (World Bank, 1985b). In the 1920s and 1930s the drilling of boreholes brought some changes to the traditional system. Seasonal movement was reduced and those people that could afford to drill a borehole gained

⁴ See IFAD, 1979; Republic of Botswana, 1977; World Bank, 1977.

de facto control over the land around the borehole because of an understanding that drilling a borehole meant ownership of the borehole. "Access to water is a prerequisite to keep cattle in the grazing areas" (Arntzen, 1984, p.104). The land was communal in theory but the reality was that control of water resulted in control of the surrounding land. In 1968 the government responded to this unofficial privatization of the communal lands by passing the Tribal Land Act which shifted the control of land allocation from the chiefs to the Land Boards (World Bank, 1985a; Odell and Odell, 1980).⁷

Because of concern about overgrazing, the government published a White Paper in 1975 on the Tribal Grazing Land Program, (TGLP). The TGLP proposed divided land into communal, commercial, and reserved land under leasehold terms rather than ownership (ROB, 1975). The rationale for the proposed long term leases was based on the conviction that long-term use rights to land would result in reduced overgrazing. Since 1975 the government has been implementing the TGLP. The TGLP will be discussed in greater detail in chapter 4.

3. Structure of land ownership

Land in much of Botswana is, of course, communal. This makes the discussion of land ownership difficult. In theory, a member of a tribe automatically has the right to use the entire tribal area but in reality there is much de facto ownership of land though it is not official. Access to land, together with other resources, is a major

⁷The Tribal Land Boards consist of 6 members, including one chief.

determinant of income and wealth in a country like Botswana. The Special Programming Mission to Botswana in 1979 summed up the situation as follows:

The pattern of land distribution is not wholly clear. In the traditional system, land holdings reflected both the need and the capability of the household to plough and use the land. This in turn was dependent on the availability of male members and draught power. More recently, at least in some areas, the practice of self-allotment and transfers beyond the kinship network in the context of the backlog of land hunger and centralization of allotment process through the Land Boards, has shown that in fact land is neither wholly free nor freely available either for arable agriculture or for livestock farming. In this situation, the poor households may have been edged out gradually, specially those who have neither a male member nor ploughing oxen (IFAD, 1979, p.13).

Access to land seems to depend more on the ability to use the land than on anything else and those households that can not use their land tend to lose access to it.

B. Livestock

1. Overview

The livestock sector has historically been the mainstay of the Botswana economy and the national cattle herd has grown and contracted over the years. In the colonial period epidemics of rinderpest, pleuropneumonia, and other diseases were major problems facing the industry. These epidemics kept the cattle numbers down but the disease eradication programs of the 1950s and 1960s dramatically reduced the impact of disease on the cattle herd, thus reducing a source of natural destocking and making overstocking possible. The pattern of herd growth before this time was one of

destocking due to disease and drought followed by rapid restocking. The eliminating of the impact of disease and the continuation of rapid growth of the national herd sets the stage for overstocking. During the post-independence period the sector expanded accordingly. In 1963-1970 the annual average growth rate of the national herd was 2.8%, compared with 1.25 percent in 1970-1980 (DeLeeuw and Tothill, 1990). But another researcher reports an annual average growth rate of 6.7% for the years 1965-1980 (See Table 1) (Isaksen, 1984). In either case the growth of the cattle herd has been rapid since independence and the feed supply is the limiting factor rather than disease (DeLeeuw and Tothill, 1990).

Table 1. Botswana: Cattle Population, 1904-1980
Average Annual Compound Growth Rate.

	1904-1934 ¹	1936-1959 ²	1965-1980 ³
Average Annual Growth Rate	7.7%	3.9%	6.7%
Addition to Herd Over Period	1,161,000	776,000	1,814,000
Average Annual Addition to Herd	38,000	34,000	120,000

Source: Isaksen, 1984.

Table 1, shows the high rate of growth of the national herd following crashes in the cattle population. Isaksen reports that:

... the addition to the herd over the last 15 years is nearly as large as the increase over the 55 years preceding that period. The annual increase in herds in the

¹After the rinderpest epidemic (1895-1896) and drought (1896-1897).

²After drought, foot and mouth disease, and locusts (1933-1935).

³After drought (1960-1965).

first two periods were 38,000 and 34,000 respectively, but for the most recent period it has been 120,000 or nearly three times as high, the herd growing at roughly twice the growth rate of the human population (Isaksen, 1984, p.97).

The rapid growth rate is also noted by Anders and Ostberg as follows: "The number of cattle in Botswana is rising sharply, at a rate paralleled by population growth. The ratio of cattle to human inhabitants -- more or less constant at 2-3 head per capita over the past several decades (with the exception of drought periods) -- has risen to 4 head per capita" (Anders and Ostberg, 1978, p.21).

In 1975 the herd was estimated at 2.7 million head (World Bank, 1977). In 1976 it was expected to reach three million head worth BP300 million and in 1977 the herd was estimated at three million (ROB, 1977). After the drought of 1982-1985 the herd was estimated to be 2.6 million with 500,000 held freehold and the rest (2.1 million) in Tribal Areas (World Bank, 1985b).

2. Structure of ownership and production

Cattle ownership in Botswana is extremely skewed (ROB, 1976). The 1974/75 Rural Income Distribution Survey found that 45% of all rural households owned no cattle and 41% held no cattle⁹. The survey also found that cattle ownership was more skewed than income distribution. Five percent of all the rural households or ten percent of the cattle-owning rural households owned 50% of the cattle. Cattle ownership is concentrated in a relatively small proportion of the population. The median number of cattle of all rural households

⁹The difference is due to the mafisa system.

was three and the median number of cattle of cattle-owning households was sixteen. Thus 50% of cattle-owning households owned sixteen cattle or less (ROB, 1976). This survey has been widely quoted⁹.

Colclough and McCarthy drew on the survey, and found that cattle ownership and wealth are highly correlated. They divided the population into three groups. The first is the group of people who own no cattle. They generally suffer from absolute poverty because they must borrow or hire oxen to plough and the area planted by this group is less than those planted by cattle owners. Crop production of this group is therefore lower. The second group is the forty percent of households who own less than fifty cattle. This group accounts for twenty-five percent of the national herd. This group had fewer constraints on arable production because they have access to enough oxen to plough their land. On the other hand, they are not wealthy enough to acquire exclusive rights to a borehole and must graze their cattle on the heavily used areas surrounding communal watering points. The third is the final fifteen percent of households which own seventy-five percent of the national herd. For this group arable agriculture is peripheral and cattle ownership is central. This small group includes a few extremely wealthy individuals, including the President, the Vice-President, and other political figures.

Colclough and McCarthy also cite several reasons for this

⁹See World Bank, 1977; Republic of Botswana (ROB), 1977; Colclough and McCarthy, 1980; and many others.

concentration of ownership. Historically, chiefs and headmen could acquire cattle from fines and custom also allowed them to appropriate stray animals. The drought in the 1960s intensified the effect as smaller owners were more likely to lose their herds. The trend is toward more unequal distribution of cattle (Colclough and McCarthy, 1980).

The production of cattle can be divided into three spatially separate sections. "Cattle are produced under three production systems: a) traditional system: about one half of the national herd is grazed around villages and in arable farming areas ... b) cattle posts: owners of larger herds have increasingly moved away from the populated areas to establish cattle posts; ... they have effective control of the land ... Most cattle posts are owned by prosperous absentee Batswana farmers, and are operated by paid family labor. c) freehold land ranches: some farmers ... have developed relatively modern, fenced, and apparently profitable ranches throughout the freehold land blocks. An estimated 370,000 cattle are in these areas" (World Bank, 1977, p.3).

While it is easy to think of meat as the only output of the livestock sector, it is important to remember that there are other valuable outputs from the sector¹⁰. Milk, manure for fertilizer, and draft-power are all important benefits to the household. In Botswana, draft-power is particularly important as illustrated by the following synthesis:

¹⁰See (Behnke, 1985), for an example of alternative methods of measuring the benefits of subsistence livestock production.

Livestock plays an important role as draught power in smallholder arable agriculture. Households aspire to increase their herds to, in turn, increase crop production. Since many households do not own livestock, they must depend on borrowing or hiring draught power to plough. Given that timeliness of ploughing is correlated to agricultural productivity, livestock allows more flexibility in ploughing to take advantage of the rains. Therefore, there is an economic incentive to increase one's herd. The minimum number of animals needed to field a team of draught animals is twenty. This is also the minimum number needed to minimize loss of the herd from drought. This suggests that rural households involved in agriculture strive to increase their herds to at least twenty animals. At present, at least fifty percent of the population has fewer than twenty animals" (Edwards, et al, 1989, p.66).

A final aspect of production is a cultural aspect called "mafisa". The mafisa system allows owners of cattle to place some of their livestock in the care of others though they still own the cattle. The benefits to the cattle owners include access to good management and an opportunity to spread risk. The herdsman or caretaker receives milk produced, may use the animals for draught, gets the meat if the animal dies, and generally is allowed to keep the first calf. Approximately twenty percent of cattle are "mafisa-ed", though families that already own cattle benefit most from the system. It does not significantly reduce the proportion of households who have no access to cattle. Generally there is about a two percent difference between those owning and those holding cattle (Anders and Ostberg, 1978; Colclough and McCarthy, 1980).

3. Marketing

The Botswana Meat Commission (BMC) dominates formal cattle marketing in Botswana. An export abattoir was established at Lobatse as a public utility in 1954 to reduce the dependence on South Africa's cattle market. This resulted in increased value-added to the industry and reduced transportation costs. In 1966 it became a parastatal with a monopoly on export of cattle and beef (Colclough and McCarthy, 1980).

In 1975, the BMC exported livestock products worth BP37.7 million which was 36% of national exports (ROB, 1977). In 1983 receipts were BP119 million (US\$113 million) with BP63 million (US\$60 million) paid to the producers. In the eight years prior to 1985 about 300,000 head per year were slaughtered and the abattoir was at capacity. This accounted for 85% of cattle offtake (World Bank, 1985b). An additional abattoir at Maun was built and one in Francistown was under construction in 1986.

Based on who sells to the abattoir, the offtake among the production systems is estimated at 17% for freehold, and about 6% for traditional farmers. Half of the cattle are from freehold farms and half are from tribal areas (World Bank, 1985b, Colclough and McCarthy, 1980).

Cattle are trekked, or sent by road or rail and can be sold to an agent, a local marketing cooperative, or directly to the abattoir. BMC also purchases cattle by pre-arranged quotas. It is difficult, however, for small cattle owners to access this system despite the government's encouragement of marketing cooperatives and the

Botswana Livestock Development Corporation which purchases cattle in the less accessible North-west of the country (Colclough and McCarthy, 1980). The export market is primarily South Africa and the EEC via the Lome Agreement (World Bank, 1985b).

