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LESOTHO'S AGRICULTURE:

A Review of Existing Information

Research Report No. 2

Lesotho Agricultural Sector Analysis Project

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Prepared by the

LASA Team

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PREFACE

In 1976 a Cooperative Agreement was negotiated between the Government of Lesotho, Colorado State University and the United States Agency for International Development to establish the Lesotho Agricultural Sector Analysis (LASA) Project. The overall goal of the effort is to strengthen the Planning Unit of the Ministry of Agriculture and the Agricultural Section of the Central Planning and Development Office. Specific objectives include a review and accumulation of library materials related to agricultural development in Lesotho, overseas and in-country training programs, and to build within Lesotho the capacity to develop and utilize sector analysis within the operational context of agricultural planning and policy formation.

The project is divided into phases. Phase II began with the arrival in Maseru of the Colorado State University Team. Phase II, the Agricultural Sector Review, was seen as a multiple purpose activity serving on the one hand to introduce the CSU Team to the problems of Lesotho and on the other to give the Government of Lesotho some confidence in the CSU Team. Phase II was thus to "serve as a foundation for the long-term relationship between the two institutions."*

The major purpose of Phase II, however, "is to provide a document utilizing existing data which is program oriented and contains specific recommendations on strategy and programs related to the immediate needs of the GOL, AID and other donors. The ASR will determine current gaps in data, knowledge and analysis which impinge upon the planning strategy of the GOL."

In actual fact the contractual specification of the content of the ASR document is more all embracing than has appeared prudent. Both the Basotho and CSU members of the LASA team feel that it would have been premature to move from a review of the agricultural sector directly to "specific recommendations on strategy and programs" without the analytical foundation to be developed during Phase III. Phase II was contractually seen as only a six-month effort, a programming fact which, itself, suggests a more limited scope. Ultimately the definition of this Agricultural Sector Review document evolved as available resources, data gaps and other factors become known. During this evolution the word "Review" became the guiding focus of our efforts.

The chapters that follow present a review of the agricultural sector insofar as it may be considered reliably understood. It is drawn almost entirely from existing data, reports and analyses. While no new raw data are included, the existing material is occasionally retabulated in novel ways to emphasize a point. As a review of present and past materials, it is drawn almost exclusively from expatriate sources and

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*Quotations in the preface are from Cooperative Agreement No. AID/TA-CA-1, signed September 30, 1976 between AID and CSU.

probably suffers for it. We are troubled to find among the references used only a handful in which a Mosotho appears as principle author of a substantive report about Lesotho. Consequently what might be considered the "view from the village" is probably under-represented.

The Cooperative Agreement specifies that five major sub-topics will be covered:

1. Land and Water Conservation/Reclamation
2. Manpower
3. Livestock
4. Marketing
5. Crop Production and Risk Management

The report deals with each as well as other topics woven in to give a more balanced picture. Conservation, as a topic, is the subject of a large consultant study recently completed. We have included material from their report into ours for Chapter VIII along with other material. Our conclusions and theirs are not necessarily identical. The marketing topic suffered from a complete absence of prior research or analysis of marketing as a process or instituion. At the time of writing, a study is underway in preparation for possible USAID assistance to the Produce Marketing Corporation, whose conclusions should add measurably to the information base on this topic. For our purposes we have chosen to include items considered significant within the chapters on livestock and cropping.

To these sections we have added a thorough review of the resource environment, both natural and human, and a review of land tenure. These two provide the framework within which agricultural activities occur.

In assembling this review we have drawn on written and personnel resources throughout the Ministry of Agriculture and elsewhere. We very much appreciate the large amount of time and cooperation extended to us. Various members of the Planning Unit (MOA) or of CPDO assisted with analysis or preliminary reviews. In particular, Marabe Phoofolo, Maurice Phakoana and 'M'ampiti Nchapi have made substantive inputs. The review could not have reached its present form without the LASA library and the assistance of Mrs. Julia Leballo, librarian. We were also assisted measurably in the search for materials by the Bureau of Statistics and Messrs Tuoane and Giri of that organization as well as the library staffs of Central Planning, the National University and the Maseru UNDP office. Errors of omission, commission and interpretation remain the responsibility of the CSU-LASA team.

The agricultural sector is complex and many facets are not well understood or reported. This review, as with all such exercises is necessarily incomplete. We would hope, however, that a useful picture of Lesotho's agriculture emerges from the following chapters.

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CHAPTER I

ECONOMIC OVERVIEW

The Kingdom of Lesotho has been aptly called "A Development Challenge" by the World Bank (IBRD, 1975). The tiny country is characterized by many economic, social, political and natural factors which are unusual, some which are unique and others which have thus far defied description. Taken together they constitute a development environment sufficient to challenge the most imaginative minds.

Lesotho is one of the few countries world wide which are completely landlocked and one of only two which are completely surrounded by another nation; the other being the Principality of San Marino. With a total area of 11,700 square miles it is approximately the size of Belgium. However, only 13 percent or just under one million acres is considered arable. Population now exceeds 1.2 million at least 85 percent of which are rural residents, a rural percentage equal to that of Bangladesh. Most of the population resides in the Lowlands giving that area one of the highest densities in Africa. While the overall human density of 104 persons/mi^2 is not remarkable, the density of 770 persons/arable mi^2 exceeds that of India.

Lesotho's climate is of a subtype which has few other examples in the world and those are confined to limited areas.* While average rainfall and temperature levels would both be considered acceptable for crop growth, the climate is characterized by unusually high levels of variability and risk, creating disincentives for farming. And it is a nation whose "Lowlands" where most cropping occurs, range between 5000-6000 feet above sea level. The remainder of the country is largely mountains including the highest peak (11,425 feet) in southern Africa.

Lesotho is also unusual in the African context in its relative ethnic homogeniety. While a few identifiably distinct groups may exist, the nation is essentially populated with one people, the Basotho, who have shared a common historical and cultural experience since the amalgamations of Moshoeshoe I, 150 years ago. Their land tenure system, while similar to that of other southern African groups, has evolved enclosed in Lesotho's peculiar circumstances since the 1860's or before and contains elements not found elsewhere. And finally, despite nearly 150 years of scrutiny, analysts differ on whether the rural Mosotho agriculturalist is a farmer or a pastoralist, whether his society can be classified as peasant or tribal and whether economics is even a useful explanatory tool with which to analyze his behavior. The rural Mosotho occasionally seems beyond analytical reach at least to the foreign observer.

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*Page II-8 contains a brief discussion of possible analogous climates.

The Economy

Resources

By most standards Lesotho is poorly endowed in natural resources. No significant mineral deposits have been discovered with the exception of diamonds. Stockley (1947) examined geological features of Lesotho in some depth and was only able to suggest building stone and road bed gravels to be of any particular importance. Part of his survey included analysis of stream bed materials from 120 rivers and streams. He concluded, "The purely negative results of these tests and examinations indicate that no valuable mineral deposits may be expected from the rocks of the Drakensberg volcanic beds" (p. 78). He specifically reviewed all evidence related to the possibility of petroleum deposits; concluding (p. 75), "The concensus of expert opinion is, therefore, definitely against the view that any workable petroleum deposits occur in the Karoo System. It is certain that there are no indications in the exposed rocks of Basutoland; and there are no clues pointing to subterranean sources". He further reviewed evidence on the economic feasibility of exploiting reported coal deposits. His finding: "All the evidence observed indicates that coal in payable quantities does not occur in Basutoland" (p. 81). While the economics of coal exploitation may have changed with technological and price developments since 1947, Lesotho still imports nearly all coal used.

Systematic exploitation of one kimberlite pipe for diamonds began in the 1970's. Exploration and testing of other locations is underway. Diamond exports have been growing rapidly, exceeding R1.2 million in 1977.

Sandstone has been historically exploited as building material. Supplies are abundant; workability varies but large strata of preferred quality exist in abundance. Systematic exploitation in support of a construction industry has lapsed in the last two decades but is being reconsidered as a possible development program aimed at employment generation.

Lesotho's two principle natural resources are watersheds and grasslands, two components of an ecological system. The mountain regions are the source of all the principle rivers in southern Africa. Upper reaches of watersheds are often characterized by extensive bogs which act as sponges, absorbing and storing torrential rains and releasing them to river flows at a slower pace. Extensive grasslands in the foothills and mountains also slow the rate of runoff, prevent erosion and contribute to the regularity of stream flows.

With the large elevation differences within the country, plus the volumes of water in the Orange and Caledon River systems as well as others, Lesotho possesses enormous hydro-electric potential. Viewed from an ecological standpoint, exports of water and hydro-electric energy would appear to constitute a natural cornerstone for economic growth. Potential for irrigation to supplement natural rainfall would also seem logical.

Population growth is spreading into the mountains resulting in increased pressure on the land for grazing and crops. Lesotho's land tenure treats grazing rights communally with the result that controlling cattle numbers and grazing intensities is exceedingly difficult*. Cattle numbers may now be at historic highs. The incidence of over grazing is increasing rapidly in the mountains. Not only are grasslands threatened but bogs and sponges are being damaged. River flows are now subject to large seasonal fluctuations; the Caledon, Lesotho's second largest river, ceases to flow in the winter of most years. Without major impoundments regular hydro-electric generation is impossible. Yet reservoirs have not attracted investment due, in part, to the absence of control over watersheds and the very high sediment loads carried.

Nevertheless, large projects for water export and power generation have been considered seriously in the recent past. Negotiations seem to have foundered on the occasional turn of events in relations between Lesotho and the Republic of South Africa which is the only possible importer (IBRD, 1974).

Ecologically, Lesotho's range lands fall within one of the most productive grassland areas of the world, the Highveld of southern Africa. Production capacity and regenerative capacity are believed to be very high. However, attempts to develop quantitative estimates in Lesotho are hampered by the absence of areas which have not been seriously affected by grazing.** Without such reference points of ground truth, it is difficult to calculate the extent to which range productivity is constrained by overstocking and communal use. Neverhteless, there is widespread concurrence that the ranges of Lesotho are producing well below levels that could be achieved by improved management.

Energy resources are a particular problem. Stockley shows quite clearly that there are no commercial deposits of fossil fuels in Lesotho. Hydro-electric potential remains untapped. Reported hot springs and vents have not been assayed for geothermal power potential. Nuclear power generation is not under active considereation.

Given the high incidence of cloudless days and the fact that cold temperatures are not excessively low in winter, solar energy appears promising. Village dwellings almost always are situated to take advantage of northward orientation of the sun during winter. Both passive and active solar heating systems are in experimental use in a few government and commercial buildings.

For the time being, however, Lesotho remains almost completely dependent on imported energy of all types. Urbanization, rising vehicle registrations, growth in manufacturing and commerce and electrification

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*See Chapter V below.

**M. Madland, personal communication.

of existing rural towns and district centers all contribute to rising demand for power. Since 1971 the value of energy imports has risen steadily at a compound rate of 30 percent annually (IMF, 1975).

The Economic Setting

Nearly every facet of Lesotho's economy is intimately linked with economic policies and events in South Africa. These effects appear throughout what follows. Important economic linkages are summarized toward the end of the chapter. Table I-1 summarizes trends in Gross Domestic Product (GDP) and Gross National Income (GNI) for recent years. 1968/68 to 1969-70 constituted a period of relative stability in most of the parameters reported and is taken as a reference point to measure change.

The picture that emerges has few bright spots. For the nine years covered in the table (measured from the mid-point of the base period) the pattern that emerges is one of increasing trade imbalance and an increasing dependence on migrant remittances to pay the bill. Exports rose at a rapid percentage rate but from a small base. In absolute terms exports in 1977/78 were estimated at R36.25 million above the base period average while imports exceeded the base figure by R186.34 million.

Behind this trade deficit migrant labor remittances were the second fastest growing component of GNI. The particularly large percentage increases in 1974/75 and 1975/76 might be questioned were they not very consistent with concurrent increases in migrant earnings. A minimum shift wage of R0.72 prevailed until June 1, 1974. On that date the minimum was raised to R1.20 per shift; six months later it was raised to R1.60. Wages at other skill levels rose proportionately (van der Wiel, 1977). Per shift mine wages have risen further since 1974 with minimum levels reaching R2.50 on June 1, 1976 and R2.75 in 1977.

Remittances as a percent of GNI rose dramatically following the 1974-76 wage increases. In 1975/76 reimttances apparently exceed GDP by R12.5 million. Imports trebled between 1973/74 and 1976/77. In the latter year very nearly 80 percent of GNI was expended on imported items.

Some progress in reversing these trends can be sensed from provisional estimates for the last two years. However, this is largely due to the recovery of the domestic economy from the bad crop year of 1975/76 plus the fact that mine wages have not increased significantly in real terms since 1976. At the end of the last fiscal year, Lesotho remained in the unenviable position of having 45.9 percent of her Gross National Income derived directly from wages in South Africa. In the South African industries to which Basotho generally migrate, wages are not determined by market forces. Consequently, the largest single component of GNI is controlled by policy decisions taken in the Republic based on criteria which do not usually include Lesotho's welfare. Not only are wage rates so determined but so are the number of jobs available to Basotho since each migrant must be processed through a recruitment agency for which the South African government sets specific quotas.

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Table I-1. Gross Domestic Product and Gross National Income for Lesotho: Composition and Growth Rates (Thousand Rand Units at Current Prices)

Item	Base 1967/68 -1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76*	1975/77*	1977/78*	1977/78 as percent of base	Compound Growth Rate
Final Consp. Expenditure, Govt.	6,382	6,223	8,299	9,296	9,590	9,550	10,560	14,220	21,780	341	14.6
Final Consp. Expenditure, Private	53,200	58,609	67,674	86,367	102,880	139,220	175,430	231,330	266,880	505	19.7
Gross Fixed Capital Formation	4,779	5,039	6,632	6,040	10,450	9,390	22,070	24,710	17,690	370	15.7
Changes in Stocks	NA	NA	NA	1,240	5,650	2,360	**	**	**	-	-
Exports of Goods and Services	3,750	3,444	2,638	5,768	9,040	23,170	20,830	36,290	40,000	1067	30.1
Imports of Goods and Services	-23,664	-24,255	-30,561	-46,495	-66,130	-105,200	-151,500	-201,760	-210,000	887	27.5
Gross Domestic Product	44,448	49,060	54,683	62,216	71,480	78,490	77,390	104,790	139,350	311	13.4
Migrant Labour Remittances	11,627	14,067	15,545	20,678	29,683	59,860	89,970	102,660	117,420	1010	29.3
Gross National Income	56,975	63,127	70,228	82,894	101,163	138,350	167,360	207,450	255,770	449	18.2
Migrant Remittances as Percent of GNI	20.7	22.3	22.1	24.9	29.3	43.3	53.8	49.5	45.9		
Exports minuus Imports	-19,914	-20,811	-27,922	-40,727	-57,090	-82,030	-130,670	-165,470	-170,000	854	26.9
Imports as Percent of GNI	35.0	33.0	39.8	49.1	56.4	59.3	78.1	79.7	66.5		

*Preliminary
**Changes in stocks included in Private Final Consumption Expenditures

Sources: 1967/68 to 1972/73 from BOS, 1978; 1973/74 onwards from tables submitted to IMF by Ministry of Finance.