Private butchers perform the majority of the domestic marketing. In 1985 it was estimated that 50,000 cattle were killed for domestic consumption (World Bank, 1985b). Domestic markets for meat increase rapidly with economic growth and Botswana has not been an exception. Hubbard, reports that in 1985 the domestic market could absorb some 20% of all meat [formally] marketed in Botswana (Hubbard, 1985).

The informal market of village and home slaughter is impossible to document accurately. The Rural Income Survey reports that animals that die, that were not sick, are eaten and animals are generally not killed except for weddings and other social occasions. Most farmers also sell cattle only if there is a need for cash (ROB, 1976).

4. Government Strategy of Livestock Development

The National Development Plan 1976-81 states:

"The Government's policy in the livestock sector is to increase output and assure the long term future of the industry but at the same time to try to spread the benefits from the industry more widely.

Measures to promote the livestock industry will be taken on five main fronts:

- Sustained Production: Land tenure changes will be accompanied by the improvement of range and livestock management in order to conserve Botswana's range land. Special emphasis will be given to assisting those people with few livestock.
- Animal Health and Disease Control: Measures will be

taken to minimize the risk of an outbreak of foot-and-mouth disease in Botswana. Livestock owners will also be assisted to reduce losses from other diseases.

- Increased Offtake: Through the improvement of internal marketing systems and the provision of additional abattoir capacity, it is intended to raise the offtake above its present low level.

- Research: New techniques will be tried and the effects of different management systems will be evaluated; the goals of sustained production, disease control and increased offtake all require a foundation of practical research.

- Increased Linkages: Secondary industries will be developed to serve and use the products of the livestock sector" (ROB, 1977, p.143 and 188).

C. Competing Uses for Land, Labor, and Capital

1. Livestock

It is apparent in light of the previous discussion that the needs of the sector are large, particularly for land. With a national herd of 2.5 to 3 million and official estimated carrying capacities that range from eight hectares to three hundred hectares per animal, it is clear that livestock use a large proportion of the natural resources of Botswana.

2. Arable agriculture

The custom in the communal lands is that a farmer can expand his arable agriculture as his labor force expands. This is generally family labor and draught-power (IFAD, 1979). As the population expands, families will need more food and will have additional labor with which to produce it and the demands for resources in this sector will increase. But expansion of the cattle herd encroaches on arable

production and presents a paradox: households need more cattle so they can field a team of working oxen to increase their arable production but the increase in the cattle population is reducing the land available for arable agriculture.

3. Wildlife

A much belated emphasis is finally being paid to wildlife in Botswana. In 1986 a Wildlife Conservation Strategy was introduced and Wildlife Management Areas were delineated (although not all yet gazetted). Staff in the Department of Wildlife and National Parks increased from 390 to 500 in 1989 and a Tourism Development Policy has begun to be drafted (Edwards, et al, 1989).

"Estimates of the gross value-added contribution of wildlife to the country's economy in 1987 was BP23.2 million. It could increase to BP44.4 million in five years and BP91.4 million in fifteen years if the sector is developed through game-viewing tourism safari hunting, subsistence hunting, farming, ranching and harvesting and trade in wildlife products" (Edwards, et al, 1989, p.74-5).

Livestock competes with wildlife for water and pasture. Because of increasing human and animal pressure on the natural resource base wildlife have reduced access to these resources. Because boreholes are frequently sited in pans, much of the surface water in the Kalahari has disappeared and species diversity has decreased. For example, there are no zebra, hippo, rhino, elephant, and buffalo in the Kalahari and the number of hartebeest and wildebeest have decreased (Campbell, 1981). Cordon fences and fenced ranches have also negatively effected wildlife movement and access to necessary resources (Shanmugaratnam, et al, 1989).

Traditional subsistence hunting is still an important part of life for many Batswana, particularly the poorer ones. It is the main subsistence activity in some areas and 10,000-20,000 participate regularly in hunting (Arntzen and Veenendal, 1986). Official estimates are that BP12 million accrue from wildlife (GOB, 1986).

Tourism has been hindered by political instability in the region, long distances from Europe and North America, and a lack of infrastructure. Wildlife resources are the basis for Botswana's nascent tourism industry and without wildlife the industry would cease to exist. Tourism accounts for five percent of Botswana's GDP at this time but it has the potential of becoming more important (Arntzen and Veenendal, 1986).

Recreational hunting forms a part of the tourism sector but it involves few hunters and few animals overall. The species are different than those hunted by subsistence hunters and recreational hunting generates revenue for the state (Shanmugaratnam, et al, 1989).

Commercial game utilization or wildlife ranching is in its initial stages but may have some interesting ramifications if it is successful. At present there are crocodile farms in Maun and Kasane, and a pilot Game Domestication project for gemsbok (Arntzen and Veenendal, 1986). If such projects are successful they could potentially be sources of high value food and other products from animals better adapted to the prevailing environment than domesticated livestock.

D. Summary

Botswana can be divided in three ecological zones; 1)the Limpopo catchment, 2)the Okavango Swamp, and 3)the Kalahari sandveld. Only a small percentage of the land area is suitable for cultivation and water is most often the limiting resource.

Land allocation has changed dramatically as the country moved from a traditional system, through colonialism, and into independence. Access to water and overgrazing were the main reasons for government policy changes on land.

Land is communal, but not open access ,and is available to anyone who can use it within social restrictions such as kinship. In reality, access to other resources such as water and cattle determine who has access to land.

Livestock has been and is an important subsector in the economy. The national herd seems to have experienced rapid growth since independence. Cattle ownership is extremely skewed. The 1974/75 Rural Income Distribution Survey found that forty-five percent of rural households owned no cattle and ten percent of rural households owned fifty percent of all the cattle. Cattle ownership is important for arable agriculture because draught-power is an important output of the livestock sector. Milk and manure for fertilizer are others.

The formal cattle marketing sector is dominated by the Botswana Meat Commission (BMC). Eighty-five percent of the offtake goes through the BMC. The major markets for Botswana beef are South Africa and the EEC. Private butchers perform the majority of

domestic marketing and village and home slaughter are thought to also be substantial but is difficult to quantify.

The government strategy for livestock development is focused on five areas; 1)sustainable agriculture, 2)animal health and disease control, 3)increased offtake, 4)research, and 5)increased linkages.

The livestock sector is large and the demand for land and natural resources is high. Other uses for the natural resources are arable agriculture and wildlife, which provides subsistence hunting, tourism, and commercial game utilization.

Chapter 3

III. RANGE MANAGEMENT AND ENVIRONMENTAL THEORY

A. Introduction

Efficient range management is central to livestock policy in Botswana, as in many other African countries. Range management in turn, is based on ecological theory. To understand range management and its role as a basis for national policy it is necessary to understand its origin, development, and assumptions. This chapter discusses conventional range management theory, including the limitations and flaws in the theory and their consequences. New systems of range management and models are reviewed in light of recent developments in environmental theory. The implications for policy and donor assistance to the sub-sector are discussed.

B. Conventional Range Management Theory

The roots of range management are found in the western U.S.A. in the writings of many authors around the turn of the century¹¹. Their main concern was the condition of the rangeland and the problems of unrestricted grazing caused by the rise of the cattle industry in the 1800s. These procedures were linked to the ecological principles of succession and climax which were developed concurrently by Pound and Clements, Cowles, Clements, and

¹¹ Some of the early writers are J.G. Smith, 1895; H.L. Bentley, 1898; D. Griffiths, 1902; E.O. Wooten, 1908; and J.J. Thornber.

Sampson¹². In 1889 through 1904 Clements asserted that the condition of rangeland was determined by overgrazing and drought. The concepts of range condition and management philosophy were linked early and closely to Clements' view of succession. The range succession model which is the foundation of the field of range management, was developed from Clements' ideas and sometimes attributed to him.

Stoddart, et al, in a range management textbook published in 1975, summarize succession as the orderly process of community change. One community of plants gradually replaces another until a climax population is reached. Any disturbance (grazing, drought, fire) leading away from climax (retrogression) retraces the pathway of primary production in the reverse direction. Secondary succession is viewed as opposing and a completely reversible linear response to retrogression and will eventually reach climax once again (Stoddart, et al, 1975). The model is one of a continuum of plant populations with one potential climax; disturbances and rests cause the populations to shift up and down this continuum. This "climax approach" dominates range management thinking (Smith, 1989).

Clements' ideas were challenged very early by other ecologists like Gleason and Cooper (McIntosh, 1980) but their views did not have much effect on range managers themselves. In the 1960s and 1970s ecologists¹³ criticized Clements' views on succession and climax

¹² Pound and Clements, 1898 and 1904; Cowles, 1899 and 1901; Clements, 1902 and 1904; and Sampson, 1917 and 1919.

¹³ See McCormick, 1968; Drury and Nisbet, 1973; Horn, 1974; Horn, 1981; Pickett, 1976; and Connell and Slatyer, 1977.

because it does not adequately address life history characteristics, disturbances, and the long-lasting and large effects of chance events on vegetation change. It does not take into account the variety and detail that exists in each situation. But Clementsian views still dominate range management textbooks, long after ecologists have rejected much of their substance. In summary, range management has not kept pace with ecological thought and new theory (Smith, 1989) and has not incorporated the nuance and the refinement of older theories that more recent ecological thought contains. The controversy remains lively even now.

The classification of range conditions and trend are the criteria that managers use to evaluate their management or the need for management. If the classification is excellent (near climax), then management has been effective and, if it poor, then management has not been effective. The assumption behind the classifications is that range condition can be improved by proper grazing management or if rest from grazing is initiated and that secondary succession is the reverse of retrogression (Laycock, 1989). "Range condition is the present vegetation as a proportion of the potential production or species composition for that site"(Laycock, 1989, p.2) and is based on ecological end points rather than agronomic or animal production endpoints (Smith, 1989).

But what is the problem? What are the shortcomings of the climax approach? It seems a simple, straightforward, elegant , easy-to-use theory. The problem is that reality is much more complicated than this.

The system does not allow for site differentiation due to rainfall, topography, or fire. Site differentiation may be confused with ecological condition. Climax vegetation on a poor site could be classified as degraded. A downward trend means only a decreasing similarity to climax; it does not necessarily imply site deterioration (Laycock, 1989; Smith, 1989).

The stages of secondary succession are poorly understood but it is safe to say that, in most cases, secondary succession is not the reverse of retrogression which is not the reverse of primary succession (Laycock, 1989)¹⁴. The literature about degradation is not applicable to the reverse improvement, and recovery can assume multiple pathways (Bartolome, 1984).

The system does not account for suspended stages of succession or thresholds. This occurs frequently in arid or semi-arid areas (Laycock, 1989; Smith, 1989). In such situations there is little that a manager can do (Bartolome, 1984).

Drastically modified communities cannot be classified at all. This includes seeded sites and those whose original plant communities have disappeared or are not known (Laycock, 1989). Climax is considered pristine vegetation in equilibrium with climate and soil. This implies that any man-induced changes are away from climax. The theory only considers the intrusion of people of European background

¹⁴Primary succession is the initial development of a site, from the development of soil, through the series of plant communities to the climax population of plant for that particular ecological zone. Retrogression is the movement back down that pathway in the opposite direction due to fire, grazing, or other disturbances. Secondary succession is the subsequent redevelopment of the site after a disturbance.

a disturbance, however. The Native Americans have affected the environment for hundreds of years, as have the Aborigines in Australia. The concept loses meaning in Europe, Africa, and Asia where civilizations began (Smith, 1989.)

Range management theory assumes that climax vegetation is the only vegetation type that furnishes adequate soil protection and is in the long run the most productive type. This is not true in many cases. Other populations of species can also protect the soil from erosion and erosion can occur due to other factors, while there is little change in vegetation. "Economists often assume that range condition is related to livestock production or wildlife values and that greatest return will come from improving poor conditions ranges. The assumptions are logical, but incorrect" (Smith, 1989). A forage with high nutritional value for livestock could be rated poor because it is very dissimilar from the climax population .

Traditional range management uses the concept of range classification based on the species of plants present to plan and to measure the success of past policy and institutional changes. It does not fulfill that role well. But range condition and trend assessment, because it is an ecological concept, is not an accurate measure of the productivity of rangeland which is, from a management standpoint, an economic or monetary concept. Critics argue that other goals or standards, such as maximum forage for livestock, maximum cover, habitat for specific kinds of wildlife, or maximum soil protection for watershed, would be more meaningful to planners. Improvements in range productivity, as measured by the succession

model, may or may not occur as a result of changes in grazing management in the face of so many variables that influence range condition (Laycock, 1989; Smith, 1989).

Smith summarizes the shortcomings of conventional range management as follows:

Climax-based range condition and trend assessment has created problems. It is not useful for planning and economic analysis, it does not provide a measure of success in achieving management objectives, it does not tell whether environmental degradation is occurring, and it promotes the image of humankind and livestock as intruders in natural systems, rather than responsible managers of land (Smith, 1989, p.126).

He recommends abandoning the use of climax or potential natural vegetation as a standard for range condition and trend.

Smith represents the end of the spectrum of thought on range management which asserts that there is a need for great change in the system. There are others that contend that the system is useful and adequate for the management of rangeland as it currently exists (Pendleton, 1989). On the surface, the positions seem irreconcilable but on closer examination, Pendleton cited examples of changes in definitions and standards in the 1980s and Smith does not deny that traditional range management theory is wrong as much as that it is inadequate (Pendleton, 1989; Smith, 1989). Change has come slowly in this field but it is not surprising considering the time frames that are necessary to detect substantial changes. For example, a thirteen years old pasture was reported to have not undergone secondary succession. Pendleton states that "to expect a measurable improvement in range condition in that time frame ... is expecting entirely too much" (Pendleton, 1989, p.31). From a geologic

time frame this is most likely true, but given the shorter time frames the managers must deal with, for all intents and purposes it is also true that there was no secondary succession occurring on that site from a management and decision making standpoint.

All theories begin as a broad generalized concept that help explain a certain phenomena or situation. As the implications of the theory are examined and the theory is applied it is found that there are situations that the theory, as it exists, does not adequately explain. The theory is reworked and added to, to address specific problems and situations. In the beginning, the theory lacks the nuance and richness of detail that will make it more useful but also more complicated. The difference between evolutionary theory as discussed by Darwin and the evolutionary theory discussed by Stephen Jay Gould is an example. This change seems to have been slow in coming for range science. The first challenge is to develop the theory so that it is useful in the short-term and specific situations that managers must deal with. The second challenge is to make the decision-makers aware of the most current thought in the area. It is not uncommon for "popular science" to be decades behind the science in the laboratory.

C. Range Management Theory in Practice in Africa.

In Africa, conventional range management theory has been the basis of livestock policy and land use in many countries throughout Sub-Saharan Africa. Because the systems of managing rangelands are transferred directly to Africa with little or no adaption the same

criticisms directed at the climax model apply in Africa as in the U.S.A.(Sandford, 1983). The popular conception is that the world's rangelands are suffering severe and rapid desertification, this is generally the view promoted in the popular press. Sandford refers to this popular view as the Mainstream View (Sandford, 1983). As one of the leading specialists in the area of pastoralist development, he observes that "the Mainstream View is still held by the majority of those professionally concerned with the subject matter, i.e. academics and officials in national or international organizations, but not often by pastoralists" (Sandford, 1983, p.11). The pastoralist living in an area frequently deny that desertification is occurring, and if the pastoralist do see it occurring it is not related to overgrazing (Dahl, 1979, p.40-41; Botswana, 1977, p.A203). Sandford himself has become less convinced of the validity of this Mainstream View.

In regards to the communal areas the concept of the "Tragedy of the Commons" (Hardin, 1968) is a large part of the Mainstream View. The tragedy of the commons describes the situation in which the land is held by the community and the livestock are owned by individuals. This separation of interests is often blamed for overgrazing and land degradation. It is often used as a basis for government policy and control on communal grazing¹⁵.

The 1968 paper by Hardin, while actually about the population growth problem, has become famous for the graphic image of a common

¹⁵See Government of Botswana,1981 for an example of how the tragedy of the commons is cited as a problem in communal grazing management.

pasture. In this open access pasture each herdsman, as a rational economic being, seeks to maximize his gain and keep as many cattle as possible on the common. The question each person must answer is what is the cost and the benefit, or utility, to me of one more animal on the common? The benefits of the additional animal accrue to the herdsman but the costs, in terms of overgrazing and less production per animal, are borne by all the herdsman. From the individual's standpoint, the benefits of one more animal will always outweigh the individual costs of one more animal. The herdsman is trapped into a system that compels him to increase his herd though it lead to ruin.

The "Tragedy of the Commons" is a

highly formalized model of human behavior that comes down deductively from a priori assumptions about how people behave; it is not a model built up from anthropological field studies of particular herdsmen in particular situations. Such deductive models can be extremely useful, but they need to be checked regularly for their consistency with the real world (Sandford, 1983, p.119).

In regards to communal, pastoral, communities the solution derived from the analysis of the contradiction of private livestock and communal land is to place both resources under the same interest. While Hardin would most likely have preferred that livestock be held by the community; land tenure reform in the communal areas has generally resulted in the privatization of the land. The idea that privatization is a solution is often an unjustifiable conclusion as the argument's assumption are not generally fulfilled in many cases . Privatization is useful is situations where it is not possible for the community to come to some common agreement about the allocation of costs as well as the benefits, but this has generally not been true of

traditional pastoral societies which have a long history of imposing appropriate rules of behavior on their members (Sandford, 1983). The elimination of disease as a destocking factor has no doubt changed the equilibrium and pastoralist societies are facing more intense pressures than historically but it is unlikely that they have had no experience with overstocking. The formal argument does not recognize that "rational men do not pursue collective doom" and that

if such traditional societies have not devised rules for controlling livestock numbers and holdings, we need in the first instance to look for the reasons elsewhere than in social incompetence. It may be that such control would not, in fact, be to their benefit, either because of the implications for average income ... or because the environment is not in fact deteriorating as a consequence of overstocking (Sandford, 1983, p.120).

This is not intended to suggest that there is no problem and that the future is bright and problem-free. It is a suggestion that before a policy which affects an entire nation is put in place it is important to identify the real cause of the problem rather than rely entirely on a formal argument that may or may not apply in the given situation.

Sandford finds many other difficulties and uncertainties with the popular view of range management as it applies to Africa. He questions whether desertification is taking place on a great scale¹⁶, particularly in the long-term given the variability of rainfall and other "noise" in the data caused by climatic factors. The assumption is that overgrazing is the sole cause of land degradation and that livestock numbers must be reduced though there is little agreement on what the correct stocking levels are. Experts often

¹⁶See Sandford, 1983 for references.

disagree by the factors of four and five about this. If the low estimates were correct then the cattle should have died of starvation long ago (Sandford, 1983). Resident pastoralists often deny that desertification is taking place (Dahl, 1979; Botswana, 1977)

Sandford also questions the accuracy of livestock population numbers and the dramatic growth in reported cattle numbers. But density is the important issue not numbers. "In Botswana both the area accessible to grazing and the number of cattle increased (allegedly) about two and a half times between 1965 and 1976 (Sandford, 1983). At some point land will become a limiting factor and density will decrease in Botswana as is the case in other areas of Africa. As more land is used for livestock production, wildlife is the most likely loser. Often, the data is adjusted to fit the conventional view¹⁷.

Sandford also believes that the mainstream range management view has a great mistrust of traditional economic and social systems. Pastoralists are viewed as irrational in their desire for large herds and land use and there is great concern about controlling numbers which pastoralist societies do not do directly, though there is some social control. Recent research has found rational reasons for maintaining large herds (Dahl and Hjort, 1976). But the mainstream view still sees social constraints as the main impediment to progress and seeks to change the societal structure (Sandford, 1983). Range

¹⁷For example, in Botswana in the 1970's, the raw data on the cattle population did not reveal the expected level of growth so an "under-enumeration factor" was built in but not reported when published (Sandford, 1983).

scientists emphasize the effects of grazing rotation systems on the production of the vegetation. While traditional systems do not have a written yearly plan for rotation, they do use social control to rotate herds. The difference is that traditional societies stress the effects on livestock in terms of mineral needs and disease avoidance, as well as the state of the vegetation. There may in fact be no significant gains in the productivity of the vegetation to be derived from western-style planned systematic rotation, or gains in primary production (plant growth) could be offset by a decrease in secondary production (milk, meat, etc.) which is the output desired by pastoralists (Sandford, 1983). This is possible if the flushes of grass in an area cannot be used because that area is not scheduled to be grazed.

The consequences of the current thought has been: 1)The haste with which range-management programs have been introduced with no research before or after the implementation of the programs. 2)The desire to reform land tenure and social system rather than assist the adaption of existing systems. Much that is good about traditional system is then lost. 3)An obsession with the doctrine of the "Tragedy of the Commons" which has led to a misplaced faith that private ownership is the only answer¹⁰. 4)An inhumanity toward the destitute of pastoral societies. Hardin writes of the "folly of

¹⁰Benefits from privatization have not occurred in dry rangelands; in Angola the degradation is worse on private lands, in Botswana, private ranches are overstocked and degraded and in the U.S.A. the number of cattle increased by twenty percent in twenty years after private access to government lands was introduced. This continued until a system of penalties was introduced. (Sandford, 1983, citing Cruz de Carvalho, 1974; Odell, 1980; and Heady and Bartolome, 1977).

famine relief" (Hardin, 1977). Drought and famine are seen as the pastoralist's fault. 5) A tendency of programs to assign a key role to micro management by the government.

Without question, some changes in the field of range management need to be made to be more useful to the planners and other individuals that use the information. It is time that the objections that modern ecologists have raised about the climax approach to range classification be examined and applied if they prove useful.