The principle implication is that Lesotho has only limited control over its own economy. A second conclusion from Table I-1 is that a very large proportion of Lesotho's consumption expenditure is dependent upon migrant remittances. Any unscheduled or abrupt cessation of these flows would be felt immediately throughout the country.

Table I-2 develops estimates of per capita GDP and GNI in real terms for the 1970's. Retail price or cost of living indices are unavailable for Lesotho prior to 1973/74. South African retail prices are available and can be used as a proxy for Lesotho since data available for years of overlap suggest a close correspondence (IMF, 1975).

Again the picture is not encouraging. There has been essentially no progress for nine years in real per capita GDP. Almost all of the growth in real GNI has occured because of rising real wage rates in the Republic, coupled with an expansion in the number of migrants. It is unlikely that either phenomenon will continue. First, facing an unemployment rate of 27 percent among their own African population as well as increasing pressures to mechanize mining and othe industries, the future for imported labor does not look promising. The most likely prospect is a decline in absolute numbers of Basotho employed over the next 20 years. Second, having substantially revised real wage rates in basic industries especially mining during the mid-1970's, it seems most probable that future wage hikes will be closely tied to cost of living indicators and will not represent growth in real terms. This is suggested by the wage adjustment made in 1977, a suggestion reinforced by South Africa's domestic unemployment rate, which will limit wage increases.

With respect to the future of migrant remittances, Lesotho's most probable prospect would seem to be at best constant numbers of migrants employed at a stagnant real wage. No contribution to real growth can be expected. If migrant numbers decline, negative growth rates will follow swiftly in Lesotho unless the domestic economy can provide offsetting stimulii.

Of the domestic sectors agriculture is by far the largest. Its importance, however, is declining due to stagnation in productivity while other sectors grow. An additional possible depressant to agriculture is, again, the increase in real migrant wages noted above. Concurrently, with this development a nationwide increase in fallow acreage has been reported, suggesting that large increases in remittances to rural households have reduced the incentive to cultivate.

Table I-3 presents the sectoral breakdown of GDP for recent years. Agriculture declines from 51.4 to 41.4 percent of the total during these four years.

Table I-2. Estimated Real Per Capital Gross Domestic Product and Gross National Income for Lesotho.*

Year	Current Prices GDP	Current Prices GNI	Price Index (1968/69=100)	1968/69 Prices GDP	1968/69 Prices GNI	Population	Real Per Capita GDP	Real Per Capita GNI	Percent Growth GDP	Percent Growth GNI
1967/68-1969/70	44,448	56,975	100	44,448	56,975	1,017	43.70	56.02	-	-
1970/71	49,060	63,127	108	45,426	58,451	1,064	42.69	54.94	-1.2	-0.9
1971/72	54,683	70,228	115	47,550	61,068	1,088	43.70	56.12	2.4	2.1
1972/73	62,216	82,894	124	50,174	66,850	1,112	45.12	60.12	3.2	7.1
1973/74	71,480	101,163	139	51,424	72,779	1,138	45.19	63.95	0.2	6.4
1974/75	78,490	138,350	157	49,994	88,121	1,163	42.99	75.77	-4.9	18.5
**1975/76	77,390	167,360	179	43,235	93,497	1,190	36.33	78.57	-15.5	3.7
**1976/77	104,790	207,450	199	52,658	104,246	1,217	43.27	85.66	19.1	9.0
**1977/78	138,350	255,770	231	59,892	110,723	1,244	48.14	89.01	11.3	3.9
9 Year Annual Growth Rate	13.4	18.2	9.7	3.4	7.7	2.4	0.9	5.3		

*Figures in Thousands except per capita columns.
**Preliminary

Sources: GDP and GNI from Table I-1; Price Index from IMF, 1975; and unpublished data from Ministry of Finance.

Table I-3. Lesotho: Gross Domestic Product at Factor Cost, 1973/74 to 1977/78. (in millions of rand - current prices)

	1973/74	1974/75	1975/76	1976/77
Agriculture	35.45	35.15	36.69	43.62
Crops	(19.28)	(17.07)	(18.87)	(24.54)
Livestock	(16.17)	(18.08)	(17.82)	(19.08)
Mining and Quarring	0.24	1.10	1.69	2.69
Manufacturing	1.83	3.15	2.60	2.30
Building and Construction	1.66	0.99	2.59	5.31
Transport and Communication	1.68	2.12	2.10	2.91
Government	6.59	6.29	9.30	11.50
Ownership of dwellings	7.59	8.57	8.83	10.90
Catering	2.00	2.37	4.33	6.07
Wholesale and retail trade	6.54	10.81	12.05	14.20
Other[1]	5.33	5.19	4.08	5.80
Total	68.91	75.74	85.26	105.30

[1]Includes electricity and water, and finance

*Preliminary

Development Planning

Formal development planning in Lesotho dates from the early 1960's when the practice of preparing successive three-year investment programs commenced. However, such planning was not stystematic and was geared mainly to the procurement and allocation of U.K. financial assistance. With the establishment of the Central Planning Office in 1967, Lesotho embarked on its first effort at comprehensive development planning. A draft Provisional First Five Year Plan was issued in 1969 and used to support negotiations for foreign assistance. Political problems delayed work on the plan and it was not formally accepted until late in 1970 (IMF, 1975, p. 20). A Planning Unit was established within the Ministry of Agriculture in 1969, receiving its first Mosotho officer in 1970.

The first plan suffered from the absence of information necessary for planning as well as an inadequate institutional framework for planning and implementation. It was largely an exploratory exercise, geared primarily toward creating a basis for future economic development. The plan's objectives included maintaining current expenditure growth at 2.5 percent per year, increasing domestic revenue, movement toward a balanced budget, improvements in vocational education and extensive natural resource and agricultural development (CPDO, 1970).

The Second Five-Year Development Plan followed covering 1975/76 to 1979/80. Broad aims are states as 1) Economic growth, 2) Social justice, 3) Maximum domestic employment and 4) Economic independence. Specific objectives listed for agriculture include: (Lesotho, 1975/76).

A. For crop production

1. To foster general yield and production increases but specifically to achieve net self sufficiency in basic grain and vegetable production. A 38 percent increase in agricultural output is targeted.

2. To increase crop derived income (wheat, beans, forage crops to support livestock production and introduction of potatoes and asparagus).

3. To bring efficient input supply and producer oriented market organization to the village level.

4. To improve power supply through support of oxen and tractor powered mechanization.

5. To increase the quality of the extension service.

6. To foster a production and market oriented crop research program.

B. For livestock production

1. Raise productivity, particularly through improvements in nutrition, breeding, disease prevention and general management.

2. Raise value added within the nation through better marketing and processing.

During the second plan period international problems arose to alter development priorities. The closure of Lesotho's border with Transkei due to South Africa's attempt to establish that area as an "independent" homeland effectively isolated the southern portion of the country. Poorly connected with other districts within Lesotho, residents in this area suddenly found themselves unable to obtain food, medical assistance and other essential items. An emergency assistance program was developed to alleviate the crisis and has received considerable response from the international foreign assistance community. A United Nations response in the form of the Farah Mission developed a very broad package of assistance to immediate needs reflecting the pressures and priorities of the situation. The United Nations program exceeds R120 million accompanied by a projected 345 expatriate man-years of technical assistance. Compared to total anticipated expenditures during the Second Plan of R233 million (R80 million through the capital budget) it is obvious that the border closure will have had a significant impact on the overall thrust of development planning.

Economic Relations with South Africa

The economy of the Republic of South Africa, its policies and events, looms pervasively behind most economic dimensions in Lesotho. Some advantages occur, while offsetting disadvantages are often cited. In overall effect, Lesotho's ability to control domestic economic events is seriously constrained. Principle dimensions of these relationships are outlined here; details appear through subsequent chapters.

Labor Migration: Migration to employment in the Republic is the most significant relationship and receives the most attention. Lesotho's male labor force between 18-60 has been estimated to be employed as follows:

Agricultural employment	28%
Paid employment in Lesotho	7%
Unproductive	5%
Employment in South Africa	60%

Some 200,000 Basotho, 175,000 men and 25,000 women were employed in the Republic in 1976, making them the largest group of the 8-10 nationalities involved in such work. Lesotho has historically maintained their high relative role in South Africa's economy, beginning with the gold mining industry in the 1890's. Over time, the Basotho have earned a preferred position within the migrant work force and on the average hold positions commanding considerably more than the minimum wage.

Traditionally most of Lesotho's migrants are employed in the mines, the largest percent still in gold mining. Employment in non-mining activities (construction, farm labor) is a significant activity but data are lacking because such migration bypasses the formal recuritment agencies. However, South African figures record only approximately 100,000 Basotho miners.

Since migration is essentially a life work for the Basotho and has been so for most of this century, it has become part of the accepted life style. It is a pervasive element touching nearly every village and family in the country with implications in most spheres of life. Even the Prime Minister was once a mine worker.

At the macro level several important consequences of migration stand out. First, very nearly half of the nation's GNP is composed of repatriated migrant earnings, a fact seen above in both positive and negative lights. On the one hand growth in remittances has provided almost all growth in real per capita GNP occuring over the last decade. On the other hand, very limited control of the overall size of the economy and its growth or stagnation is implied.

Second, sixty percent of the nation's male labor force is absent from the country; seventy percent of those in the most productive 20-50 age bracket. The consequence is human resource scarcities at all levels of government, industry, commerce and agriculture. Labor shortages have

been suggested as one of the more serious constraints to agricultural production. One piece of evidence informally cited is the rise in arable land left fallow that parallels the rise in mine wages since 1970. Another notable symptom is the thriving weed population found in most maize and sorghum fields.

At the micro level migration affects family life in countless ways. Some eight households out of 10 are believed to have a family member working in the Republic. For these households, R554 of an average total household income of R783 is derived from migrant incomes. The balance of incentives and what it implies for agricultural growth is suggested by the comparison with income from crops (R47), from livestock (R90) and income from off-farm work in Lesotho (R92). Combined crop and livestock incomes contribute only 17 percent of the total.

Analyses in Chapter V shows that the land tenure system does not prevent accumulation of wealth by rural individuals and therefore does not, by itself, preserve income equity. It would seem from the above that, to the extent Lesotho can truly claim an equitable rural income distribution, the principle cause is relatively equal access to employment in South Africa.

The above summary of migration has borrowed extensively from A.C.A. van der Wiel's excellent study (1975). A more exhaustive discussion constitutes part of Chapter IV below.

Trade Relations: For one of the world's "least developed countries" to be surrounded by a developed nation such as South Africa is a unique situation. Points at which the two economies interact highlight the contrasts. The instance of migration discussed above is simply a case where the labor market in South Africa offers to the rural Mosotho a minimum wage five times that prevailing in his village. With training and experience he can reach salary levels equal to those of intermediate level Government of Lesotho employees. Forty percent of migrant's remittances to Lesotho are in the form of goods purchased in the Republic (Lesotho, 1975/76) while a major portion, perhaps 65-70 percent or more, of cash remittances are respent on produce imported from RSA.

Table I-4 summarizes trade statistics for recent years. Annual growth rates in nearly all classes of imports except chemicals exceed 30 percent. Manufactured goods and foodstuffs accounted for 75 percent of the growth in total value. While an important component in 1976 was generated by goods imported with foreign assistance money for development projects, the overall picture, nevertheless, implies very large expansions of consumer expenditures. Net imports, very largely from RSA stood at approximately 80 percent of GNP in 1976/77.

Lesotho's exports are processed primarily through South African channels. Cereals, wool and mohair, the largest single export commodities are sold through or to commodity marketing boards. Wheat is exported as grain to the Republic and wheat flour is imported for consumption The

Table I-4. Estimates of Imports and Exports of Goods (in values of million rand)

	1968-1970 Base	1971	1972	1973	1974	1975	1976
Imports							
Foodstuffs, beverages, tobacco*	6.5	6.9	11.7	18.2	20.3	27.0	45.8
Crude Materials	0.3	0.6	0.5	0.4	0.5	0.8	1.3
Mineral fuels, etc.	1.4	1.7	2.4	2.8	5.4	7.1	11.7
Animal and Vegetable Oils	0.1	0.3	0.4	0.5	0.8	1.1	1.6
Chemicals	1.5	1.8	2.2	2.8	4.2	6.3	9.5
Manufactured goods	10.0	11.9	20.7	28.9	42.0	62.0	87.0
Machinery and transport equipment	2.8	4.1	5.0	6.9	8.4	12.8	22.7
Other imports	1.0	0.7	-	-			
TOTAL Imports	23.6	28.0	43.0	60.5	81.7	117.3	179.6
Exports							
Live Animals	0.9	0.7	0.9	2.0	1.5	0.4	0.2
Foodstuffs	0.7	0.3	0.7	0.3	*	1.1	1.8
Wool	1.3	0.8	2.0	3.2	3.5	1.5	1.7
Mohair	0.6	0.5	1.1	1.5	1.6	2.3	2.0
Diamonds	0.8	0.2	0.2	0.3	0.9	0.5	0.5
Other exports	0.2	0.4	1.1	1.5	2.7	3.5	8.4
TOTAL Exports	4.4	3.0	6.1	8.8	9.8	9.2	14.6
Trade Deficit (Exports-Imports)	-19.2	-25.0	-36.9	-51.7	-71.9	-108.1	-165.0

*Includes live cattle

Source: BOS, 1978.

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construction now underway of a large flour mill in Maseru will alter this pattern substantially. Diamond exploitation in Lesotho is being managed by the De Beers Company and the product exported, largely in raw form, through South Africa to Europe.

The feasibility of developing trade with countries beyond South Africa has received considerable attention in recent years. In southern Africa, excluding the Republic, markets are limited. Shipment to Europe is cumbersome for a nation without access to the sea and without an airport capable of handling cargo aircraft. The embryonic asparagus industry is based on the assumption of a European market and shipments have been made in small lots by air through Johannesburg. Establishing trade access directly to points beyond RSA is the principle economic justification for the new national airport being designed at present.

The South African Customs Union: Lesotho is a member of the South African Customs Union and the Rand currency area. These relationships have both advantages and disadvantages. On the positive side, Lesotho has, with some exceptions, free access to a large market with great purchasing power. For some agricultural products Lesotho benefits from support prices paid by South Africa. Furthermore, Lesotho is able to draw on the foreign exchange reserves of South Africa, which relieves her of the necessity of insuring that development generates foreign exchange for debt servicing.

The principle detriment is severe constraints placed on Lesotho's ability to pursue an independent monetary or fiscal policy. Lesotho has no central bank and since it uses the South African rand as its currency has no independent monetary policy.

> "Although, in theory, the arrangements provide for consultation on policy matters among the participating countries, in practice it has been the strongest member, South Africa, who has determined the policies relating to foreign exchange, exchange rates, monetary matters and levels of customs, excise and sales tax. These policies are generally determined in the light of South African economic conditions, and are not necessarily in the best interest of the three smaller countries". (IBRD, 1974).

Of direct importance to agriculture, commodity prices in Lesotho correspond very closely to those in the Republic. The Mosotho farmer, therefore, faces a price structure set for a land and labor extensive, capital intensive agriculture. In the neighboring Orange Free State white owned farms average 1230 hectares with a total per farm investment including land of R452,536. Consequently the Mosotho faces a relative price mix that does not reflect his relative resource mix at all. Even with production levels equal to those on the best South African farms, it is doubtful that a Mosotho with five acres and no equipment or investment capital can equal the net returns to be made from migration.

Supply of Food: At the household level, the South African economy is important in another significant dimension. Figures for 1973 show that Lesotho produced only 45.1 percent of the total apparent consumption of foodstuffs. Over half of daily food consumption is thus being imported (IMF, 1975). This fact, alone, locks Lesotho into an intimate economic relationship with the Republic of South Africa quite apart from linkages at the macro or national level discussed above.

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CHAPTER II

RESOURCE ENVIRONMENT FOR AGRICULTURE

Part 1, Physical Resources

There seems little need to stress the importance of the physical environment and physical resources to agricultural planning and development. Although remarkable results can be achieved in environmental modification through such means as fertilizers and irrigation, the opportunities and constraints presented by the natural environment still largely determine the potential for agriculture. This is particularly true in Lesotho where economics and environment conspire to severely limit the range of agricultural possibilities.

Thus, it comes as something of a surprise to find that in the past major development efforts have been designed and implemented with little attention to the climate, soil, and water resources of project areas. The following section briefly reviews major characteristics of physical resources in Lesotho, and advances some suggestions for improving the bases for analysis and planning.

Climate

The climate of Lesotho is often cited as one of the major constraints on agriculture (e.g., Rose 1977, pp 9-10; Smit 1967, p. 33). Average climatic conditions establish the general range of agricultural options and climatic hazards, such as drought and frost, form primary risk elements for Basotho farmers. Yet despite the critical role assigned to climate in Lesotho, many aspects of particular concern to agricultural activities and planning remain uninvestigated. The following brief review will discuss the major characteristics of climate in Lesotho and suggest specific areas where additional information is needed.*

Precipitation

For most stations in Lesotho more than 75 percent of the annual precipitation falls during the six summer months October-March (Table II-1), primarily in the form of convectional showers or storms. Lowland southern stations receive slightly less rain than northern stations and may receive a greater proportion of rain in the winter from frontal systems passing to the south. Considering the modest annual averages of 700 to 800 mm in the Lowlands the north-south seasonal differences, although small, are important in terms of soil moisture conditions and crop suitability.

Precipitation generally increases from west to east corresponding to increasing altitude. Along the central Maluti and eastern Drakensberg ranges average annual precipitation may exceed 1300 mm. However,

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*For a more complete treatment see LASA Discussion Paper No. 1, "Agroclimatology of Lesotho" (Wilken 1978a).

Table II-1. Average Monthly Precipitation (mm)

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total	Six Months Winter Amt	Six Months Winter %	Six Months Summer Amt	Six Months Summer %
Lowlands																	
Butha Buthe (28° 46'S 28° 15'E 1770m)	12	14	27	78	99	110	127	107	105	58	30	13	780	154	20	626	80
Leribe (28° 53'S 28° 03'E 1740m)	13	13	30	76	104	117	132	115	112	60	34	13	819	163	20	656	80
Teyateyaneng (29° 09'S 27° 44'E 1750m)	11	12	22	68	90	93	111	93	99	57	31	11	698	144	21	554	79
Maseru (29° 17'S 27° 30'E 1530m)	12	13	21	61	88	89	108	91	99	60	29	11	682	146	21	536	79
Wepener, RSA (29° 44'S 27° 01'E 1400m)	12	12	18	49	66	70	85	89	96	56	26	13	592	137	23	455	77
Mafeteng (29° 49'S 27° 15'E 1610m)	12	15	26	59	82	88	104	106	107	66	33	13	711	165	23	546	77
Mohale's Hoek (30° 09'S 27° 28'E 1600m)	14	15	26	62	86	95	113	101	106	61	37	15	731	168	23	563	77
Quthing (30° 25'S 27° 43'E 1740m)	14	17	34	64	83	98	101	93	102	67	37	15	725	184	25	541	75
Mountains																	
Mokhotlong (29° 17'S 29° 05'E 2200m)	9	14	23	57	78	9[illegible]	105	78	66	36	21	9	586	112	19	474	81
Thaba Tseka (29° 30'S 28° 37'E 2160m)	11	14	22	59	67	86	96	72	74	39	27	8	575	121	21	454	79
Qacha's Nek (30° 07'S 28° 42'E 1970m)	13	19	39	66	103	147	163	140	120	46	26	18	900	161	18	739	82

Source: Hydro Surv. 1971. Period of record 50 years, 1920-1970 except Quthing (47 years to 1970); Mokhotlang (40 years to 1970) and Thaba Tseka (approx. 30 years of broken record to 1970).

mountain valleys such as those of the Senqu (Orange) river are sheltered from prevailing winds and orographically produced rain and may receive as little as 500 mm (Fig. II-1).

From long-term records (HMSB 1971) it is known that annual precipitation at some stations may vary from 50 percent below to 50 percent above the mean. Variations for individual months are much greater. Although the ranges are not particularly unusual, variations of this magnitude around low annual averages may mean crop losses from drought or field flooding, especially in the shallow and poorly drained soils that characterize much of the Lowlands.

Hail is a recurrent threat and is one of the main concerns of Basotho farmers (Gay 1977, pp. 145-166). Schulze (1972) estimates that most points in Lesotho can expect hail 7 to 8 times per year. Unfortunately, no nationwide or even regional survey of hail incidence and hail damage has been completed so evaluation of this worrisome climatic hazard remains largely subjective.

To compensate for inadequate data on hail probabilities the South African insurance company that offered coverage in a trial program to the Leribe Pilot Agricultural Scheme charged 1 percent more on premiums in Lesotho than on similar insurance sold in the Republic (Leribe 1973).

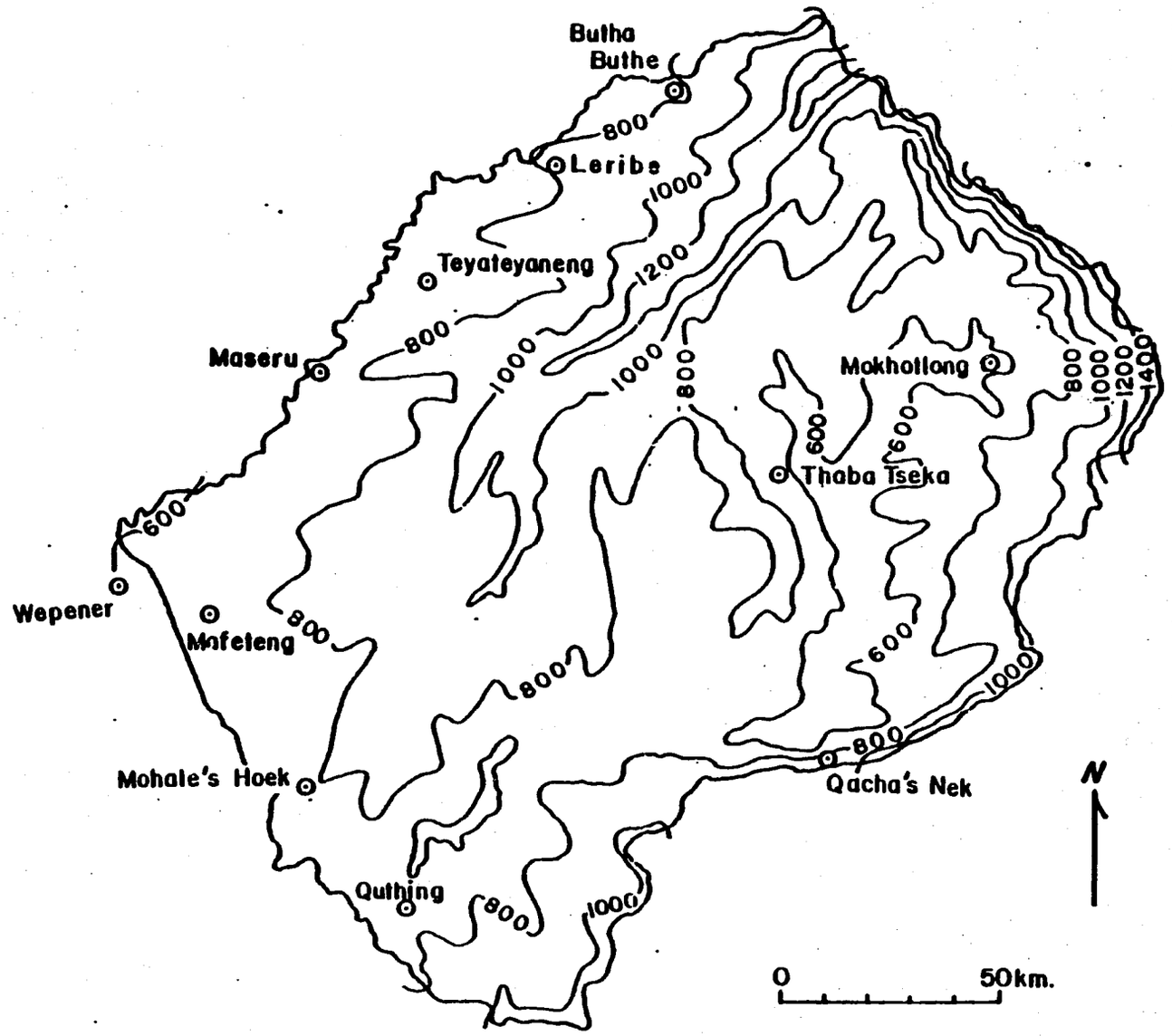
Temperature

With a north-south extension of less than 250 km there is only a slight latitudinal effect upon temperature differences. Instead, altitude is the dominant control in this high and mountainous country. Annual temperatures for Lowland (1500-1800 m) stations average 14 to 16° C. whereas stations in the central and eastern mountains (above 2400m) are considerably colder.

The annual march of temperatures for selected stations are shown in Table II-2. Highest monthly temperatures occur in January or February; lowest in June or July. Diurnal temperature ranges are considerable. Minimum ranges occur in mid- to late-summer and are on the order of 12 to 13° C. in the Lowlands and 14 to 15° C. at higher elevations. In the winter daily temperature ranges increase to 14 or 15° C. in the Lowlands and 18 to 20° C. in the mountains.

Frost is one of the more threatening climatic hazards in Lesotho. Although most Lowland stations enjoy a seven- to eight-month frost free summer, late or early frosts can reduce the growing season by a month or more. The first and last frost dates for Lesotho shown in Table II-3 are from measurements at standard screen (shelter) height of 120 cm.

Figure II-1. Average Annual Precipitation in Lesotho



Source: Sweco 1977 Vol. 2, p. 2:5

Table II-2. Average Monthly Temperatures for Ten Stations in Lesotho. (units °C.)

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Year
Western Lowlands													
Butha Buthe (28° 46'S 28° 15'E 1770m)	7.3	9.6	13.1	16.2	18.0	19.5	19.8	19.1	17.4	14.6	10.1	6.9	14.3
Leribe (28° 53'S 28° 03'E 1740m)	7.1	9.9	13.7	16.9	18.3	19.8	20.3	19.2	17.8	14.4	10.4	7.3	14.6
Teyateyaneng (29° 09'S 27° 44'E 1750m)	8.0	10.7	13.9	16.9	18.0	20.1	20.3	19.6	17.8	14.7	11.5	8.4	15.0
Maseru (29° 17'S 27° 30'E 1530m)	6.7	10.1	13.3	16.0	18.3	20.5	21.0	20.4	18.3	14.7	10.3	6.7	14.7
Wepener, RSA (29° 44'S 27° 01'E 1400m)	7.5	10.5	13.8	17.2	19.1	21.2	22.1	21.3	19.1	14.9	10.9	7.5	15.4
Mafeteng (29° 49'S 27° 15'E 1610m)	7.4	10.3	13.2	16.4	17.6	19.9	20.4	19.5	17.5	14.4	10.9	7.9	14.6
Mohale's Hoek (39° 09'S 27° 28'E 1600m)	8.1	10.7	13.8	16.9	18.8	20.4	21.4	20.2	18.6	14.9	10.9	7.3	15.2
Quthing (30° 25'S 27° 43'E 1740m)	6.9	10.4	13.2	16.1	17.7	19.4	20.5	19.3	17.5	13.9	10.8	7.8	14.5
Eastern Mountains													
Mokhotlang (29° 17'S 29° 05'E 2200m)	4.9	9.8	10.9	13.6	14.4	16.3	16.6	16.3	14.4	11.6	7.4	5.0	11.6
Thaba Tseka (29° 30'S 28° 37'E 2160m)	5.6	7.9	11.1	14.0	15.1	17.1	16.9	15.9	14.7	11.8	8.3	5.6	12.0
Qacha's Nek (30° 07'S 28° 42'E 1970m)	7.4	9.8	12.7	14.9	15.9	17.6	18.5	18.0	16.5	13.9	10.6	7.6	13.6

Source: Clim. Bul. 10/1975. Average monthly temperatures for Thaba Tseka developed from Binnie & Partners 1972, Vol. 1, p. 7, and from data in the files of the Hydrological and Meteorological Services Branch, Ministry of Works, Lesotho; for Wepener from RSA-WB Pt. 1, WB 19, p. 32.

Table II-3. First and Last Frost Dates for Lesotho

	Years of Record	Elevation	Extreme Last Frost	Average Last Frost	Average First Frost	Extreme First Frost	Frost Free Days Between Average Last & First Frost Dates
Leribe	29	1740	1 Dec	14 Sep	10 May	7 Apr	237
Teyateyaneng	28	1750	2 Oct	24 Aug	2 Jun	5 Apr	281
Maseru	29	1530	4 Oct	6 Sep*	13 May	2 Apr	254
Wepener	27	1400	17 Dec	3 Oct	1 May	8 Apr	209
Mafeteng	25	1610	13 Nov	20 Sep	19 May	23 Apr	240
Mohale's Hoek	28	1600	1 Dec	26 Sep	11 May	6 Apr	226
Mokhotlong	21	2200	30 Nov	13 Oct	9 Mar	19 Apr	187
Thaba Tseka	11	2160	25 Dec	21 Oct	3 May	9 Apr	193

Source: RSA-WB 1954 (Pt. 1, WB 19) p. 115 except average last frost date* for Maseru adjusted to 6 Sep vice 5 Aug in concurrence with suggestion of Clim. Bul. 2/1977.

Of perhaps greater interest for agriculture are "grass minimum" temperatures taken 5 cm above the ground where most crop plants grow, and where all pass their early growth stages. A comparison of screen and grass minimum frost dates for Maseru (Table II-4) shows that the average frost-free growing season is more than two months shorter if surface rather than screen temperatures are used, and that January is the only month without a recorded frost during the period of record.