D. New Developments in Range Management

In the last decade the recognition of the shortcoming of the climax approach to range management have been increasingly recognized. This recognition has stimulated a reconsidering of conventional range management. The new thinking in range management is not a rejection of the existing range theory but a recognition that the theory is not adequate in every case. Given the diversity of local environments that exist, the traditional succession model may be adequate and correct in some settings but it does not encompass the diversity of situations in which it now being applied. There are some flaws in the concepts, but the whole system need not be rejected. It should be remembered that there are many succession theories and they are all hypotheses that are subject to change and not written in stone.

An important development is the recognition that there are several different models which will be useful in different situations and that succession, tolerance, or inhibition models and combinations

of these models will all be correct depending on the situation (Smith, 1989). This may not be as neat and clean as the climax-approach but it is more realistic.

Other schemes use site potential or a land-use approach. These schemes allow for a stable, lower-successional plant community or introduced forage to be considered a desirable condition (Laycock, 1989). The recognition that extreme or infrequent events may have drastic, long-lasting effects on the predictability of succession is also important (Smith, 1989).

Several new guiding principles are proposed for the future. It is necessary to recognize that range condition encompasses several distinct and non-additive features and that different types of data are needed. The potential of the site must be included in any classification and it should be remembered that any classification scheme is artificial and that reality will always differ to some extent. What really needs to be known is if there is degradation of the site's potential but this will be difficult to evaluate in the short term useful to managers (Smith, 1989).

Bartolome calls for a "measure of range condition on a basis which incorporates the modern views of vegetation change, ecosystem function, and multiple management goals" (Bartolome, 1984, p.924). This is a tall order but the first step is a recognition that the current system is inadequate.

Some suggest that other endpoints or goals such as animal production goals be used as criteria. Smith proposes a system that predicts outputs by resource value ratings (RVR). Westoby, *et*

al, proposes an alternative model which describes rangelands in terms of various possible states and the transitions among the states. In this model, management would be working to shift to a more desirable state and avoiding less desirable states. The model incorporates the alternative possibilities and the costs of moving or not moving from state to another (Westoby, et al, 1989).

E. Implications

The implications of this new thinking in range management are far-reaching. It requires a reevaluation of many of the assumptions behind land and livestock policy for rangelands. Changes in the measurement of desired output, from ecological to some economic or other endpoint, will require that different data be collected. Changes in how the economic and social systems of pastoralists are viewed will require research to determine how the systems maintained an equilibrium with the environment and if any of these strategies are still useful given the changes that the systems face. The impact of changes are far-reaching because they imply philosophical change at the national policy level and not just redesigning of local projects.

F. Summary

Chapter 3 discusses the close relationship between range management and environmental theory and how range management is used. The roots of conventional range management theory are found in the western U.S.A. around the turn of the century. The ecological

principles of succession and climax populations were being developed concurrently. The ecologist, Clements', views on succession had a great deal of influence on range management and remains important into the 1980s and 1990s.

Succession is the orderly process of community change until an equilibrium or "climax" population is reached. Disturbances which lead away from climax retrace the pathway of primary production.

Clements' ideas were challenged early by other ecologists and also later in the 1960s and 1970s. They criticized Clements' view because it did not adequately address life history characteristics, disturbances, and the effects of chance events on vegetation change.

Range managers use the classification of range condition and trend to evaluate their management or the need for management. It is assumed that range condition can be improved by proper grazing management and that secondary succession is the reverse of the pathway of degradation.

The concept of range condition is based on ecological endpoints rather than agronomic or animal production endpoints.

The climax approach does not allow for site differentiation nor is secondary succession always the reverse of retrogression. Neither does it account for suspended stages of succession or thresholds. The system can not be applied to drastically modified communities and it is assumed that only climax vegetation furnishes adequate soil protection and erosion prevention.

Range management specialists use the concept of range classification to measure the success of past policy and

institutional changes, but it does not do this well because it is not an economic system but a biological one. Smith, representing the extreme position, recommends abandoning the climax approach entirely; most range scientist seems to agree that some refinements of the basic theory are needed.

In Africa, conventional range management theory has been the basis of livestock policy and land use. In addition to the problems inherent in range management, policy for communal areas rely heavily on "The Tragedy of the Commons" scenario.

Sandford finds many problems with the approach used in regard to communal areas. He questions whether desertification is taking place on a great scale; the accuracy of reported livestock statistics; and the mistrust of traditional economic and social systems.

The consequences of the current thought have been 1)rapid implementation of programs with little research before implementation, 2)the desire to reform social systems rather than assist their adaption, 3)an obsession with the "Tragedy of the Commons", 4)an callousness toward the destitute of pastoralist societies, and 5)a tendency of programs to assign a key management role to the government.

New developments in range management are primarily the recognition that the theory is not adequate in many cases and that it needs to be refined. Some recommend a combination of models depending on the situation. Others use site potential or a land use approach. Still others suggest other endpoints that reflect the

economic production goals of the sector. The implications of this new thinking in range management are far-reaching because they would affect planning at the policy and program level.

CHAPTER 4

IV. LIVESTOCK DEVELOPMENT PROJECTS AND PROGRAMS IN BOTSWANA

A. Evaluation and Criteria

The objective of this chapter is to evaluate the First and Second Livestock Development Projects (LDP I and LDP II), the Tribal Grazing Land Program (TGLP), and the National Land Management and Livestock Project (NLMLP) which is sometimes referred to as the Third Livestock Development Project (LDP III). The focus will be on the cattle portions of the projects and those aspects of the projects that have ramifications for natural resources such as overgrazing and land tenure issues, but also wildlife issues, because wildlife is an important natural resource in the country of Botswana.

In many cases, an evaluation of a project included a financial and economic benefit-cost analysis of the project (Gittinger, 1982). While this type of analysis is important in the planning and selection of projects it is not the type of evaluation that will be done here. The objectives of this chapter is to examine the policy framework, the performance of projects and the implications for future livestock projects.

B. The First Livestock Development Project

The first Livestock Development Project was proposed in 1970 and implemented in 1972. The project included the development of twenty-four karakul sheep farms, ten cattle fattening ranches, five

growing out ranches, a network of trek routes, and thirty breeding ranches (Odell and Odell, 1980; Odell, 1980). This analysis centers on the thirty breeding ranches that were modeled after freehold farms. The ranches and facilities were built and developed by the project and were turned over to the private rancher upon completion.

The objectives of LDP I were to relieve grazing pressure on communal lands around villages by removing large herds of cattle from those areas to the ranches (Carl Bro Int, 1982; Odell and Odell, 1980) and to serve as "models of fenced ranching" for tribal areas (ILCA, 1978) though there was little information on which to base the project design.

When planning began in 1968 the proposal was different than the final project. The proposal was for eighteen ranches, half of them fenced; with ranchers supplying labor to erect fences and facilities with government materials. At the time the changes must have seemed logical¹⁹. The government recognized early on that the project would not reach substantial numbers of owners, and that it lacked answers to the problems of overgrazing and "bad" management. It also recognized that the wealthy were the only people with the resources to participate (Odell, 1980).

The project was fraught with problems, some from outside the

¹⁹The eighteen ranches became thirty ranches because a northern block was canceled due to lack of water and there were funds available for more ranches. Research since the 1930's indicated that the productivity of fenced ranches was double that of cattle posts so all the ranches were fenced. Self-help became turnkey because self-help takes longer and they wanted to get the project going faster. They also feared that the rancher would never finish the development (Odell, 1980).

project but many inherent in the project design because it concentrated on infrastructure rather than institution building. Odell and Odell placed the major problems in eight broad categories²⁰.

First, the logistical problems were large and many were unsurmountable. The project site was 300km (180 miles) from the nearest district headquarters and 600km (360 miles) from the capital with no telephone contact and little radio communication. The project manager was based in Gaborone (Odell, 1980).

Second, there were institutional problems. Private contractors were used to construct boreholes, fences, and other facilities, and these contractors were insufficiently supervised by the project due to manpower shortages. The false economy of accepting the lowest bid resulted in shoddy workmanship. Unsupervised government personnel proved to not be much better (Odell, 1980). Poor supervision was also blamed for the misplacement of the project on a game trek route (ILCA, 1978).

Third, there were problems with the organizational structure. The project manager reported directly to the Permanent Secretary of the Ministry of Agriculture who wasn't very interested in the project. Moreover, the Livestock Project Coordinating Committee often failed to function.

Fourth, there were technical problems. A block of ranches in northern Botswana was canceled because no water was found. Ten more ranches were then included in the Nojame block because of the

²⁰This section draws heavily on Odell and Odell, 1980.

funds available from the northern block.

Fifth, there were ecological problems. The ranches were located on a major wildebeest migration route (Odell and Odell, 1980; ILCA, 1978). The herds of wildebeest demolished fences, grazed-out paddocks, and transmitted disease. The government had been warned about the game trek route where thousands to ten thousands of animals passed²¹. In 1972 the project announced that there was no problem; that the project was off the trek route (Odell, 1980). The assumption was that man and livestock would triumph and long-term damage to wildlife was not a concern. Ngwamatsoko points out that in 1973 the coordinator of the project said that wildlife was not a priority and animals would be shot if fences were damaged (Ngwamatsoko, 1982).

Sixth, there were sociological and cultural problems. The project planners never worked with local institutions and therefore the local institutions had no interest in the success of the project. While it was stated that management training and extension were important, these areas were given short shrift. The project staff was so busy with infrastructure building that there was no one to think about training and extension. Fencing was seen by the population as valuable for reducing strays but not as a part of a

²¹In 1969, the Livestock Project Coordination Committee recommended that the ranches not be fenced because of game movement and Department of Wildlife ecologists endorsed this recommendation. An ecological study in 1972, concerned with the fencing on wildlife, recommended small blocks with two to three mile corridors between, rather than one large block. For economy's sake this was not done; the result was thirty-five miles of fence across the trek route.

management strategy and exclusive rights to land did not reduce the cultural pressure to increase cattle numbers. Often the three paddocks were run as three fenced cattle posts resulting in overstocking and overgrazing.

Seventh, there were economic problems. High inflation in the mid-1970's increased the cost of developing each ranch by eighty percent to BP27,000. There was no requirement of a cash commitment from participants though they were drawn from the ranks of the wealthy of the country. Occupants took out a loan for their ranch while the government paid the entire cost initially (Odell, 1980).

Eighth, there were political problems. The government was not willing to enforce laws and reduce overstocking. The plan was that 225 head would be put on the ranch and in thirteen years a maximum capacity of 530 head would be reached. In reality, two-thirds of the ranches were overstocked in three years.

There were other problems as well. The beneficiaries of the project were not those living in the nearly communal areas neither did they move to the ranches but became absentee owners (Odell, 1980). This caused two distinct problems. The first is that the owners had family members and other people live on the ranches. Instead of twenty-five families, the project had 461 people living on thirteen ranches in 1978; at that rate there was a potential for 1000 people to be living on the ranches and they would require health services, education, and other services (ILCA, 1978). The number of cattle needed to support that population would also increase that chances for overgrazing. The second problem was that the absentee

owners had little interest in the ranch and the people who lived on the ranch were in no position to make decisions (Odell, 1980).

Overstocking and overgrazing quickly became a problem on the ranches. One study reported that half of the ranches were overstocked (ILCA, 1978) and another reported that six were seriously overgrazed with two closed down for two to three years for range recovery (Carl Bro Int., 1982). It was also noted that there was no "modern" grazing system and rotational grazing was recommended (ILCA, 1978).

The literature on LDP I illustrates the role of conventional range management practices in the course of implementing the project. Rangeland monitoring of plant composition was done and range condition scores were assigned based on this. Though it was stated that these conditions could be due to differences in soil and natural vegetation or levels of land use the monitoring is used as if all the changes are due to land use (ILCA, 1978). Kwerepe assumes that species change equals degradation and therefore overall production is reduced (Kwerepe, 1982). This could be, but it is not necessarily the case because sub-climax populations could still provide good fodder for animals. Seitshiro also used classic ecological endpoints in his paper (Seitshiro, 1982) as does Van Vegten when he explains how degradation and increasing numbers of cattle can occur at the same time (Van Vegten, 1982). Odell cites Sandford and an extension officer as questioning if there is adequate information for reaching any conclusions about carrying capacity because some supposedly overstocked ranches, in terms of official livestock to

unit area, were not in poor condition. The issue was not pursued further but was at least mentioned (Odell, 1980). Bush encroachment is also seen as always being a problem but the value of some species as browse and a food bank in the dry season when the digestibility of grasses is very low, is overlooked.

In the end the LDP I serves as an example and a warning of what not to do (Odell, 1980; Carl Bro Int., 1982). Land that was thought to be unoccupied turned out to be occupied by hunter/gatherers whose rights were usurped (ILCA, 1978). The concept of turnkey and instant development was as empty concept (Odell, 1980). Only a small percentage of cattle were withdrawn from the communal areas and the project reinforced the unequal distribution of resources by opening up more land for the wealthy (Odell, 1980). There was a misconception regarding the development of management and productivity. Fencing was seen as management; almost to the point that fences were not only necessary but sufficient for management. Fencing could not replace training and extension (Odell, 1980). The assumption that Land Boards would control cattle numbers was false and wishful thinking and the lack of concern for ecological factors was unrealistic (Odell, 1980).

In contrast to this, Odell and Odell found one bright spot. A parallel project, the Village Area Development Project (VADP), on the communal lands was begun in conjunction with the LDP I. But VADP never got off the ground either for many of the same reasons. The only difference was that one VADP staff member got involved in land use planning in consultation with the local people. This planning

focused on land use patterns and their relationship to other land uses, taking into account both livestock and arable agriculture and the relationships between the two activities. The success of this made the government recognize that development needed to take people's priorities into account (Odell and Odell, 1980). The researchers felt that supporting of local institutions in long-range, broadly-based planning was an important step in the right direction.

C. The Tribal Grazing Land Program

In 1975, the Government of Botswana published a White Paper entitled the National Policy on Tribal Grazing Land or TGLP (ROB, 1975). The TGLP was a response to concerns about overstocking and overgrazing, particularly on the communal pastures (IFAD, 1979). The aims of the Tribal Grazing Land Policy were to: 1) stop overgrazing and degradation of the veld, 2) promote greater equality of incomes in the rural areas, and 3) allow growth and commercialization of industry on a sustained basis (ROB, 1975). To these three causes Sandford adds a fourth; the interest of rich men in acquiring firm private title to previously communal land (Sandford, 1983). The government recognized the close relationship that exists between livestock and land, and livestock policy and land policy. In 1978, Von Kaufmann called the TGLP "probably the most open and comprehensive land reform programme being undertaken any where in the world at this time" (Von Kaufmann, 1978, p.255).

The "Tragedy of the Commons" philosophy underlies the TGLP (Isaksen, 1984) and is evident in papers discussing the program (Von

Kaufmann, 1978; Devitt, 1982). In line with this philosophy it was assumed that privatization or exclusive rights would solve the overgrazing and bring about stock control (Devitt, 1982; Odell and Odell, 1980).

The TGLP policy divided the lands into three categories; commercial, communal, and reserved (ROB, 1975). The commercial lands would be distributed on long leases to large herders and minimal rents were to be paid to the government. Groups were encouraged to participate and individuals could also get land in these areas. In the communal areas there would be no change in government supervision but the people would be taught better management. The reserved areas were for the future. This land was to be for future generations, poor people who would acquire cattle in the future, wildlife, mining, and cultivation (ROB, 1975). It was thought that an improved system of range management could then be applied. Improved meant "western" system of rotational grazing, fencing, and supplemental feedings (Edwards, et al, 1989; Devitt, 1982; ROB, 1975). The policy also provided for public consultation through radio listening groups and follow-up sessions (ROB, 1975). Odell and Odell point to this as an important development in decentralization of planning that they noted in the VADP (Odell and Odell, 1980).

The program was launched in the late seventies but it suffered delays because of zoning problems and sorting out the terms of the leases (ILCA, 1978). This delay caused a great deal of the political impetus and goodwill to dissipate (Sandford, 1983).

Despite good intentions, the implementation of TGLP revealed

many flaws. First, the assumption that there was unused land proved to be incorrect. There were large numbers of people living in supposedly empty areas either around boreholes or hunter/gatherers (IFAD, 1979; Carl Bro Int., 1982; Hitchcock, 1978). It became apparent that land could not be considered unlimited (Shanmugaratnam, 1989). Because of this, there turned out to be too little land available for commercial land to reduce the overgrazing on the communal lands (Isaksen, 1984; Shanmugaratnam, 1989; IFAD, 1979).

Rather than reducing stocking on the communal lands, the programme had the opposite effects as small herds were moved away from commercial areas into communal lands (Shanmugaratnam, 1989). A report by noted that there had been "no relief from overgrazing in the communal areas as a result of TGLP" (Carl Bro Int., 1982, p.206).

The TGLP policy did not provide for the needs of non-stock owning people (Shanmugaratnam, 1989). The Land Boards did eventually try to provide for compensation for these people (Abel and Blaikie, 1989).

The main thrust of the program was the formation of commercial ranches and the communal areas and small holders were a low priority....The dominant groups utilized traditional institutions to manipulate the implementation [of the programmed] to preserve and strengthen their own interests....the cattle owning elite consolidated private control but maintained dual rights" [to communal area land as well] (Shanmugaratnam, 1989, p.7).

This socio-economic and political structure has not permitted the programme to reach its ideals (Isaksen, 1984)²². The issue of dual rights was often seen as problem. The leaser of a commercial ranch

²²This aspect of the programme was mentioned by others such as Sandford, 1983 and Carl Bro, 1982.

had the right to bring cattle back to the communal areas when the grass on the ranch was gone. This proved to be a particular problem in drought years and contributed to the overgrazing and land degradation in the communal areas (Edwards, et al, 1989).

Privatization did not prove to be the panacea that it was expected to be. Overgrazing was as big or bigger a problem on private land as on public (Isaksen, 1984; Carl Bro Int., 1982). There appeared to be two related reasons for this. First, ranchers used the TGLP as a way to gain access to land but not necessarily for purposes of development (World Bank, 1985c). Land speculation played a part in this and the owners were often absentee owners with no commitment to development which resulted in poor management (Shanmugaratnam, 1989; Edwards, et al, 1989) or "fenced cattle posts" (Carl Bro Int., 1982).

When the zoning was completed, there were no reserved areas (Hitchcock, 1978; Carl Bro Int., 1982). This did not reflect the intentions of the policy and the stated concern for the future and the poor were essentially ignored.

There were numerous recommendations to improve the TGLP programme. Some recommended that TGLP be implemented as originally formulated because it had changed in implementation (World Bank/Botswana quoted by Isaksen, 1984; Edwards, et al, 1989). Others recommended that yet more management was needed and that "Government should address the social and economic factors that led to the poor performance" (Edwards, et al, 1989, p.112). This reflects the old idea that pastoralists are not rational and they just need to be educated. On the other hand, the same authors suggest, along with

Devitt and Sandford that local communities be allowed to manage their own resources. Devitt and Sandford both recommend using and strengthening social institutions rather than trying to overcome perceived social constraints (Devitt, 1982; Sandford, 1980).

D. The Second Livestock Development Project

The Second Livestock Development Project was the first livestock project implemented following the Tribal Grazing Land Policy (TGLP) of 1975. (World Bank, 1977; LPCU/ILCA, 1979). The project was launched in 1981. The experiences of the First Livestock Development Project and other projects were taken into account in the design and planning of the LDP II. The project management in LDP I was considered poor and the management responsibilities were more clearly defined in LDP II, but logistical problems were expected to be a problem in the second project as they were in the first and the budget was adjusted for this (World Bank, 1977). The concept of turnkey ranches was abandoned and commercial ranches were to be developed by the farmer in order that the farmer would have a vested interest in the development of the ranch. There was also a shift from infrastructure toward more human capital development (World Bank, 1977).

While there were changes from LDP I there was much that was the same, particularly in development philosophy. The problems were still seen as sociological, not technical. The same management package was recommended and beef was seen as the only expected output.

The project was to assist farmers develop 100 ranches that

would be acquired on TGLP commercial land, develop fourteen communal grazing cell units to test different grazing systems in the communal lands, extension of credit for small communal schemes, support the agricultural credit division of the National Development Bank (NDB), develop marketing infrastructure such as trek routes and railway facilities, support technical services including experimental work, and bulk a ranch training center (World Bank, 1977). Both LDP I and LDP II promoted rotational grazing schemes. While rotational grazing is a good strategy in climates where the rainfall is reasonably regular and predictable, it is not practical in arid areas where the rainfall is variable from year to year, and even from field to field. Western points out that flexible mobility is an important exploitation strategy of pastoralists as the pastoralists attempt to reach the green flushes before the wildlife, and avoid disease outbreaks (Western, 1982).

The ranching benefits were to accrue to 200 families (1000 people) and more people were to benefit from the communal grazing cells. The project was "likely to benefit principally many of Botswana's wealthiest farmers" (World Bank, 1977, p.ii) because they were the only ones with the equity and cattle to participate.

The LDP II was implemented to support the TGLP. In 1977 when the appraisal of LDP II was completed, TGLP was seen as "an important and courageous, albeit imperfect, effort to begin [land tenure reform]" (World Bank, 1977, p.ii). LDP II could not therefore begin until the zoning and signing of leases were completed. LDP II was to be a five year project begun in 1978 or 1979 but the monitoring and

progress reports of 1979, 1980, and 1981 all reported the same recurring problems. The project was subject to all the problems of the TGLP as previously discussed and the allocation of leases was taking a longtime and implementation was slow. In 1981, three years into the project, there was still only one grazing cell unit and one control unit established on the communal lands; and there were few ranches leased and few of those were actually developed by the rancher (LPCU/ILCA, 1979; LDPCU/ILCA, 1980; LDPCU/RSU/ILCA, 1981).