Table II-4. Comparison of Frost Dates at Maseru 120 cm and 5 cm above the Ground. (Period 1968-1976).

	Extreme Last	Average Last	Average First	Extreme First	No. of Frost Free Days Between Average First & Average Last Frost Dates
Screen (120 cm)	8 Oct	14 Sep	14 May	2 May	241
Grass (5 cm)	5 Dec	30 Oct	14 Apr	6 Feb	165

Source: Clim. Bul. 2/1977

Evaporation

Records of evaporation from Class A pans in Lesotho are presented in Table II-5. The short periods of record and in some cases questionable quality of data preclude detailed analysis in relation to precipitation and soil moisture storage. Furthermore, evapotranspiration calculated by any of the standard formulae has not yet been satisfactorily reconciled with

measured evaporation (Binnie & Partners 1972, pp. 54 ff). However, it appears that evaporation at most stations exceeds precipitation in all months and that annual deficits (P-E) are substantial. In the warm Lowlands available moisture normally is not sufficient to satisfy the atmosphere's capacity to absorb water. Thus, in rainy years losses to evaporation and plant transpiration actually increase (de Baulny 1977, p 13). Developing reasonably reliable potential evapotranspiration estimates for the agricultural regions of Lesotho deserves highest priority since it is essential information for crop planning.

Table II-5. Class A Pan Evaporation for Three Stations in Lesotho (millimeters)

Yrs. of Record	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Butha Buthe 7	97	139	181	212	215	245	230	197	178	125	110	84	2013
Maseru 3	84	122	186	215	230	260	288	227	174	117	83	62	2048
Mokhotlong 6	102	158	193	225	211	211	225	184	176	121	114	100	2020

(Binnie & Partners 1972, Vol. 1, p. 54)

Future Research Needs

Hazards: Environmental hazards are widely recognized as an important component of agricultural planning and decision-making in Lesotho (Wilken 1978b). Recurrent drought (Dyer and Tyson 1977), frequent hail, killing frosts, and field flooding from too much rain are mentioned by farmers as major problems, (Gay 1977, pp. 145-166), as are climate-related hazards such as worms and blight. Farmers' fears are well-placed: crop failures from climatic or climate-related causes were reported as 13.7 percent of total area planted in 1969/70 and 11.5 percent in 1976/77, the two years for which crop failure data is available (BOS 1972; 1978). Total losses often run into the millions of Rands. Aside from some tentative investigations into remedial measures such as hail insurance (e.g., Leribe 1973), little has been done either to understand the conditions and probabilities of hazardous events or to acquaint farmers with methods for reducing risks.

Local Climates: Temperature and precipitation are measured by a network of about 30 stations in Lesotho, and precipitation only is collected at perhaps 30 more. For a poor country such as Lesotho this is reasonably good coverage. However, it is not adequate to reveal local meso- or micro-scale climates that are important to agriculture. Small

scale climates largely are results of local modification of general elements (Geiger 1965). For example, radiation and temperature regimes differ markedly on north- and south-facing slopes. Cold air ponds in valley bottoms. Strong winds and high evaporation rates are modified by rows of hills. Often, favorable local climates can be exploited for crops that in general are prohibited, or unfavorable areas can be avoided. To date, no programs have been proposed to identify local climates for planning purposes. It would be advisable if future development programs, particularly area-based projects, were to include detailed regional investigation and inventories of local climates, and evaluations of their potential for agriculture.

Agroclimatic Analogs: The combination of low latitude, high altitude, and position with respect to prevailing pressure and wind patterns produces distinctive and relatively uncommon climates in Lesotho. But uncommon is not the same as unique, and at similar latitudes and altitudes similar climates may be found. Thus, a preliminary survey has revealed possible climatic analogs for Lesotho in Argentina, Australia, Laos, southern China (People's Republic), Zimbabwe (Rhodesia), and neighboring South Africa. Lack of available data has prevented detailed comparisons. Nevertheless, conditions appear to be sufficiently similar to warrant careful investigation of these and other analogous regions.

The use of agroclimatic analogs is a familiar method for identifying environmentally similar regions and for comparing crop combinations and farming systems. It has already been used in Lesotho although never systematically: recommendations by UNDP-FAO to plant asparagus and cherries in Lesotho were based upon the fact that these crops grew successfully in South African areas with similar soils and climates (Philippe 1971). It would be of considerable value to extend the method to include all the world's areas with similar environmental conditions in an effort to determine the spectrum of crops, animals, and farming systems that might be considered for introduction into Lesotho.

Summary

Despite the key role assigned to climate in Lesotho by most agricultural analysts, exact relationships remain largely uninvestigated. Long-term records are available for several major stations, and recent installations of new stations and improvement of existing stations promise that general nationwide reporting will be considerably improved. However, information on local micro- or meso-scale climates that are vital to farming are lacking. In addition, probabilities of major hazards such as drought, hail, and frost are not yet available, nor are studies of farmers' perceptions of climate, risk, and risk avoidance strategies. Finally, analagous climates elsewhere in the world could be examined for crops and farming systems that might be considered in Lesotho.

Soils

For an agrarian nation the soil is one of the most fundamental resources. Not only types of agriculture but also general levels of

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activity and prosperity depend upon the natural soil endowment, and upon the management which maintains and improves this endowment or, alternatively, degrades it.

Thus a thorough knowledge of soils and a complete soils inventory are essential to any comprehensive evaluation of agricultural potentials. But although soil conservation has had a long history in Lesotho, scientific soil sampling and analysis has been undertaken only recently. For this reason as well as the variability of Lesotho's soils, nationwide evaluations of the soil resource are not yet possible. This review, therefore, will focus upon current activities as an introduction to the subject, and to the information of value to agricultural planners that now is being developed.

Soil Surveys

Until recently soil evaluations in Lesotho were mostly subjective-descriptive, of little use to systematic agricultural planning. The excellent reconnaissance surveys and maps of Carroll and Bascomb (1967) and Bawden and Carroll (1968) provided the first nationwide overview. Although certain emphases and terminologies have since been questioned (Binnie & Partners 1972, v. 3, pp. 19-20), these surveys remain useful for general patterns of soil types.*

Presently soil surveys are being carried out by the Conservation Division, Ministry of Agriculture. Surveys usually are of specific conservation project areas, in some cases associated with area-based agriculture development projects (e.g., Thaba Bosiu). Surveys and accompanying soil maps are either reconnaissance or detailed. Table II-6 lists those soil surveys that have been completed. Although still far from adequately surveyed, Lesotho no longer is the *terra incognita* of earlier times; a great deal is now known about the characteristics and potentials of agricultural soils and a basis is available for sound planning.

Classification Systems for Soils

Soil analyses and surveys are absolutely essential for establishing an objective inventory and evaluation of the soil resource and as such, are indispensible for sound agricultural planning. But soil science has its own technical language that often is unintelligible to the uninitiated. In this review it seems appropriate to simplify the detailed and often technical description of soils and processes by grouping soils according to general characteristics.

Such an approach is available in the Lesotho Conservation Cropping Guidelines (MOA, 1977a), in which soils are grouped according to general

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*Binnie & Partners (1972, v. 3) elaborate on the earlier Carroll and Bascomb (1967) survey and attempt to reconcile its classifications with more conventional systems.

Table II-6. Approximate Area of Conservation Projects and Soil Surveys of the Conservation Division (areas in hectares)

Project	Arable Land	Grazing & Villages	Approximate Total Area	Approximate Area of Soil Surveys to Date	Type of Survey
Beria-Majara	11,331 ha	9,955 ha	21,286 ha	21,286 ha	detailed
Bera-Martintsi	3,076	2,266	5,342	5,342	detailed
Khomokhoana	9,510	5,463	14,973	- - -	- - -
Kolonyama	7,284	809	8,093	8,093	detailed
Likhakeng	243	- - -	243	- - -	- - -
Liphiring	649	565	1,214	- - -	- - -
Matelile	786	144	930	- - -	- - -
Matsieng-Morija	3,035	3,946	6,981	6,981	detailed
Moroeroe	728	1,485	2,213	- - -	- - -
Mount Moorosi	809	1,457	2,266	2,861*	detailed
Onyeluk's Nek	- - -	4,451	4,451	3,688	detailed
Oxbow	- - -	- - -	- - -	1,619	detailed
Phuthiatsana	43,382	72,923	116,305	60,701	reconnaissance
Qalo	3,391	6,943	10,334	12,140*	detailed
Qhalaqhoe	1,607	9,365	10,972	- - -	- - -
Qhoqhoane	9,966	14,371	24,337	- - -	- - -
Senqu	66,454	578,184	644,638	- - -	- - -
Thaba-Bosiu	38,638	77,277	115,915	115,915	detailed
Thaba Phatsoa	542	3,441	3,983	3,983	detailed
Thaba-Tseka	3,237	40,468	43,705	1,619	detailed
				54,411*	reconnaissance
Tsakholo	- - -	- - -	- - -	- - -	- - -
Tsoaing	16,954	16,470	33,424	4,047	detailed
	221,622 ha	849,983 ha	1,071,504 ha	302,686	
Sehlabathebe National park	- - -	- - -	7,610	7,610	detailed
				(195,184 ha)	(detailed)
				(115,112 ha)	(reconnaissance)
Totals	221,622 ha	849,983 ha	1,079,215 ha	310,296 ha	

* Area of soil survey may exceed are of project.

Source: Conservation Division, Ministry of Agriculture, Lesotho.

characteristics and crop suitability. These groups include the main agricultural soils from the Lowlands and Foothills regions where most farming takes place. The soil series, descriptions, and evaluations below are taken from these Guidelines.*

Prominent soil groups in the Lowlands and Foothills include:

1. Leribe Soil Group: (Includes Leribe, Matela, Sofonia, and Maliele soil series). Moderately deep to deep, mostly well-drained, reddish colored, loamy soils of the undulating to rolling sandstone uplands.

2. Thabana Soil Group: (Includes Thabana and Khabos soil series). Deep, moderately well to somewhat poorly drained, dark colored, clayey soils of the mountain foothills and ancient river terraces, respectively.

3. Mats'aba Soil Group: (Includes Mats'aba and Machache soil series). Moderately deep to deep, well-drained, reddish-colored, fine loamy to clayey soils of the undulating to rolling basaltic foothills.

4. Berea Soil Group: (Includes Berea and Rama soil series). Moderately deep to deep, somewhat poorly drained, yellowish-colored and mottled, loamy soils of the undulating to rolling sandstone and uplands.

5. Sephula Soil Group: (Includes Sephula and Maseru soil series). Moderately deep to deep, somewhat poorly to poorly drained, grayish-colored and mottled, clayey soils of the valley bottoms.

   The Sephula group contains the distinctive and somewhat controversial "duplex soils" in which a light-textured surface layer overlies a much heavier and usually much older substratum. In true duplex soils the transition between the two layers is abrupt. Drainage is severely impeded and heavy rainfall can quickly waterlog these soils. In addition, they seem particularly susceptible to gully (*donga*) erosion.

   Duplex soils are widespread in southern Africa and are generally considered a major problem in Lesotho (Carroll and Bascomb 1967, pp. 14-16). However, Binnie and Partners (1972, v. 3, pp. 31-36) argue that they are not prevalent in Lesotho, being limited mostly to the Border Lowlands, and thus do not pose major management problems except in that region.

Land Capability Classes: The chemical and physical analyses that are used to differentiate soil series do not by themselves necessarily

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*Detailed characteristics of the various soil series are available in Binnie & Partners (1972, v. 3) and from the Conservation Division, MOA.

indicate suitability for any particular use. Therefore, soils must further be evaluated for general purposes. Two of the most common uses are for civil engineering, as in foundation material for roads or buildings (e.g., MOA, n.d.) or for agriculture. Suitability for agriculture commonly is indicated by Land Capability Classes.

Capability is an expression of the effect of physical features, including climate and slope, on the suitability of land for agriculture without permanent damage to the soil resource. Soils are grouped according to their possibilities and limitations, and to their response to similar land treatments. The classes do not take into account expensive modifications such as major slope modification (e.g., bench terraces) or irrigation.* Generally, only Land Capability Classes I to III are considered suitable for farming. (Table II-7)

Table II-7. Land Capability Classes

Class I	-	Very few soil limitations that limit their use for cropland.
Class II	-	Moderate limitations in soils or slope that either reduce the choice of crops or require moderate conservation practices for safe use.
Class III	-	Severe limitations in either soils, slope or climate that reduce the choice of crops or require intensive conservation practices for safe use.
Class IV	-	Very severe limitations in soil and/or slope that reduce the choice of crops or require very intensive land treatment for safe use (the land should be in grass most of the time).
Class V	-	Physical limitations that are impractical to remove for cropland use. There is little or no erosion hazard when used for pasture, range or woodlot. (To-date none of this land has been mapped in detail).
Class VI	-	Severe physical limitations in either soil or slope that preclude their safe use for cultivated crops and limit their safe use to pasture, range, woodlands, recreation and wildlife.
Class VII	-	Very severe physical limitations in either soil or slope that preclude their safe use for cultivated crops and restrict their use largely to grazing, woodland and wildlife.
Class VIII	-	Physical limitations in landforms that preclude their use for commercial plant production. They are restricted to recreation, wildlife, water supply or esthetic use.

*A separate 6-part classification has been developed for rating the irrigation capability of land in Lesotho. (Binnie & Partners 1972, v. 3.

Soil Evaluation and Management: The soils "groups" are listed above in general order of agricultural quality, from the Leribe Series which contains the better soils in Lesotho to the Sephula and Maseru soils which are particularly difficult to manage. The correlations are only approximate since any Soil Group could include soils in Capability Classes I to VII. As a final step, therefore, soil groups are evaluated in terms of specific crops and treatments. Preliminary findings are shown in Table II-8. These ratings are still being refined and should be checked before decisions are made with respect to soil suitability and crops.*

Table II-8. Soil-Crop Guidelines

	Soil Group*				
Crop	Leribe	Thabana	Mats'aba	Berea	Sephula
Maize	Good	Good	Good	Fair	Fair-Poor
Sorghum	Good	Good	Good	Fair	Poor
Wheat	Good	Good	Good	Good	Fair
Beans	Good	Good	Good	Fair	Fair
Peas	Good	Good	Good	Good	Poor
Potatoes	Good	Poor	Good	Fair	Unsuited
Sunflower	Good	Good	Good	Fair	Poor
Fodder	Good	Good	Good	Good	Good

*Rating applies to Land Capability Classes I to IV

To recapitulate, soils are assigned to a Soil Series based upon chemical, structural, textural, and locational characteristics. Similar series are combined into Soil Groups. Evaluation for a general purpose (e.g., agriculture) results in Land Capability Classes, whereas Cropping Guidelines relate Soil Groups to specific crops and management practices.

The preceeding discussion of soils in Lesotho is not to be interpreted as a guide for planning as such. Instead, it suggests that a systematic program for soil analyses, inventories, and evaluations is well underway, and that as information becomes available, it can be presented in forms that are usable by those without technical training.