The allocation of ranches was slow because of de facto ownership of land prior to TGLP which left little land available for commercial ranches and other reasons cited in the review of TGLP previously. The bottlenecks in the establishment of the experimental grazing cells were siting, the long time spent in consultation, and group formation which was a alien concept (LDPCU/ILCA, 1980). The communities proved reluctant to release land for the cells when the land was crowded and they felt they needed all the land for grazing (LPCU/ILCA, 1979). While the problems were myriad, there were some positives; there was more extension and education in LDP II than in previous projects and TGLP and LDP II seemed to have focused more attention on the communal areas (LDPCU/RSU/ILCA, 1981).

Because TGLP never quite got off the ground neither did LDP II. In particular, the aspects of the project that dealt with grazing and stocking, while the most important, were the least successful aspects of the entire project. The project's major components were so much in arrears that the World Bank, requested Bekure and Dyson-Hudson to undertake an in depth study of the project and the report

was published in 1982. The report was a scathing assessment of TGLP as the basis of LDP II as Bekure and Dyson-Hudson felt that TGLP was a political platform disguised as a planning document which promised all things to all classes of people (Bekure and Dyson-Hudson, 1982). The problem was considered to be a political one and one for which there could not be a technical answer.

The "paralysis of LDP II had very little to do with the internal flaws in the project structure ... but LDP II had been inserted into a setting in which it could not operate and which it therefore could not affect ... The flaws of TGLP were amplified in the project because it attempted to operationalize TGLP" (Bekure and Dyson-Hudson, 1982, p.1-2).

The researchers found that surprisingly few people, even in government, had actually read the TGLP paper. The objectives, when examined closely, conflict and no priority is suggested. Land was to be equitably distributed while protecting the allocations received under the old system, whose supposedly biased distribution was a reason for land tenure reform. Exclusive rights to land were to be granted to the wealthy while the poor were to be kept always in mind. Allocation was to begin before public consultation though input from the people was to be a priority. Large herds were to move from the communal lands to reduce grazing pressure but commercial land holders kept rights to communal lands also (Bekure and Dyson-Hudson, 1982).

TGLP and by extension, LDP II were based on the dubious assumptions that 1)the removal of the communal system would benefit everyone, 2)land owners would actually move cattle and start a modern ranch, 3)Land Boards would control stock numbers,

4)production could be more than doubled with management and most importantly, 5)that there was empty land (Bekure and Dyson-Hudson, 1982).

Different Land Boards made allocations differently depending on the levels of individual pressure from officials and public pressure. Reserved lands were zoned last and commercial lands were zoned first which was a reversal of the White Paper's intentions (Bekure and Dyson-Hudson, 1982).

The other aspect of the project which was to have some influence on grazing systems was the Communal Grazing Cells which were to be used as experimental plots for grazing systems. This also was a failure with only one of the fourteen cells established. Communities were not eager to carve out a chunk of land for the use of a few when the need for grazing was high, the beneficiaries did not see sufficient incentive to join and the concept of a cooperative venture was foreign (Bekure and Dyson-Hudson, 1982). The LDP II had become involved in "deep social and political change" which it was not equipped to handle (Bekure and Dyson-Hudson, 1982). The recommendation on the commercial ranches which was a major and important part of the project was the following:

Since they offer no chance of achieving the aims of TGLP (which LDP II was intended to facilitate) it would be better if the Bank withdrew as firmly and rapidly as possible from the support of commercial ranch development in Botswana;... While it may be in the interest of a small number of individuals, so placed as to secure themselves private holdings, nothing in the operation of alienating land for commercial ranch use shows, so far, that it is in the national interest (Bekure and Dyson-Hudson, 1982, p.31-2).

In 1986 the project performance audit was completed by the

World Bank. In it "shortfalls" in the aspects of the project that affected grazing were noted but it was felt that the success of other aspects of the project, such as the building of marketing infrastructure and other infrastructure balanced the disappointment and that the project was reasonably successful (World Bank, 1986). It was noted that the project was overly ambitious and that the timeframe was too short; 20-30 years rather than five would have been more reasonable. Project performance would have been deemed better if the objectives had been less ambitious. Lower production targets and expectations would have improved the performance (World Bank, 1986). While realistic obtainable goals are important, the lowering of expectations to minimize the shortfall and to make the project into a success seems the easy way out. Why not work to make it better; why must it be: expect nothing so you won't be disappointed so you can write a positive report on a failure.

It is strange that while drought is one of the events that is cited as having a major effects on range condition, the 1981-1986 drought that occurred during the implementation of LDP II is not named as a cause of overgrazing but only as a cause of low water availability. Overgrazing is considered the sole cause of the range degradation in the project audit report.

E. National Land Management and Livestock Project

More was learned from the progress of the LDP II in Botswana and this is reflected in the design of the next livestock project, the National Land Management and Livestock Project which is also

referred to as LDP III. Through the three projects there has been progressively less emphasis on building "things" and more emphasis on increasing ability and institution building. The projects have also become more comprehensive as the "interconnectedness" of the economic system is recognized.

The NLMLP was also designed to support the development of the TGLP. Other objectives were to increase foreign exchange, improve the marketing infrastructure, refine the pricing structure in the livestock sub-sector, and reduce overgrazing. This was to be done by strengthening institutional capabilities of the country (World Bank, 1985), and improving the capability to manage and exploit rationally and equitably the rangelands including wildlife.

The project consisted of four land use plans for the four districts with the most cattle and assistance and training for implementing these plans, the training of extension personnel, the development of management plans for the communal areas and funding of these plans, credit and managerial assistance for developing commercial ranches and the building of more trek routes. A thousand farmers were expected to benefit from the project directly but with a potential to benefit all 58,000 livestock farmers in the TGLP due to better land use planning. It is thought that the previous projects failed because of no firm planning base on which to base the TGLP program. (World Bank, 1985). Twenty-five percent of the project funds were for land use planning and management, twenty percent were for livestock extension, forty-one percent were for a credit scheme for medium to large farmers, and seven percent were for the building of

trek routes (Shanmugaratnam, et al, 1989).

Ranches were still seen as the best way to achieve sustainable development and that the linking of producers to specific grazing areas would result in improved management (World Bank, 1985; Shanmugaratnam, et al, 1989). Privatization is still being assumed to be the answer.

While some things remain largely the same, the NLMLP has also taken some important and new steps. The project has incorporated some of the recent concerns for the environment by considering wildlife as part of the equation. The conflicts among livestock, arable farming, and wildlife are included and it is hoped that the land use plans will help minimize the conflicts between the sectors (Shanmugaratnam, et al, 1989). The project has taken a more integrated approach than projects in the past. Another issue that had not been considered before was pricing. Prices and the tax structure encourage investment in the livestock sector but not necessarily in offtake which encourages overstocking (Shanmugaratnam, et al, 1989). This investment from other sectors into cattle increases the pressure on the environment. It is possible that economic changes in these areas might have a greater impact on overgrazing than the methods used in the past.

The emphasis on ranch development and credit is leading to increasing inequality of resource distribution and incomes. NLMLP requires that ranchers develop their ranches as a term of the loan. This required infrastructure development has not been effective. In most cases, minimal work has been done, and management remains poor

as does the loan repayments (Shanmugaratnam, et al, 1989). The drought had some effect in some cases but development in areas that were not affected were not any better so it seems that drought was not a major constraint in this regard. As of 1989, there had been no progress on the group ranches and the communal areas development (Shanmugaratnam, et al, 1989). It is apparent that NLMLP will not address the overgrazing and natural resources problems of the communal areas any better than any of the previous projects.

The NLMLP suffers from the constraints of TGLP as the LDP II did before it. "The situation as we see it raises the question of whether or not the TGLP program in the present design and modes of implementation is the best way to achieve the goals of development set by the government of Botswana" (Shanmugaratnam, et al, 1989, p.35). They also concluded that the time has come to review TGLP as a basis for development. These conclusions are not surprising as Bekure and Dyson-Hudson reached the same conclusions seven years before.

Shanmugaratnam, et al, conclude their report with the following propositions: 1)The ranching program has not successfully solved the range management problem in the communal areas because dual rights exist. Dual rights should be abolished. 2)The reason why ranch development has been relatively limited and the overgrazing problem not solved even on individual ranches is lack of ranch management. Furthermore, this problem could be solved if absentee ownership of ranches were abolished. 3)To achieve an equitable development of the livestock sector, the policies must at this stage of the development

process be directed toward communal development because ranch development is an elitist development strategy (Shanmugaratnam, et al, 1989).

They recommend the development and use of flexible regulatory mechanisms that can respond to the changes in climate. They also recommend the empowerment of local institutions and the recognition that village members must have something to gain to cooperate (Shanmugaratnam, et al, 1989). It is obvious that doing development "to" people has not been effective.

While the NLMLP has made some important changes from projects in the past it does not address the most important range management problem that faces Botswana; the overgrazing and potential land degradation.

F. Lessons

There are many lessons that could be learned from this review of these projects. The following is a summary of the major lessons that could be learned.

1. While it is clear that there are many changes needed if livestock projects are to succeed in the future, it is also clear that positive changes had occurred from project to project. From LDP I and LDP II there was a move from turnkey development to requiring the ranchers to invest some of his own capital and labor in the development of the ranch. This change recognizes the importance of the target population feeling that they have a vested interest in the project and that it is "their's" and not the government's.

The TGLP, while not able to address the issues successfully, stated important, valid, and ethical goals. The government of Botswana should be commended for recognizing and attempting to address such issues when many governments ignore them. The goals remain important and additional methods of addressing them should be sought.

The effectiveness of the NLMLP, because it is relatively recent, is more difficult to assess. The fact that the design of the NLMLP is dramatically different from its predecessors is evidence of lessons learned. Land use planning studies and strengthening of "human capital" are a far cry from turnkey ranches. If the land use planning takes the relationships among different land uses and pastoral societies interests into account it should have a greater chance of success than past projects.

2. There is a need to reexamine the obsession with the "Tragedy of the Commons", privatization, and ranches in the communal area. The "Tragedy of the Commons" has dominated development in communal areas, possibly because it is a succinct and easy-to-understand concept and it is a justification for privatizing land. Privatization has not proved to be a cure-all for the overgrazing problem in the communal areas in these projects and elsewhere (Sandford, 1983), but planners return to it again and again, failure after failure. The concept of ranches also does nothing to address the needs of the poor. In some cases privatization is seen as an additional destabilizing force in a stable pastoral ecosystem (Ellis and Swift, 1988). While discussing the growth of population, Hardin, unknowingly

did a great disservice to pastoralist people. Much of the policy on the development of communal areas is based almost exclusively on this paradigm. While the "Tragedy of the Commons" is an interesting intellectual exercise "it does not derive from the complex reality of communal pasture exploitation and therefore, should not be accepted without question as the basis for formulating or evaluating pastoral development policy" (Artz, 1985, p.147). The mistake is to assume that "commons" means complete and open access rather than recognizing that there may be a variety of formal and informal systems, often social, for regulating resource use. The problem is that if the paradigm is abandoned and privatization is cast aside, there is nothing to take its place. A new system needs to be derived so there is an alternative rather than a return to old constructs by default.

3. There needs to be an acceptance and understanding for the existing pastoral system and the motivations of the pastoral people at the policy and planning level. There is a large body of knowledge in this area, primarily in cultural anthropology but also, more recently, is agricultural economics, but this information has not yet filtered into the policy arena. These pastoral social and economic systems have developed over very long periods of time to function in an unpredictable and erratic environment (Coughenour, et al, 1985). Now that the system is threatened by new exogenous factors the system should be encouraged to adapt to the new situation as it has adapted to other changes in the past. Rather than assume that pastoralists are irrational in their economic behavior, researchers and planners should determine why they behave as they do and use the knowledge

that the pastoralist have (Scoones, 1989b). This is different from the romantic view frequently promoted by social scientists who wish the system to be maintained exactly as it is. It is likely that pastoralist systems will have to change and adjust as they come into greater contact with modern society, but these existing local systems should be strengthened in areas where they work and assisted in an adjustment process where they do not, rather than discarded.

4. All the livestock projects in Botswana viewed the output of the projects as beef and its export value. The poorer stockholder is perhaps equally interested in the outputs of draft, milk, and manure. This difference in view could account for some of the indifference by participants to the projects; the pastoralists are reluctant to lose these outputs that developers and planners do not acknowledge. Behnke has proposed various alternative methods of measuring the benefits of subsistence and commercial livestock production (Behnke, 1985). He also suggests that measuring output by unit area rather than per head more closely reflects the pastoralists perspective. Abel, enlarging on Sandford's idea of "opportunistic strategies" calculates that when all outputs are considered, an opportunistic strategy (Traditional pastoral management) results in much higher total output than a conservative strategy (modern ranching) (ODI, 1990). Along these same lines, Western notes that the Maasai pastoral system has a food chain efficiency higher than that of a well-managed commercial ranch. He also points out that pastoralism supports a high human density per unit of land (Western, 1982). There is a need to recognize the various outputs that the

pastoralist receives and not impose a western view of the output.

5. Range management is rooted in environmental and ecological science and has been used to make economic choices and it is not adequate for the job with out some adaption and inclusion of economic ideas. Chapter three discussed why this is so. It is apparent that different measures of output need to be used if the effects of overgrazing are to be measured in a meaningful way. The assumptions about what constitutes degradation (changes in dominant species of grass) also need to be reviewed. One example is that the decrease of perennial grasses and the increase of annuals is considered degradation. However, this may represent a shift in response to changing rainfall rather than an indicator of range trend (Dye and Spear cited by Scoones, 1989). Researchers are now questioning the policies regarding stocking rates and rangeland conservation policies²³ and the costs and benefits of doing so. Another paradigm and model is needed in order that more useful management information can be generated. Ellis and Swift have proposed such a paradigm from an ecological standpoint (Ellis and Swift, 1988). They point out that pastoral ecosystems have historically been studied with the assumption that the systems are "potentially stable (equilibrium) systems" which can become destabilized by human and livestock activity. Their study presents a theory that pastoral ecosystems are "non-equilibrium but persistent, with system dynamics affected more by abiotic than biotic controls" (Ellis and Swift, 1988,

²³Abel and Blaikie, 1989; is a well done and comprehensive study of the entire issue of land degradation, stocking rates and conservation policies.

p.450.) Westoly,et al, have proposed an alternative management model (Westoly,et al,1989) from the standpoint of a range scientist using various states and transitions among the states and the costs involved in moving from one state to another.

6. It is clear that there is not now a new theory and system to take the place of conventional range management theory but there is a need to consider alternatives and additions to the theory if they prove to be pragmatic and useful. There is also a need for a generally accepted economic definition of degradation. Abel and Blaikie, and others have proposed some. It is not the intention of this paper to claim that everyone has been getting excited over nothing and overgrazing does not really exist. On the contrary, while the conventional succession model states secondary succession will result in improved land quality, the time frame for this happening is often very long particularly in arid climates. Given this long time frame (sometimes 40-50 years), it is not possible for managers to consider land redeemable in the shorter time periods (possibly annual) and it is increasingly important to keep true degradation from happening in the first place. The point is that there is a set of situations that are now termed overgrazing or land degradation and that a subset of this set really is defined correctly. Alternatively, there is also a subset of situations that are not overgrazing and not land degradation from an economic viewpoint. The task is to devise a system that will discriminate between these subsets so that attention and resources can be more accurately targeted at the real problems.

The information on which to begin building this new paradigm exists now but in a piece-meal fashion at the technical level. For example, animal nutritionists have known for several decades that browse from shrubs is an important part of the diet of herbivores in Africa, particularly in the dry season when the digestibility and crude protein in grasses is very low (Otsyina and McKell, 1985). Bush encroachment, or the growth of shrubs, is one of the components of degradation in the conventional theory. Depending on the species of animal, and the species of bush this can be true or false, and is site specific. There is much knowledge in individual disciplines that need to be brought together and developed into a complete system. They must be operationalized. It often takes a long time for ideas and concepts to be popularized and longer for them to gain legitimacy before conservative organizations like governments are willing to use them but the process needs to be begun.

7. Five years is too short a time frame for livestock projects. Given the long generation time of cattle, particularly in stressful climates; the time for an idea to be accepted by people, and delays due to others problems, time frames of anywhere from fifteen to thirty years would be more appropriate.

G. Summary

This chapter evaluates the First and Second Livestock Development Projects (LDP I and LDP II), the Tribal Grazing Land Program (TGLP), and the National Land Management and Livestock Development Project (NLMLP). The objectives of the chapter is to

examine the policy framework, the performance of projects and the implications for future livestock projects.

The First Livestock Development Project was proposed in 1970 and implemented in 1972. The objective of LDP I was to relieve grazing pressure on communal lands around villages by removing large herds of cattle from those areas to the ranches. The project was fraught with problems, many of which were inherent in the project design. The major problems fall into eight categories: logistical, institutional, organizational structure, technical, ecological, sociological and cultural, economic, and political.

Overstocking and overgrazing quickly became a problem on the ranches and no "modern" grazing systems had been implemented. LDP I illustrates the role of conventional range management practices in the course of implementing the project. Rangeland monitoring of plant composition was done and range condition scores were assigned based on this. While the theory recognizes the impact of other factors, in practice it is assumed that all changes are due to land-use practices. In the end the LDP I serves as an example and a warning of what not to do. The one positive aspect was that a Village Area Development Project staff member got involved in land use planning with the local people. The success of this made the government recognize that development needed to take people's priorities into account.

In 1975, the Government of Botswana published a White Paper entitled the National Policy on Tribal Grazing Land or TGLP. The TGLP was a response to concern about overstocking and overgrazing in the

communal lands. The "Tragedy of the Commons" philosophy underlies the TGLP. The aims of the Tribal Grazing Land Policy were to 1)stop overgrazing and degradation of the veld, 2)promote greater equality of incomes in the rural areas, and 3)allow growth and commercialization of the industry on a sustained basis. The program planned to divide the land into three categories; commercial, communal, and reserved.

The program suffered delays because of problems with zoning and with the leases to the commercial ranches. The TGLP had many flaws. The assumption that there was unused land proved to be false and the program actually increased the number of cattle on the communal lands as small herds were moved from the commercial areas. The program also did not provide for the needs of non-stock owning people and dual rights to land became a problem. Privatization did not prove to be the panacea that it was expected to be and the ranches in the commercial areas were quickly as overgrazed as the land in the communal areas.

The Second Livestock Development Project was the first livestock project implemented after the TGLP. While there were changes from LDP I there was much that was the same, particularly in development philosophy. The project was to assist in the development of TGLP ranches and encourage modern management practices. Implementation was very slow because of delays in the TGLP zoning and delays in the signing of leases. A review of the project was conducted and it was reported that TGLP was so flawed that the World Bank withdraw as firmly and rapidly as possible from the support of

commercial ranch development in Botswana.

The project design of the National Land Management and Livestock Project reflects some of what was learned in the previous livestock projects but NLMLP was also designed to support the development of the TGLP. The major aims of the project were to develop land use plans for the four major districts in the country, support livestock extension, a credit scheme for ranchers and, the building of more trek routes. The NLMLP suffers from the constraints of TGLP as the LDP II did before it.

CHAPTER 5

V. SUMMARY, POLICY IMPLICATIONS, AND AREAS OF FURTHER STUDY

A. Summary and Policy Implications

Pastoralism and communal livestock production are important economic activities in Sub-Saharan Africa. In Botswana, the agriculture sector is dominated by the livestock subsector because the country lacks adequate rainfall for arable agriculture. Recurrent drought is also a complicating factor. While the minerals sector has become the largest sector in terms of its contribution to the national GNP, livestock is important because a large portion of the population rely on income from livestock to survive.

Since 1960, many livestock projects have been implemented in Sub-Saharan Africa but few have been successful and most donors have withdrawn from this sector. There is a need for an evaluation of the design and performance of these projects in order that future projects can be improved. An equally important issue is the natural resource and environmental aspect of communal livestock. As people become more aware of the need for environmentally sustainable agriculture, this concept will need to become a part of project planning. Botswana is located in Southern Africa, is land-locked, and has an arid to semi-arid climate with highly variable rainfall. The vegetation is primarily thornveld and dry woodland savannah. The population in 1989 was estimated at 1,347,568 and the growth rate is estimated to be 3.4%. Eighty percent of the population lives in the

eastern strip of the country. A large number of Batswana work in the mines in South Africa.

Botswana is a democratic country which was known as Bechuanaland and was a British Protectorate before independence. Independence was achieved in September 1966. At independence Botswana was one of the least developed and poorest countries in the world. Shortly after independence the country was found to be rich in minerals. As a result of the expansion of the beef industry and the minerals sector, economic growth has been very high.

Historically, livestock, and cattle in particular, have been central in the economy because of the climate. Cattle are also important for milk products and plowing. The 1978 Symposium on Drought concluded that recurrent drought was a recurring problem in Botswana and this convinced the government that environmental concerns needed to be considered in the future. The World Commission on Environment report, Our Common Future, mobilized donors and world opinion to also include environmental concerns in development planning and evaluation.

The purpose of the paper is to assess the performance of selected livestock projects in the communal areas of Botswana since independence, with emphasis on natural resources and environmental issues. The objectives of this paper are to:

- 1) discuss the historical role of livestock in the economy of Botswana from 1966 to 1990,
- 2) review recent developments in environmental and range management theory,
- 3) analyze past livestock development projects in Botswana, and
- 4) discuss the implications of these changes on the design of future interventions in the livestock subsector.

Botswana can be divided in three ecological zones; 1)the Limpopo catchment, 2)the Okavango Swamp, and 3)the Kalahari sandveld. Only a small percentage of the land area is suitable for cultivation and water is most often the limiting resource.