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*The complete Cropping Guidelines contain many more specific mangement suggestions, including plowing, planting, and fertilizing recommendations.

Summary and Recommendations

Concern with soils has a long history in Lesotho, in part because of their problematic nature and the spectacular erosion to which some are susceptible. Thus, although soil analyses and detailed mapping still are far from complete, the general state of soil knowledge is much more advanced than in many other countries at comparable stages of development. There should be no doubt that this work is fundamental to objective agricultural planning and development and there should be no lessening of survey efforts until all farming areas have been mapped in detail.

In a commendable effort to make soil characteristics and potentials intelligible to field advisors and farmers, the results of laboratory analyses and field trials are being organized in simplified fashion. This effort could be made even more effective by incorporating traditional soil knowledge of Basotho farmers into classification and evaluation systems. Contrary to a popular misconception, Basotho farmers are not ignorant of soil characteristics, nor of the relationships between different soils and crops, and have developed local classification systems that permit this knowledge to be shared. One example, probably from a Tlokoa area, is shown in Table II-9.

Table II-9. Traditional Soil Classification System

Soil Type (Sesotho)	Characteristics	Evaluation
Selkoe	black, heavy	fertile but difficult to work when dry
Lehlohlojane	reddish, light	moderate fertility, easily worked when dry
???	gray, sandy	relatively infertile, easily worked

Source: Ashton 1967, p. 121

If the various soil classifications and evaluations now being developed were correlated with traditional systems, and if evaluations included traditional experience, it is likely that the program would prove even more acceptable to Basotho farmers.

Water

The Southern African region is comprised of four principal watersheds or river systems, namely the Zambezi and the Limpopo, flowing to the Indian Ocean on the east, and the Orange and Cunene, flowing to the Atlantic Ocean on the western side of the Cape of Africa. These four river systems account for 84 percent of the Subcontinents' total drainage area, with the Zambezi basin to the north containing the largest share of the regions water supply (Midgley, 1976). For the interior and western portions of the Republic of South Africa, an area which is largely arid to semi-arid, the principal source of surface water is the Orange River system which rises in Lesotho. In fact, all major rivers in Southern Africa are international in character, either forming state boundaries or flowing through two or more countries enroute to the sea.

The Southern African interior plateau known as the High Veld, situated to the north and west of Lesotho, is drained to the west by the Vaal River whose tributaries rise along the crest of the Qoatlhamba (Drakensburg escarpment) to the north of Lesotho. The upper Senqu (Orange River) and its tributaries, the Makhaleng and Mohokare (Caledon) Rivers, rise within Lesotho and comprise the largest share of the Orange-Vaal River system discharge.

The Hydrologic Cycle

The topographic relief and oceanic weather systems combine to provide Lesotho with definite patterns of wetness and dryness (Dyer and Tyson, 1977). The rainy season, which extends from approximately October to April, typically occurs in the form of intermittent thunder showers, and consequently hydrographs of surface flows exhibit large temporal as well as intertemporal variation (de Baulny, 1977). Because of the geologic features of steep surfaces and shallow residual soils, the lag between surface and subsurface runoff is quite short for a given rainfall event. Deep percolating waters contribute most of the base flow in perennial water courses, with base flows typically accounting for less than five percent of mean annual discharge. Unless winter snow cover is particularly heavy (about one in ten years), a considerable proportion of snowpack is lost to sublimation and evaporation.

Surface Resources

Measurements of daily, monthly and annual discharge for Lesotho's principal rivers and tributaries are generally not available prior to the mid-1920's. Accordingly, most estimates of mean annual surface runoff are based on a time series of 50 years or less. Current estimates of the mean annual discharge for the Senqu, Makhaleng and Mohokare river sub-basins, obtained from studies which are representative of several different data series, are compared in Table II-10. Average annual runoff is estimated at approximately four billion cubic meters (about 3.3 million acre feet in English units). Although two-thirds of the total flow is attributed to the Senqu main stem, the Makhaleng sub-basin has

approximately the same water yield per unit area. The Mohokare river watershed, which includes a greater percentage of the lowland area and consequently receives less precipitation, has the lowest water yield of the three principal sub-basins. Mean annual water yield for the entire country is 125 millimeters (about 5 inches) or approximately 15 percent of total precipitation.

Table II-10. Principal Drainage Basins and Average Surface Water Discharge

River Basin	Drainage Area in km^2	Mean Annual Runoff: Midgley (1969)	IBRD (1972)	SWECO (1977)	Annual Discharge/km^2
		- - - - (m^3/s) - - - - -			(1000 m^3)
Senqu above Makhaleng	20,714	101.6	91.9	99	148.4
Makhaleng	3,044	14.2	14.2	14.2	147.1
Mohokare	6,694	24.1	24.1	27.5	118.9
Other Catchments*	260	-	-	.6	72.8
Totals	30,712	139.9	130.2	141.3	140.8

Source: after SWECO (1977)

*Includes several small tributaries situated between the Mohokare and Makhaleng Rivers in the west-central border area.

One of the more distinguishing features of Lesotho's surface water supply is its seasonal and annual variability. Although the existance of a 10 to 12 year dry-wet cycle is yet to be established (or refuted), historical evidence suggests that periodic droughts and deluges have had devastating impacts in the past (Germond, 1967). In a recent study of time series data for several gauging stations in the Mohokare drainage basin, Jacobi (1977) reports that as much as 25 percent of a river's total annual flow can occur in only three or four days, and that the total discharge of a dry year can be exceeded in a few hours during a major flood event in another year. On more than one occasion the surface flow of the mighty Senqu (which can exceed 1,900 m^3/s) has entirely dried-up before reaching the border area.

An obvious consequence of high variability in precipitation (and runoff) is the potential for soil erosion and related problems of water quality (Bogardi, 1977). The High Veld ecosystem is generally resilient, but under the circumstances presented by long dry periods (several years) followed by an especially wet period the fragile soil structure of the High Veld is easily eroded. Such conditions have occurred from time

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to time in Southern Africa during the past two centuries, the results of which are clearly evident in the Orange Free State, the southern Transvaal, and especially in Lesotho. The accounts of early missionaries vividly describe such periods of devastation: one consequence was that travel by horse between Morija and Thaba Bosiu was extended from two hours in 1835 to nearly a full day by the late 1840's due to deeply eroded channels which occurred during the intervening years (Germond, 1967).

Given the chemical composition of most soils in Lesotho, surface waters carry few dissolved solids. Even during low flow (winter) months salinity concentrations seldom exceed 300 mg/l, thus presenting no serious problems for agricultural or domestic users (Binnie & Partners, 1972). Nonetheless, Lesotho does have a serious water quality problem in the form of suspended sediment. Comprehensive study of this problem has only been undertaken in recent years and it will be some time before sound, empirical descriptions of the principal sediment transport mechanisms are formulated and alternative control programs identified. Preliminary findings underscore the importance of variability in sediment loading.

Work by the Hydrology Department of the Ministry of Works and various consulting teams involved with research on the subject of sediment pickup and transport mechanisms, can be summarized as follows: 1) the greatest proportion of annual sediment yield from the major river systems in Lesotho is believed to result from a few major storms during the peak rainfall months, November through February; 2) the concentration of suspended sediment typically increases with the fall in elevation of the watershed, the upper reaches of most tributaries being almost sediment-free throughout the year; 3) seasonal sediment loading is characterized by extreme variability and therefore annual estimates of sediment transport are subject to wide margins for error (more recent studies have invariably revised earlier estimates upward); and 4) the silt load of several river systems is sufficiently high to warrant a moratorium on major storage schemes until more conclusive evidence on long-term effects is available.

Groundwater Resources

Rural and urban household surveys conducted during the 1960's revealed that the major source of domestic water was obtained from groundwater rather than surface water. Consequently, it was not until the early 1970's that reconnaissance studies were undertaken to establish the extent and distribution of subsurface water supplies (IBRD, 1972; Navarro, 1974; and Bonney, 1975). The findings of these studies are in general agreement that acquifer storage is extremely limited in Lesotho, and that available supplies are widely distributed but limited in quantity at any one site. Even though excess rainfall occurs regularly during the summer, recharge of acquifers is constrained by limited surface exposure and rapid runoff. The fact that base stream flows are small and tend to dry up towards the end of winter indicates a small groundwater storage capacity. The mining of subsurface flows also tends to be seasonal, coincident with surface runoff.

The geological configuration of the country and present population distribution favor a wide use of groundwater resources. Thus far the Molento beds appear to be the most productive formation, and water from springs and boreholes in this strata are of excellent quality. Estimates as to the extent of groundwater supplies vary, but a total of some 2.9 million m^3/d with a minimum reserve of 50,000 m^3/d is generally accepted (SWECO, 1977). A groundwater reserve of 50 to 100,000 m^3/d is believed sufficient to meet rural domestic requirements in the foreseeable future, possibly even to the extent of providing limited supplies for irrigation in some cases. In the urban centers, however, groundwater reserves have already been depleted in most instances and increasing dependence on surface supplies is indicated (Shand & Partners, 1972).

The Annual Water Budget

Total surface and groundwater resources and the mean values for various balance components in the hydrologic system (runoff, evapotranspiration, infiltration, consumptive withdrawals) are reported in Table II-11. Recognizing that these parameters only represent long-term 'means' and that the relationship between budget components can vary from year to year (for example, see Kite, 1977; and McWhorter and Sunada, 1977), it is nevertheless reasonable to conclude that groundwater resources are of minor significance in terms of total usable water supplies. In relation to the total resource, currently developed uses are so small as to be of little practical consequence.

Table II-11. Annual Water Budget for Lesotho in an Average Water Year

Water Budget Component	Annual Average: mm per Unit Area	Annual Average: m^3 per year (millions)*	Percent of Base: Precip. (A)	Percent of Base: Groundwater (D)
A. Precipitation	825	24,962	100.0	
B. Surface Runoff	100	3,026	12.1	
C. Evapotranspiration	690	20,878	83.6	
D. Groundwater Inflow A-(B+C)	35	1,058	4.2	100.0
E. Consumptive Withdrawals	.1	3		.31
F. Evapotranspiration	10	303		28.6
G. Groundwater Runoff	25	756	3.0	71.4
H. Total Runoff (B+G)	125	3,782	15.1	

Sources: SWECO, 1977; Bonney, 1975; and Binnie & Partners, 1971

*A drainage area of 30,712 km^2 is assumed.

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Water Demands and Utilization

Before the 1960's water use in Lesotho was limited almost completely to human and animal consumption needs. The first five-year development plan called for the initiation of several irrigation schemes to explore the technical feasibility of pumping from existing channels to irrigate adjacent lands. Also included in the first plan were initial efforts to test the feasibility of commercial fish culture in water empoundments designed especially for that purpose. The experience gained during the first plan period (largely positive) led to increased interest in water development for these two purposes during the second five-year plan. Current consumptive use, including some 400 hectares of irrigated crops, accounts for less than one-half of one percent of annual surface water supply.

Historically, however, 'Basutoland water development' was synonomous with power production and interbasin transfers (Jeffares and Green, 1951; Shand, 1956; and Carter, 1965). In more recent studies Dutkiewicz (1976) suggests that international cooperation in the development of water resources in Southern Africa (which implies significant exports from Lesotho to the Vaal Basin) is more important today than at any time before, while the Swedish Consulting Group (SWECO, 1977) documents no less than twelve recent proposals for internal hydropower development schemes. Although this discussion is limited mainly to agricultural issues, the potential for hydro-power generation is clearly one of the most interesting prospects in Lesotho's future.

Development Potentials: There are extensive areas in the Lowlands (some sites in blocks of 3,000 hectares or more) which are irrigable. Estimates range from 20,000 to 50,000 hectares, depending upon water delivery and application methods (Montreal Engineering, 1977; and SWECO, 1977). An additional 5 to 10,000 hectares are considered technically feasible for commercial fish pond developments. During the second five-year plan, two major development schemes are scheduled for implementation: the Phuthiatsana Irrigation Project, a 2,000 hectare scheme in the north, and the Tsakholo Fisheries Project, a 40 hectare scheme located near Mafeteng (CPDO, 1975). Some 400 hectares of pilot irrigation projects and 80 hectares of fish ponds are presently in use, and more similar small-scale ventures can be anticipated during the next several years. Domestic water supplies will continue to be developed incrementally with population growth; no major developments are scheduled through 1985 for urban or rural domestic uses.

The potential development of water supplies for power and possible export are considerable. The timing of such developments is highly speculative and the consequences that extensive hydropower production (either for internal use or export) will have on future irrigation, domestic and other requirements is a matter of some concern. Preliminary estimates developed by the Swedish Consultant Group (SWECO, 1977) (which include possible minimum and maximum development senarios for irrigation, fisheries, domestic use, and internal power production over several different time frames), suggest that as much as 3 percent of the country's

total water supply could be developed by 1985, and over 60 percent by the year 2000. For the most optimistic development scenario, consumptive use (primarily from reservoir evaporation and irrigation) in the year 2000 is estimated at 10 percent of total surface water resources. It should be noted that these estimates exclude water exports which still remain a possibility (Dutkiewicz, 1976).

Constraints to Development

The future of water resource development in Lesotho is aptly characterized by an ancient Chinese proverb: "To Rule the Mountain is to Rule the River" (Salmond and Croft, 1955). The principal watersheds that can be used to trap surface water for irrigation purposes are also the most severely eroded, and under present conditions the useful life of identified storage sites ranges from 10 to 30 years. Because of the increased wear on pumping equipment caused by suspended sediment, current irrigation projects are having to replace expensive pumping systems every other year. The present sediment loads of rivers with hydropower potential would require power plant sitings in the upper reaches of most watersheds. From these locations generated power would not be priced competitively with imported electricity (Lesotho's major source of power). In sum the potential benefits of water resource development in Lesotho are fundamentally constrained by present uses of the watersheds, the results of which pose a severe water quality management problem.

Further constraints revolve around the issue of whether or not water is in fact a bottleneck to growth (Howe, 1971; Garstha, 1978). The experience of water resource developments elsewhere in the developing world suggests that successful efforts rest upon a number of necessary preconditions: 1) that water is a real constraint to economic growth, 2) that sufficient capital is available for the duration of the project, 3) that institutions capable of administering and managing the new technology exist, and 4) that the new technology is compatible with the social structure and values of the people. The relatively brief experience with irrigation in Lesotho (only since the 1960's) should underscore the importance of such 'necessary' conditions. At the present time there are no success stories about irrigated crop production that have been attempted at the commercial level. Small irrigation schemes have failed because of all four of the above, but the most important seems to be the question of compatability (van Oosten, 1972; Ntokoane, 1978; and Khalikane, 1978). Developing water supplies has not been an 'experienced' need in the past, hence social and institutional structures and values common to most hydro-agricultural cultures are in an embryonic stage of development in Lesotho.

The Spatial Context for Integrated Development Strategy in Lesotho

Introduction: The study of spatial organization develops general explanations of the effect of space and spatial characteristics on man's behavior, on patterns of occupancy and location, and on the structure of

interrelations in space. The emphasis is on principles of spatial behavior. It is this approach that has the most direct link with development theory and is the focus of this section.*

Traditional theories of spatial development rest on the Western concept of center-periphery relationships. Equilibrium models as extensions of traditional location theory assumed that economic processes would guide a nation automatically toward economic growth. Primate cities as centers of modernization acted as catalysts for economic growth, from which the benefits of modernization flow outwards to revitalize the stagnating agricultural sector (McGee, 1971). This view that concentrated industrial investment in major cities creates a "ripple effect" of growth throughout the country is reflected in the major models that have governed past development thinking (Soja & Toblin, 1975). Thus economic development presumably would spread naturally across the nation.

A major criticism of this approach is succinctly stated by Friedmann (1973: p. 14); "a major difficulty with the equilibrium model ... is that historical evidence does not support it." Friedmann and others (e.g., Myrdal, 1957) employ a different form of the center-periphery concept, called a self-reinforcing center model, which asserts that disequilibrium is built into transitional societies from the start, and that major urban centers act as self-reinforcing magnets of economic development. The model identifies an inevitable polarity occurring in every nation's economic development and calls attention to a tendency for dual economics to emerge as investments are clustered in location-favored core regions. These centers, as they grow, not only drain off the best manpower from peripheral areas but restrict investment in those hinterlands by luring both capital and entrepreneurship to the more dynamic centers (Johnson, 1970). The centers thus are able to benefit from an agglomeration of activities and in the process gain external economies that give them further advantages (for elaboration see Isard, 1960). Terms of trade between the core and the periphery will tend to favor the former, since hinterlands have usually only primary products to exchange for the center's manufactured goods and specialized services. Over time, the peripheries develop a quasi-colonial relationship with the relatively more prosperous centers.

There are several reasons for the failure of equilibrium theory to correspond with economic reality, and why one primate city or a few dominant centers continue as focal points for investment. Location decisions in most developing countries were tightly constrained. In some cases, colonial policy established developing nations as raw material exporters to serve industrial nations, which made an entrepot, usually a major shipping point, the only efficient location for infrastructure and services. Elsewhere, political influences shaped the pattern of spatial development, with the administrative capital becoming the center of social, economic, and cultural activities and receiving the highest priority for

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*For a more complete treatment of theoretical aspects and the Lesotho example of spatial organization see Wagner, 1978.

investment in public services and facilities. For example, the development of Maseru as Lesotho's capital city appears to begin with the establishment of a police post there by a British Commandant in 1869. The railway reached Maseru in 1905, connecting it to South African Railways (Rosenthal, 1948).

But regardless of initial pressures, once investment is concentrated at a site, a series of events reinforce continued concentration. In a scenario described by Rondinelli and Ruddle (1976: pp. 16-17),

> Lower transportation costs from proximity to complementary activities, economies of scale and agglomeration, and migration of society's most talented people to the city, created multiplier effects that provided one place with a competitive advantage over all others, and attracted even larger numbers of rural people in search of economic opportunities. Resource scarcities, moreover, made creation of multiple centers difficult. The emphasis on foreign trade curtailed development of a domestic system of distribution and exchange, obviating the need for a geographically dispersed transportation system. Advantages of initial concentration quickly increased the primate city's competitive advantages. Additional physical infrastructure, accumulation of administrative and political power, and a stronger economic base, made it a magnate (sic) for industry, services, social and cultural activities.

This skewed pattern of spatial development constrains growth and inhibits its spread in developing nations. Although primate cities of the developing countries attract important change-inducing activities, their concentration in single locations creates dual economies, in which islands of modernization emerge from seas of poverty (Rondinelli & Ruddle, 1976: p. 17). The growth impulses generated by the center do not trickle down to the periphery, as predicted by the equilibrium model. The prospects for income convergence between the two become remote, or as Berry (1969, p. 207) notes, "growth and stagnation polarize; the economic system remains unarticulated".

The negative elements of such dual economies indicate that alternative development strategies are needed. A mere increase in overall economic growth is not sufficient to aid the non-integrated peripheral regions. Planned intervention is thus called for to at least reduce the polarity, although it appears impossible to eliminate it (Nichols, 1969). Policies chosen will vary but it is generally true that developing countries are opting for development of their poorer regions, the stagnating peripheries, in an attempt to alleviate the dual economy syndrome. This is certainly true in Lesotho where specific growth objectives of the development plan include "improvement and expansion of transport and communication, (emphasizing) mountain areas" and "rational use of resources to benefit the greatest number through concentration of improvements on growth centers" (CPDO, 1975: 21-22).

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The Special Case of Lesotho: The dominance of the primate city and the absence of an articulated hierarchy of central places or growth centers seriously obstructs the balanced development of Third World nations such as Lesotho. Johnson (1970: p. 171) notes that the Third World lacks the spatial system that provided the base for Western progress, where "... the varied hierarchy of central places has not only made possible an almost complete commercialization of agriculture but facilitated a wide spatial diffusion of light manufacturing, processing, and service industries ... (and provided) employment of a differentiated variety."

In Lesotho, the primary central place is Maseru. In 1976 the constituency that includes the capital and immediate suburbs held 45,211 people (BOS, 1978). If outlying residential areas were included, the total would be even higher. Only five other towns may realistically be classified as functioning, independent central places: Butha-Buthe, Hlotse (Leribe), Mafeteng, Mohale's Hoek, and Teyatenyaneng (Moody, 1975). Their combined population does not equal that of Maseru alone. Given the national population of Lesotho in 1976 of 1,063,837 (not including absentees) the country has less than ten percent urban populace. What little industry exists is clustered around Maseru and at Maputsoe, near the Ficksburg Bridge. Thus the opportunity exists for selecting those places at which future growth should be encouraged and thereby alleviating the negative effects of the dual economy while diffusing the benefits of development to a wider populace.

The importance of an articulated system of central places is noted by Rondinelli and Ruddle (1976: pp. 17-18):

> Without accessible markets farmers lacked incentives to increase output, to modernize their technology, or to adapt products to consumer demand, contributing to rural unemployment and to what Johnson calls a "wanton dissipation of ability and talent." Without competitive markets only marginal amounts of produce are sold from near subsistence farms; and village traders easily exploit farmers who must sell their produce immediately after harvest at depressed prices. Consequently, farm income is perpetually limited, as are savings and investment, constrainting farmers from obtaining technical and other inputs needed to increase agricultural production. Without a national system of production and exchange, this vicious cycle of rural poverty cannot easily be broken.

The principal means of attaining the goals of the new strategy of dispersed development is through integrated spatial development. This strategy recognizes the role of major centers in generating growth, change, and modernization. Not only is it essential to define the spatial pattern of development, but it is also crucial to integrate that pattern with the specific sectors of the economy. Too often the development plan focuses upon the industrial sector, but "industrial development is only one of the several important roles the growth foci

have to play in varying development situations" (Misra, 1972: p. 156). Central places may also function as service centers for their hinterland providing specialized governmental, medical, educational and other needs. In addition, they should act as innovation-diffusing and growth-promoting centers and be able to provide employment opportunities for the surplus population of the rural areas. The aim is to build up the functions and level of services of the central place so that the regions become oriented towards them (Darwent, 1972). Lesotho recognizes this spatial planning component in its identification of three major project areas and 36 concentration areas in its agricultural development scheme (CPDO, 1975: 81-86).

Location and Promotion of Central Places: A program to develop a set of central places must first select location criteria to serve the goals of the nation. For example, Lesotho's Second Five-Year Development Plan includes target goals of increasing agricultural productivity, promotion of non-agricultural small industry, development of the nation's water and mineral resources, improvement of social services, creation of new jobs, and provision of wider participation in productive activity and social services (CPDO, 1975).

These goals suggest that sites be chosen with the ability to assist the agricultural sector in increasing productivity, to support industrial development, to tap the natural resource base, to aid in the delivery of social services to the populace, and to provide employment opportunities to workers. Since approximately 85 percent of Lesotho's domestic work force is employed in the agricultural sector (IBRD, 1975: p. 37), it is apparent that any spatial development policy concerned with social equity must direct itself to the rural areas.

In Lesotho, land-holdings tend to be small relative to production needs, with only occasional surpluses that can be spared from family needs and brought to the market (IBRD, 1975: p. 7). One consequence is a small volume of marketed produce; another is indifferent quality resulting in low prices. Thus, Johnson (1970: p. 181) claims "in near-subsistence agrarian economies it is hard to say whether it is the absence of markets which holds down the marketed surplus, or whether it is the low volume and poor quality of the goods which impedes the development of a network of marketplaces for agricultural produce."

The issue then is how to increase the commercial fraction of farm output in the economic development policy. Johnson (1970: p. 181) identifies several areas of concern. First, the cultivator needs access to inputs such as fertilizers, improved seeds, tools, and pesticides. This requires the presence of "vertical trade" in which agricultural produce is traded for these inputs. The agricultural produce must be of sufficient quality to be marketable. The exchange process, then, reflects a degree of specialization on both parties. Hence, a modern type of agriculture not only presupposes the existence of markets where produce can be sold, but also of markets where inputs can be purchased, and that both markets be spatially dispersed to be within the farmers' travel range. Planners must select locations for these markets as a basis of development of the agricultural sector.

Spatial Development Strategy in Lesotho: Any spatial development policy must be rooted in the goals of the agency, and must recognize the existing spatial structure and environmental constraints of the area. For Lesotho, much of this basic information is present. The goals and objectives are specified in the Five-Year Plan (CPDO, 1975). The spatial structure has been assessed in terms of the traditional growth pole theory (Moody, 1975). Numerous studies have been made of the environmental conditions present in the country (Smit, 1967). The major task ahead is to articulate a program of economic development which takes into account its spatial components explicitly. Many of the specific objectives are expressed in the comprehensive Basic Agricultural Services Program (BASP) of which a primary goal is the establishment of infrastructure in the Lowland region of Lesotho. BASP plans include primary focus upon service centers and connecting links. However, they are not integrated with the general methodology of regional and spatial development. Thus implementation seems to be preceeding analysis of existing spatial patterns, and of long-term effects upon regional and spatial relationships.

It is proposed that a modified growth pole concept be applied in Lesotho emphasizing the agricultural sector. The agricultural sector is stressed because the population is overwhelmingly oriented towards agriculture. Lesotho's national goals stress social justice, maximum domestic employment, and economic independence, and an improved agriculture sector can help achieve each of these. Further, a stronger agricultural sector provides a sound base on which to build secondary and tertiary activities.

Given the focus upon agriculture, spatial development policy should attempt to reinforce and direct development forces towards rural centers which would serve the dispersed rural population with essential marketing facilities and private and public services. This may be termed a policy for decentralized economic activity in which rural centers would be classified as service centers. They would function to disseminate social and technological innovations to the rural population, to provide basic social services, and to act as market centers for locally produced goods.

Each service center must be sensitive to the concerns of the region which it serves; while relating to the comprehensive development plan. The interdependence of the regions, especially to the developing core around Maseru, must be stressed. As Lesotho strives to become more economically independent, Maseru should serve as the major center of employment for excess labor from the rural areas and of manufactured goods to be purchased by farmers. In turn, rural areas depend upon the cash income earned by migrants in jobs in Maseru, and services provided by the center. Lower order goods and services are provided in smaller centers located throughout the country. Smaller centers (service centers) may also develop selected secondary and tertiary activities, as reflected in their resource base. Examples are resort facilities at Oxbow and mining at Letsene-la-Terae.

Strategies must be designed for each region of Lesotho, with input from representatives from the area. A lack of sensitivity to local needs and customs will greatly reduce the likelihood of success. It is not sufficient to merely provide services and information; a program must also work for their acceptance and adoption. Therefore, the spatial development policy must be integrated with a set of functional policies (social, cultural, institutional) that will achieve community involvement and development as well. The goal is to achieve a greater degree of integration of the nation's spatial economy while remaining sensitive to regional concerns. The result could be economic development in all regions simultaneously, but not necessarily at the same rate or of the same type.

The functional policies of overall development should serve to provide the farmer with needed information and inputs to increase production, such as erosion controls, livestock management, fertilizers, cultivation practices, and farm machinery. In addition, satisfactorily administered markets for farmer's produce, conveniently located to the producers, should be provided. The service centers would serve this purpose.

A spatial development policy should also improve transportation links to service centers. The purpose is twofold--to provide farmers with access to markets, information, and inputs, and to provide an outlet for produce brought to the service center (Stanley, 1971). Road transport, because of its versatility and flexibility, represents the most useful mode for economic and social progress (Fromm, 1965).

Lesotho, with its mountainous terrain, represents a challenge to the development of any mode of transport. Roads, however, provide relatively low cost facilities for the movement of goods and people that can be used by all. This is especially true given the alternative--air service. It is doubtful that railroads would be economically justified, given the high cost of construction and lack of demand for the bulk movement of goods. Another advantage of roads is that the local population can be employed in construction and maintenance projects. Improved transport facilities are essential in developing the commercial agriculture potential of Lesotho, and road planning must be one component of the spatial development policy (Roughton & Partners, 1974).

Road development is also important in promoting industrial and tertiary activity in Lesotho. Road access to natural attractions, such as the Oxbow area, the Sehlabathebe Park, and the Maletsunyane Falls, would increase tourist activity and associated employment in that sector (Moody, 1975). A final consideration in road planning is political in nature. At present, there is very poor connectivity between the regions in Lesotho. Many areas have direct connections to South African towns and little access to Lesotho towns. The result is lessened economic activity and marketing in the country, and greater economic dependence upon South Africa. Road facilities directed toward internal development of Lesotho should help reduce that dependence. (Figure II-2.)