Land allocation has changed dramatically as the country moved from a traditional system, through colonialism, and into independence. Access to water and overgrazing were the main reasons for government policy changes on land.

Under the communal system, land is available to anyone, within a kinship group, who can use it. In reality, access to other resources such as water and cattle determine who has access to land.

Livestock has been and is an important subsector in the economy. The national herd is reported to have experienced rapid growth since independence. Cattle ownership is extremely skewed. The 1974/75 Rural Income Distribution Survey found that forty-five percent of rural households owned no cattle and ten percent of rural households owned fifty percent of all the cattle. Cattle ownership is important for arable agriculture because draught-power is an important output of the livestock sector. Milk and manure for fertilizer are others.

The formal cattle marketing sector is dominated by the Botswana Meat Commission (BMC). Eighty-five percent of the offtake goes through the BMC. The major markets for Botswana beef are South Africa and the EEC. Private butchers perform the majority of domestic marketing and village and home slaughter are thought to also be substantial but is difficult to quantify.

The government strategy for livestock development is focused on five areas; 1)sustainable agriculture, 2)animal health and disease control, 3)increased offtake, 4)research, and 5)increased marketing linkages.

The livestock sector is large and the demand for land and natural resources is high. Other uses for the natural resources are arable agriculture and wildlife, which provides subsistence hunting, tourism, and commercial game utilization.

Chapter 3 discusses the close relationship between range management and environmental theory and how range management functions in practice. The roots of conventional range management theory are found in the western U.S.A. around the turn of the century under the leadership of the ecologist, Clements. The ecological principles of succession and climax populations were developed concurrently. Succession is the orderly process of community change until an equilibrium or "climax" population is reached this is based more on species type than on density. Disturbances which lead away from climax are thought to retrace the pathway by which the climax population was developed.

Clements' ideas were challenged by ecologists in the early part of the century and also later in the 1960s and 1970s. They criticized Clements' view because it did not adequately address life history characteristics, disturbances, and the effects of chance events on vegetation change.

Range managers use the classification of range condition and trend to evaluate their management. It is assumed that range

condition can be improved by proper grazing management and that secondary succession is the reverse of the pathway of degradation.

The concept of range condition is based on ecological endpoints rather than agronomic or animal production endpoints and while there is correlation between these endpoints they are not as precise and exact as they could be. Range condition is considered excellent if the species of grasses present are climax species or nearly climax species that would occur naturally if there was no human intervention. There are therefore, no explicit economic endpoints or goals in the basic concept of range condition though economic results are implied.

The climax approach, in practice, does not allow for site differentiation nor is secondary succession always the reverse of retrogression. Neither does it account for suspended stages of succession or thresholds in the short timeframes useful to managers. The basic theory can not be applied to drastically modified communities and it is assumed that only climax vegetation furnishes adequate soil protection and erosion prevention.

Range management specialists use the concept of range classification to measure the success of past policy and institutional changes, but it does not do this well because it is not an economic system but a biological one. Some range management specialists recommend abandoning the climax approach and Ellis and Swift, and Westoby, et al, suggest alternatives.

Conventional range management theory has been the foundation of livestock policy and land use in most African countries. In

addition to the problems inherent in range management, policy for communal areas rely heavily on "The Tragedy of the Commons" scenario. "The Tragedy of the Commons" describes a situation in which land is held publicly while, in this case, cattle are held privately. Because the marginal costs are shared by a group but the marginal benefits accrue to an individual there is no incentive to refrain from bringing additional animals onto the land.

Sandford finds many problems with the current thought and assumptions on which communal areas policy is grounded. He questions whether desertification is taking place on a great scale; the accuracy of reported livestock statistics; and the mistrust of traditional economic and social systems.

The consequences of the current thought have been 1)rapid implementation of programs with little research before implementation, 2)the desire to reform social systems rather than assist their adaption, 3)an obsession with the "Tragedy of the Commons", 4)an insensitivity and callousness toward the destitute of pastoralist societies, and 5)a tendency of programs to assign a key management role to the government.

New developments in range management include the recognition that the theory is not adequate in many cases and that it needs to be refined. Some recommend a combination of models depending on the situation. Others use site potential or a land use approach. Still others suggest other criteria that reflect the economic production goals of the sector. The implications of this new thinking in range management are far-reaching because it would affect the policy and

program level.

Chapter Four evaluates the First and Second Livestock Development Projects (LDP I and LDP II), the Tribal Grazing Land Program (TGLP), and the National Land Management and Livestock Development Project (NLMLP). The objectives of the chapter is to examine the policy framework, the performance of projects and the implications for future livestock projects.

The First Livestock Development Project was proposed in 1970 and implemented in 1972. The objective of LDP I was to relieve grazing pressure on communal lands around villages by removing large herds of cattle from those areas to the ranches. The project was fraught with problems, many of which were inherent in the project design. The major problems fall into eight categories: logistical, institutional, organizational structure, technical, ecological, sociological and cultural, economic, and political.

Overstocking and overgrazing quickly became a problem on the ranches which had been developed on unused land because the ranchers moved more cattle onto the ranches than was anticipated, including the cattle of family members and employees and no "modern" grazing systems had been implemented. LDP I illustrates the role of conventional range management practices in the course of implementing the project. Rangeland monitoring of plant composition was done and range condition scores were assigned based on this. It is assumed that all changes are due to land-use practices. In the end the LDP I serves as an example of what not to do. The one positive aspect was that a staff member of the Village Area Development

Project got involved in land use planning with the local people. This planning focused on land use patterns and their relationship to other land uses, taking into account both livestock and arable agriculture and the relationships between the two activities. The success of this made the government recognize that development needed to take people's priorities into account.

In 1975, the Government of Botswana published a White Paper entitled the National Policy on Tribal Grazing Land (TGLP) in response to growing concern over overstocking and overgrazing in the communal lands. The aims of the Tribal Grazing Land Policy were to 1)stop overgrazing and degradation of the veld, 2)promote greater equality of incomes in the rural areas, and 3)promote growth and commercialization of the industry on a sustained basis. The "Tragedy of the Commons" philosophy underlies the TGLP. The program planned to divide the land into three categories; commercial, communal, and reserved.

The program suffered delays because of zoning problems and problems with the leases to the commercial ranches. The TGLP had many flaws. The assumption that there was unused land proved to be false. The program actually increased the number of cattle on the communal lands as small herds were moved from the commercial areas onto the communal lands, thus exacerbating the problem of overgrazing rather than curing it. The program also did not provide for the needs of non-stock owning people and dual rights to land became a problem. Privatization did not prove to be the panacea that it was expected to be and the ranches in the commercial areas were

quickly as overgrazed as the land in the communal areas.

The Second Livestock Development Project which was proposed in 1978 and implemented 1980 was implemented under the TGLP. The goal of the project was to assist in the development of TGLP ranches and encourage modern management practices. But implementation was very slow because of delays in the TGLP zoning and delays in the signing of leases. A review of the project was conducted in 1982 and it was reported that TGLP was so flawed that the World Bank withdraw as firmly and rapidly as possible from the support of commercial ranch development in Botswana.

The design of the National Land Management and Livestock Project (NLMLP) which was implemented in 1984, reflects some of what was learned in the previous livestock projects but NLMLP was also designed to support the objectives the TGLP. The major aims of the project were to develop land use plans for the four major districts in the country, support livestock extension, a credit scheme for ranchers and, the building of more trek routes. The NLMLP suffers from the flaws of the TGLP as the LDP II did before it.

The major policy implication that flows from this paper is that the assumptions on which conventional range management are based are being questioned by the range scientists themselves because conventional range management does not describe the biological variability of specific environments in enough detail to be useful in the management of various heterogenous areas. Because the government's land and livestock policies are based on conventional range management it is apparent that these policies would be

strongly affected. The government will need to study and review the new paradigms that some scientists are proposing and determine how policy would need to change to fall in line with these ideas. The effects are far-reaching indeed as they would require additional research and funds into a field in which there has been minimal research and funding. If policy is to change to take account of current ecological thought then it is possible that the bureaucratic structure may need to be changed as well. This is not as easy thing, for this requires people to change the way they think and view the world and this is often more difficult than changing the design of a project or adding another department of an existing structure.

B. Areas of Further Study

The field of range management requires a great deal of work. Measurement systems using endpoints such as forage for livestock, and ground cover need to be tested and standardized and compared with the existing methodology to see if overgrazing can be better defined in more economic terms. There is also a need to determine the value of browse in the diet of herbivores and if bush encroachment is as big a problem as it is supposed. There is a great need for all the information from different discipline to be brought together and integrated. Finally there is a need to apply economics to the study of pastoralism. There is much that is known about the motivations of the pastoralists and how pastoralism really functions but this work has primarily been done by anthropologist and has not been applied by range scientists and ecologists. There is a great need for people to

be aware of information outside of their own discipline and to integrate all this information. The pastoralist system has developed in an erratic and fluctuating environment and has developed many strategies for dealing with this environment. It also is no longer isolated from the rest of the national economy and needs to be integrated with it. Some aspects of the pastoralist system that have developed in response to the risks of the environment need to be retained while others will need to be adapted as the system comes in greater contact with the rest of the national and international economies. It is necessary to know what that pastoral system does well and what it does not do well if the positive aspects are to be strengthened. Throwing the entire system out has not proved to be a useful technique.

While there is much that could be done at the technical level, no amount of research or study can change the fact that the real issue is political power. In Botswana, as in many countries, there is a close alignment of wealth and power. It would be the rare government indeed which would voluntarily give up a portion to its personal wealth in exchange for social justice. Because of this, it is important that development efforts promote economic and social justice and not reinforce the existing distribution of resources. Hirschman borrows price theory terminology when he describes projects as "trait-takers" or "trait-makers" (Hirschman, 1967). He suggests that "the decision which traits to 'take', that is, to accept ... and which ones to make ... is crucial to project design and success. Yet it is hardly ever spelled out" (Hirschman, 1967, p.131). In the case

of livestock projects this would suggest that because cattle are largely owned by the wealthy, any livestock development project which involves cattle would just reinforce a skewed distribution of resources. If it is the true intention of a project to improve the situation of the poorer segments of a society then it would follow that development projects should avoid funding sectors which are dominated by the wealthy. If livestock development projects are to address this issue, perhaps an emphasis on smallstock rather than cattle would be more ethical. Ownership of smallstock in Botswana is more widespread than that of cattle and the ownership is much less skewed (Colclough and McCarthy, 1980). Ownership of smallstock is much more accessible to the poor, and could possibly improve nutrition as smallstock are killed for food while cattle are generally sold for cash and not often slaughtered for consumption. A concentration on smallstock will not address the draft issue and thereby assist arable agriculture but the benefits of directing funds toward the poor would outweigh that issue, particularly because the emphasis on cattle has not incorporated the draft issue either. In any case, there can be no technical answer to political issues other than to avoid reinforcing the existing situation.

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