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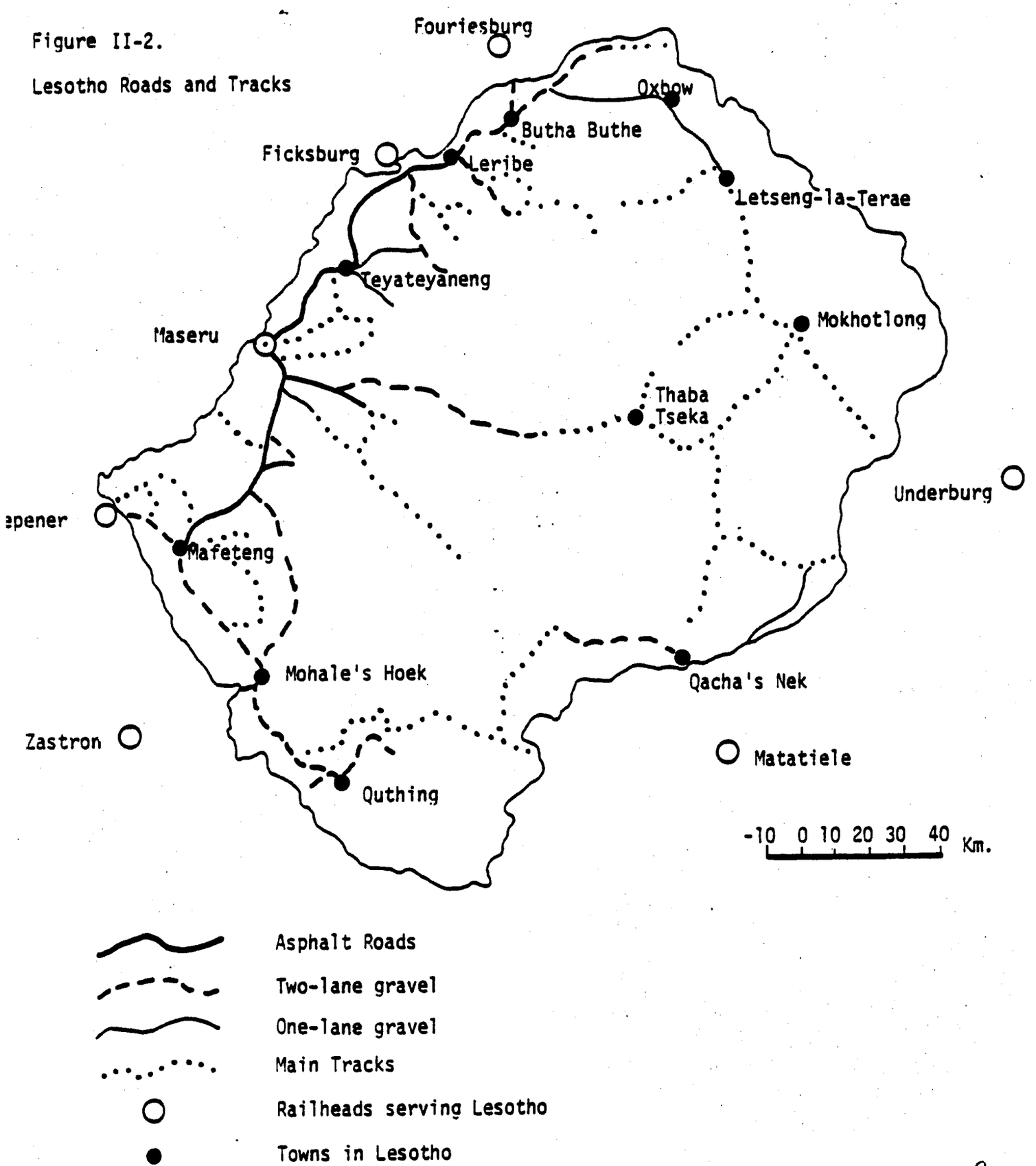
Summary

A major concern is to make explicit the functional and spatial pattern of economic development. It is unrealistic to expect, based upon the experience of other developing countries, that the dual economy syndrome will not occur in Lesotho. But a carefully designed and implemented spatial development policy can minimize this problem. In this regard, it is essential that criteria for site selection be developed from national development goals, and growth centers be chosen accordingly. Further, an administrative framework needs to be created to coordinate the planning and the investment decisions of the development program. Two areas in particular that deserve elaboration are the transportation and communication sector and the extension program. The former should focus upon the improvement of accessibility to central places, the latter on a system for delivering and demonstrating innovations to the rural populace as well as generating feedback from the people regarding their needs and concerns. In these matters the LASA/MOA Planning Unit could provide valuable analytical and advisory service to BASP and other regional development programs, and to the Ministry in formulating an integrated national plan for development.

Figure II-2.

Lesotho Roads and Tracks



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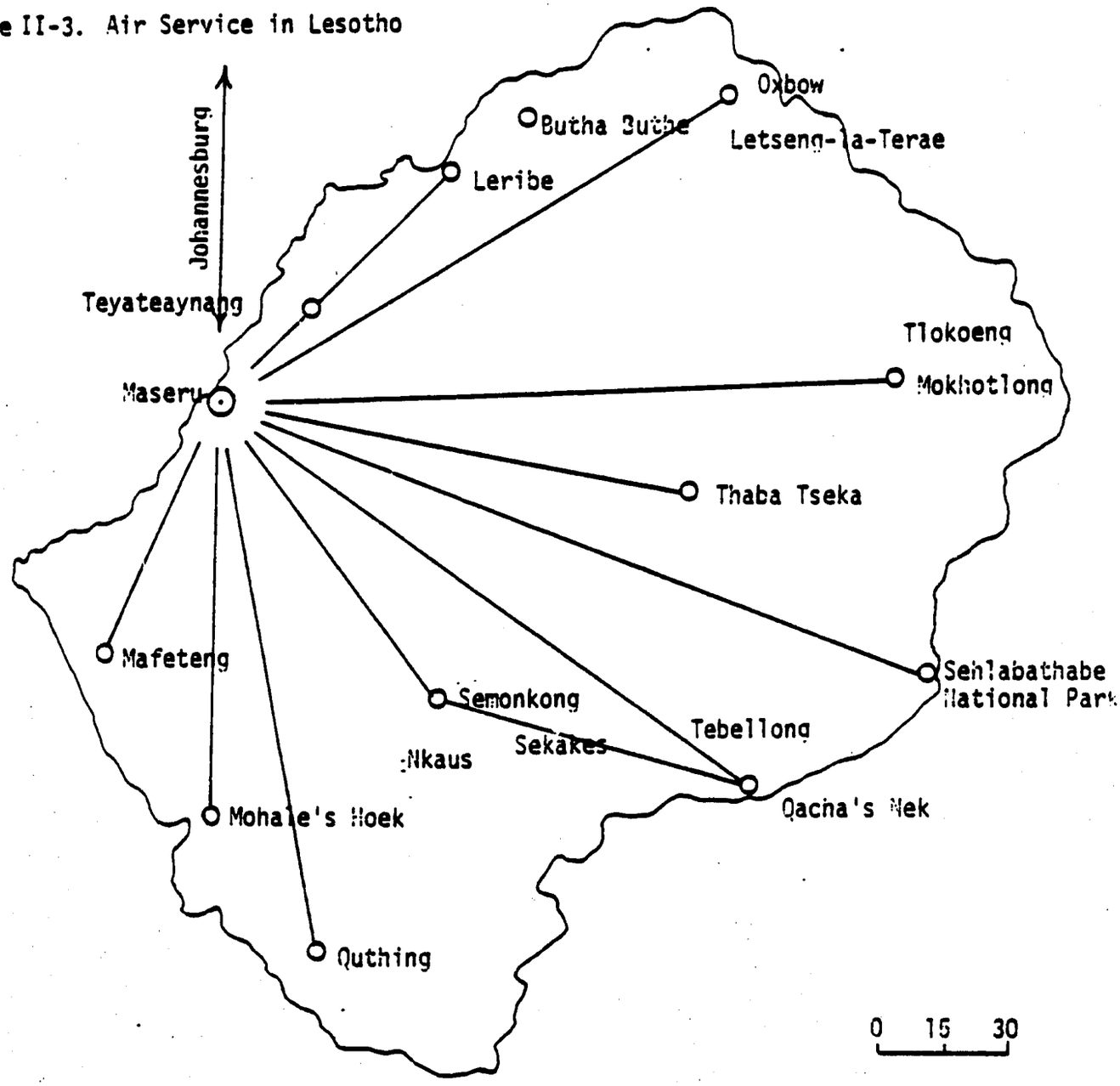
Source: Ministry of Works

Figure II-3. Air Service in Lesotho



after Moody 1975

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CHAPTER III

RESOURCE ENVIRONMENT FOR AGRICULTURE

Part 2, Human Resources

Human resources are no less important than physical resources to planning and development. And if the physical environment of Lesotho is distinctive, the human environment is almost unique. The Basotho have a cultural history similar to few other southern African groups, and contemporary demographic characteristics have drawn the attention of social scientists the world over.

Since various features of Lesotho's population, especially economically-related cultural characteristics and employment, permeate every facet of the agricultural sector they appear in almost all sections of this report. This chapter concentrates on general characteristics of population, education, and nutrition, and leaves the discussion of implications to appropriate other sections.

Population

The relationships between population and agriculture in developing countries are well-known: not only is the agricultural sector the primary source of food but also the primary source of employment. These relationships are made explicit for Lesotho in the 1974 National Population Symposium which stresses the need for agricultural development and careful land use planning (Monyake 1974, pp. 12-13 and elsewhere).

Careful inventories of population and agricultural resources are necessary to establish the bases of these relationships. Assessments of soils, water, crops, and livestock are found in other sections of this Review. This paper will report briefly on the 1976 census of population and on some historical trends of interest.

Population and Growth Rate: A preliminary review of the 1976 census* reveals a *de jure*** population of 1,216,883. This represents a gain of 244,508 people in the last 10 years for an average growth rate of 2.27% (Table III-1).

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*Since only part of the 1976 census of population had been released at the time this report was prepared, most figures are from pre-publication records and are necessarily subject to revision.

**The term "*de jure*" as used in census reports refers to those persons who are present in the country and who were enumerated on a *de facto* basis, plus those persons who had been away from the country for less than five years and were ennumerated in absentia at their usual places of residence.

Table III-1. Selected Population Characteristics for Lesotho, 1976.

Characteristic	1976 Lesotho Census Data	Comments
De jure population	1,216,833	
males	586,870	equals 48.2% of total population
females	629,963	equals 51.8% of total population
Absentee population	153,513	Absent from ennumeration area, but not necessarily out of country; equals 12.6% of total population.
Population growth rate	2.27	Average rate for 10 years since last (1966) census.
Years required to double population	31	Theoretical figures assuming continuing average growth rate of 2.27% per year.
Estimated population in year 2000 A.D.	1,713,792	" " " " "

Source: Jilbert 1978

The present population can be placed in perspective by comparing it with previous periods (Table III-2). From these data it appears that the Basotho have experienced one of their highest population growth rates ever during the period 1966-1976. In the last 10 years population has increased by nearly a quarter of a million.

Table III-2. Population Trends for Lesotho

Census Year	Total *de jure* population*,**	Total Change	Percent Change	Average Rate of Growth
1911	425,437			
1921	543,078	117,641	27.7	2.47
1936	660,546	117,468	21.6	1.31
1956	793,639	133,093	20.1	1.85
1966	972,325	178,686	22.5	2.05
1976	1,216,833	244,508	25.1	2.27

*Populations reported for past census years vary depending upon source. Data to 1956 are from Jenness, n.d.; for 1966 corrected from BOS, 1969/71; for 1976 from BOS, 1978 and Jilbert, 1978.

**Prior to 1966 all census were taken either by the "assembly" method or simply by rough estimates, or both. In 1966 the "canvasser" method was

Age Distribution: Preliminary analysis of 1976 census data indicates that Lesotho has the typical broad base population pyramid that would be expected for a country with a moderately high growth rate. About 40 percent of the population is less than 15 years of age. The percentage of working-age males (15 to 55) is about the same. Most of the migrant workers absent from the country and employed in South Africa's mining or agricultural industry are drawn from this critical age group. Some 38 percent of females are in the 15 to 40, or child-bearing age group.

Table III-3. Percentage Distribution of the Population by Age and Sex

Age	Males	Females
0- 4	15.54	15.10
5- 9	13.05	12.74
10-14	11.41	11.16
15-19	10.04	9.83
20-24	8.75	8.60
25-29	7.59	7.49
30-34	6.58	6.51
35-39	5.69	5.67
40-44	4.89	4.91
45-49	4.15	4.21
50-54	3.47	3.58
55-59	2.83	2.98
60-64	2.22	2.43
65 & over	3.79	4.79

Source: Ngakane, n.d.

Regional Population Trends: A first approximation of regional distribution can be made by assigning arbitrary elevation limits to traditional physiographic regions (Table III-4). Comparisons with censuses prior to 1966 are difficult since ennumeration areas were not the same (Perry, 1976).

Clearly there are substantial regional differences. Growth rates for the 10-year period, 1966-1976, range from 31 percent in the Lowlands, the only region that exceeds the national average, to the Mountain Region that grew at less than half the national average. If natural increases are even approximately constant nationwide, then the most plausible explanation is that migration to the Lowlands is taking place. However, nowhere does migration completely offset natural increases and thus all regions are experiencing net gains in population. In the Lowlands the burden of high natural increase is exacerbated by in-migration. Assuming a nationally constant growth rate, in-migration contributed an additional

Table III-4. Regional Distribution of Population in 1966 and 1976

Region	Altitudinal Limits	Total Population 1966	Pct.	1976	Pct.	Change: 1966-1976 Total	Percent
Lowlands	below 1828 m (6000 ft)	504,754	51.9	661,300	54.3	+156,546	+31.0%
Foothills	1828-2437 m (6000-8000 ft)	128,193	13.2	151.819	12.5	+ 23,626	+18.4
Mountains	above 2437 (8000 ft)	67,503	6.9	75,505	6.2	+ 8,002	+11.9
Mountain Valleys	1828-2437 m (6000-8000 ft)	195,783	20.1	236,663	19.4	+ 40,880	+20.9
Senqu (Orange) Valley	below 1828 m (6000 ft)	76,092	7.8	91,537	7.5	+ 15,445	+20.3
Totals		972,325*		1,216,824**		244,499	

* Corrected from Lesotho 1969.

** Discrepancy of 9 in summation of regional ennumeration areas.

Source: Jilbert 1978

29,850 persons to the Lowlands during the intercensal decade; a net addition of 0.6% to the annual growth rate of the region. Thus, it is there that the heaviest demands for employment, land, and social services are occurring.

Much of the total migration to the Lowlands is accounted for by movement to one urban place, Maseru. The population of the capital increased by 80 percent between 1966 and 1976 while other Lowland district headquarters increased only by 3 to 44 percent. Of these, only Leribe and Mafeteng showed percentage changes above the national growth average. It seems likely that migration toward Maseru is the dominant feature of internal migration in Lesotho (Jilbert, 1977). If this is so, then the problems of migration-accelerated population growth mentioned for the Lowlands in general will be even more concentrated and severe in the Maseru area.

Absentee Population: Proportionately Lesotho has one of the highest absentee populations in Africa. The lack of domestic income-earning possibilities and low wages relative to the employment opportunities nearby in South Africa have proved irresistible to working age Basotho males for many years.

Because ennumeration of absentees is imprecise and definitions vary from census to census, comparisons between censuses are subject to misinterpretation. Nevertheless, reference to previous periods is of some value. Table III-5 presents *de facto* and absentee populations by district from 1911 to 1976. Except in certain exceptional years, the order of percentage of absentees by district is similar from census to census. Lowland districts generally have higher percentages of absentees than mountain districts, and northern Lowland distrcits usually are higher than southern. Maseru is something of an anomoloy in that it more often resembles the Mountain districts of Qacha's Nek and Mokhotlong than the other Lowland districts, presumably a reflection of the employment opportunities in the national capital.

With respect to comparisons of recent censuses, definitions of absentees are critical. Perry (1971) reports 117,273 persons "absent from the country for more than five years", whereas Jilbert (1978) and BOS (1978) figures cover only those "absent" but not necessarily out of the country. Thus, the percentage of absentees out of the country in 1976 could be even less than that shown in III-5.

Based on the preceeding figures it appears that although the total number of absentees has risen by some 35,723 in the last ten years, absentees as a percent of total *de jure* population has changed very little. (Average absentee growth rate = 2.69%; total *de jure* average population growth rate = 2.27%).

The significance of a relatively rapid population growth rate and of a high percentage of persons "absent from the country for less than five years" is much greater than can be suggested by mere numbers. Hardly an aspect of the agricultural sector, or for that matter of the nation as a whole, is not affected by the growing numbers, the loss of

Table III-5. Population and Absentees by District 1911-1976

ct	1911 Absentees / De facto Afr. Pop.	1911 %	1911 Rank Order of %	1921 Absentees / De facto Afr. Pop.	1921 %	1921 Rank Order of %	1936 Absentees / De facto Afr. Pop.	1936 %	1936 Rank Order of %	1956 Absentees / De facto Afr. Pop.	1956 %	1956 Rank Order of %	1966 Absentees / De facto Afr. Pop.	1966 %	1966 Rank Order of %	1976 Absentees / De facto Populate	1976 %	1976 Rank Order of %
	3,971 / 44,909	8.8	1	7,634 / 56,674	13.3	2	10,818 / 55,522	19.5	3	23,900 / 73,207	32.7	1	18,523 / 99,580	18.6	1	20,326 / 125,798	13.9	2
Buthe	7,161 / 82,927	8.6	2	15,759 / 107,794	14.6	1	24,537 / 132,245	18.6	4	40,966 / 138,027	29.7	2	31,236 / 192,871	16.2	2	41,220 / 242,516	14.5	1
ng	3,823 / 64,945	5.9	3	6,066 / 67,279	9.0	3	12,200 / 70,864	17.2	5	20,708 / 81,391	25.4	3	16,354 / 102,599	15.9	3	20,579 / 133,760	13.3	3
's	2,615 / 58,659	4.5	5	5,204 / 60,568	8.6	4	7,944 / 65,309	12.2	7	18,062 / 76,129	23.7	4	13,195 / 96,604	13.7	4	17,411 / 118,900	12.8	4
g	1,498 / 35,581	4.2	6	2,452 / 38,051	6.4	5	9,728 / 44,552	21.8	1	11,942 / 52,347	22.8	5	7,320 / 65,352	11.2	5	10,352 / 78,139	11.7	5
	4,319 / 79,131	5.5	4	5,985 / 99,378	6.0	7	23,579 / 108,237	21.8	2	23,968 / 128,325	18.7	6	19,494 / 181,226	10.8	6	25,828 / 231,981	10.0	7
s Nek	1,243 / 33,655	3.7	7	4,041 / 66,193	6.1	6	12,467 / 82,544	15.1	6	15,236 / 89,431	17.0	7	11,151 / 111,781	10.0	7	16,938 / 133,067	11.3	6
long																		
als	24,630 / 40,807	6.1		47,141 / 495,937	9.5		101,273 / 559,273	18.1		154,782 / 638,857	24.2		117,273 / 850,013	13.8		152,654 / 1,064,161	12.5	
ed s	425,437			543,078			660,546			793,639			967,286			1,216,815		

Sources: BOS, 1978; Jenness, 1972.

Note: Data are not strictly comparable because of differences in census techniques, inclusion or exclusion of non-African population, etc. Although comparisons of district trends (e.g., rank orders) are valid, the data should not be considered exact.

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a high percentage of working-age males, and conversely, the possibility that in the future an ever-growing work force will not be able to find migrant jobs. Implications and policy considerations of these dynamic aspects of demography of Lesotho are discussed in other sections of this Review.

Education

Development means change and education is accepted as one of the determinants of change. Education is, therefore, a critical issue in the development of a nation. This section is a survey of Lesotho's educational resources including institutions, curricula, courses of study and where possible, the number of people affected by each.

Overview of the Educational System

The literacy rate in Lesotho is reported to be high, and although figures vary widely, the estimates cluster between 40 and 70 percent (LDTC, 1976). The 1966 population census quoted 47.5 percent using completion of 2 years in school to define literacy. Estimating the proportion of the population that can read Sesotho, the UNESCO Statistical Yearbook (1973) found 59 percent, which is in agreement with a 1976 study carried out by the Lesotho Distance Teaching Center (1976). In 1975, a World Bank Mission re-evaluated the rate to be an estimated 40 percent of the adult population, but a definition of literacy was not included with the figures (World Bank, 1975). There does seem to be agreement that the literacy rate is slightly higher in the Lowlands versus the Mountains and among women versus men. In the LDTC study, 66 percent of Lowlands and 54 percent of the Highlands people interviewed were literate, while 46 percent of the men and 64 percent of the women could read Sesotho. By comparison, in the Thaba Tseka Project area half of the women and one-quarter of the men have completed standard 5 which was felt to be a "reasonable guarantee of functional Sesotho literacy" (Mueller, 1977). As these figures suggest, printed materials have a potential of being an important method for rural communication and education. Research on reading comprehension has shown that between one-fifth and one-half of the people could read and understand printed text, and that another 40 percent who cannot read are read to by others (LDTC, 1976). A study done by the Thaba Bosiu Project on the effect of extension activities found that three out of every ten households were reached by leaflet distribution in the project area (TBRDP, 1976). To determine the implications of a relatively high literacy rate for rural education, more will have to be known on the impact of written materials.

Lesotho has a long history of education patterned after the developed western world. French Evangelical Missionaries established schools as early as 1834, and these as well as other church schools continued largely independent of government control until the First Five Year Plan period. At this time the Government moved to reform the education system which it felt was overly literary and deficient in development-oriented subjects. In order to increase government control and influence in the schools, the Government began paying teachers salaries and changing the focus of education to rural development as a means of increasing the country's self reliance (Klaus,

et al, 1977). This emphasis also included practical courses for adults and an expansion of technical training to meet the country's manpower needs. The educational objectives of the Second Five Year Plan are 1) to improve the quality and efficiency of primary education, 2) to continue to develop secondary education with emphasis on math, science and practical studies, 3) to develop technical, vocational and higher education to meet national manpower needs, 4) to initiate a coordinated program of non-formal education and 5) to strengthen Government control and supervision of educational activities.

Primary School

Since Independence in 1966, the Government has been concerned with the quality and efficiency of the school system, and has taken steps to improve them. Tables III-6 and III-8 indicate some effects of policy changes. In 1970 the primary system was reduced from 8 years to 7 years, which not only increased the number of students finishing Primary that year but may also in part explain the leap in percentage passes. Then as a result of the high repetition rate during the first five year planning period (estimated to be 20 percent), the Government encouraged a policy of automatic promotion which assures a pupil of being passed into the next standard if he has attended school for three-quarters of the school year (Caldwell, 1975). In 1974 primary tuition fees were abolished in an attempt to make education more universally accessible at the lower levels. Presumably as a result of older first time students, enrollment shot up 16.3% in 1974 but returned to a lower growth rate the following year. On the other hand, Table III-9 shows that the increased numbers of students pushed the student:teacher ratio back up to 52:1 after some years of improvement and put the classroom to student ratio at 77:1 in 1975. The Second Five Year Plan calls for an expansion of the teaching force to remedy this and a redesign of primary curriculum to emphasize practical and cultural activities (Caldwell, 1975).

Tables III-6, III-7 and III-8 point out why Lesotho's educational system is called a "bottom heavy pyramid". Of some 43,800 students beginning school in 1961, only 4,000 or 9 percent of the original number graduated from primary school in 1968. There was improvement by 1970 when enrollment was 42,000 and 24 percent of that number or almost 10,000 students completed primary in 1976.

Table III-9 presents male versus female enrollment figures and shows why women tend to have a higher literacy rate than men. According to the previous section on population, 48.8 percent of the 414,957 children from 5-19 years of age in 1976 were male and 51.2 percent were female. However, enrollment for boys is only 41.1 percent in primary and 43.5 percent in secondary schools. This is due primarily to the structure of the livestock sector in Lesotho which requires herd boys. Table III-10 shows that the percentage of male students tends to be lower in the mountainous districts where livestock is of greater importance to the local economy. The Ministry of Education and the Lesotho Distance Teaching Center are working to solve the problem of schooling for these boys by developing classes especially for them during hours when they are available to attend. To know how changes in agricultural practices will affect school enroll-

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Table III-6. Primary Enrollment and Examination Results: 1961-1977

Year	Number of Students by Standard (Class) 1	2	3	4	5	6	7	8	Final Year Students Passing Exam Number	Percent	Percent of Base Year Completi Prim Scho.
1961	43,756	28,866	25,400	16,555	14,245	9,985	4,782	3,004	1,570	52.3	N.A.
1962	44,606	27,666	26,958	17,733	14,887	11,621	4,753	3,361	1,520	45.2	N.A.
1963	45,452	28,102	27,189	18,612	15,828	11,620	6,094	3,625	1,826	50.4	N.A.
1964	45,652	28,144	29,199	20,266	18,059	13,734	8,236	3,786	2,172	57.4	N.A.
1965	52,178	29,115	28,329	19,003	16,320	13,053	6,046	4,136	2,199	53.2	N.A.
1966	46,598	30,425	29,060	19,392	16,802	13,076	7,003	4,813	2,319	48.2	N.A.
1967	44,124	30,159	29,779	19,999	17,713	12,800	7,838	5,391	3,400	63.1	N.A.
1968	41,543	34,828	29,439	24,831	18,666	14,349	9,356	6,374	4,013	63.0	9.2
1969	41,159	33,071	30,146	23,462	21,665	14,871	9,616	6,913	4,090	59.2	9.2
1970	41,867	33,030	30,141	23,449	22,298	16,400	8,233	7,977	10,856**	67.0	11.9
1971	38,952	31,139	28,922	23,124	20,943	17,384	10,990	**	6,370	58.0	12.2
1972	41,699	31,272	28,901	22,538	20,823	15,782	12,197		6,996	57.4	15.0
1973	47,060	34,528	30,381	23,850	20,874	16,462	14,304		8,854	51.9	20.1
1974	58,743	40,298	33,872	27,131	22,847	18,381	16,766		10,321	61.6	24.8
1975	50,216	44,008	36,814	29,205	23,972	19,124	18,593		12,482	67.1	30.3
1976	50,294	41,337	38,145	30,440	24,490	19,527	17,784		9,976	56.1	23.8
1977	55,446	39,984	36,424	30,216	24,678	18,994	17,973		11,089	61.7	28.5

Sources: Lesotho Bureau of Statistics, 1977 and Ministry of Education, 1973, 1975, 1977

*The base year is that in which a group of students would have begun Standard 1 if they had attended school in consecutive years and without repetition. For example, those students beginning Standard 1 in 1961, who advance and continue each year, would enroll in Standard 8 in 1968. Thus, the number of Standard 8 students passing in 1968 can also be figured as apercentage of base year 1961 enrollment.

**In 1970 the primary school system was reduced from 8 years to 7.

Table III-7. Secondary Enrollment and Examination Results: 1961-1977

Year	Enrollment in Lower Secondary* Form A	Form B	Form C	Junior Certificate Exam Passes* Number	% of final year enrollment	% of Form A enrollment**	Enrollment in Upper Secondary* Form D	Form E	Cambridge Overseas Certificate Exam Passes* Number	% of final year enrollment	% of Form enrollment***
1961*				217					27		
1962	928	680	405	272	67.2		111	85	63	74.1	
1963	1132	722	524	283	45.0		163	85	62	72.9	55.9
1964	1069	810	505	318	63.0	34.3	189	121	88	72.7	54.0
1965	985	895	556	262	47.1	23.1	194	146	102	69.9	54.0
1966	1128	809	613	401	65.4	37.5	227	165	104	63.0	53.6
1967	1287	895	646	405	62.7	41.1	207	166	101	60.8	44.5
1968	1728	1177	758	495	65.3	43.9	268	210	133	63.3	64.3
1969	1983	1463	986	658	66.7	51.1	338	241	156	64.7	58.2
1970	2304	1764	1302	888	68.2	51.4	399	259	160	61.8	47.3
1971	3501	2010	1472	919	62.4	46.3	495	338	203	60.1	50.9
1972	4572	4560	1715	1283	74.8	55.7	630	459	230	50.1	46.5
1973	4355	3578	3211	2117	65.9	60.5	847	568	246	43.3	39.0
1974	5396	4004	3330	2169	65.1	47.4	1390	788	264	33.5	31.2
1975	5044	4570	3553	2079	58.5	47.7	1137	1307	418	32.0	30.1
1976	5846	4532	3919	1797	45.9	33.3	1316	1113	340	30.5	29.9
1977	5633	5339	3853	1962	50.9	38.9	1374	1234	354	28.7	26.9

Source: Bureau of Statistics 1977, and Ministry of Education 1973, 1975, 1977.

*Data is incomplete for these years

**These figures are a percentage of Form A enrollment from the year in which the graduating students would have begun Form A, i.e. 1962 Form A students will graduate with a JC in 1964.

***These figures are a percentage of Form D enrollment 1 year prior to graduation year.

Table III-8. Percentage of Base Year Enrollment Continuing Through Educational System: 1961-1977

Year	Primary Standards 1	2	3	4	5	6	7	8	Exam Passes	Lower Secondary Form A	B	C	JC Passes	Upper Secondary D	E	CSOC Passes
1961	100															
1962	100	63.2														
1963	100	63.0	62.1													
1964	100	61.9	65.5	46.3												
1965	100	63.8	62.3	42.6	37.3											
1966	100	58.3	63.7	42.7	37.7	29.9										
1967	100	64.7	57.1	43.8	39.0	28.7	17.9									
1968	100	78.9	63.2	47.6	40.9	31.6	21.0	14.6	[illegible]							
1969	100	79.5	68.3	50.3	41.5	32.6	21.2	15.5	9.2	4.5						
1970	100	80.2	72.6	53.1	47.9	35.9	18.0	17.5	11.9*	5.2	4.0					
1971	100	74.4	70.3	55.7	47.5	37.3	21.1		12.2	7.6	4.5	3.4	2.1			
1972	100	80.3	60.0	54.8	50.1	35.8	26.2		15.0	8.8	10.0	3.8	2.9	1.4		
1973	100	82.8	78.0	57.0	50.7	39.6	32.4		20.1	9.3	6.9	7.0	4.6	1.9	1.3	.6
1974	100	85.6	81.2	69.7	54.6	44.7	40.4		24.8	12.2	8.6	6.4	4.2	3.0	1.8	.6
1975	100	74.9	78.2	70.0	61.5	45.7	45.2		30.3	12.1	10.4	7.6	4.5	2.2	2.9	.9
1976	100	82.3	64.9	64.7	58.7	50.1	42.5		23.8	14.2	10.9	8.9	4.1	2.8	2.1	.7
1977	100	79.5	72.5	51.4	52.4	45.6	46.1			13.5	13.0	9.3		3.1	2.6	

Source: Developed from Tables 1 and 2.

*In 1979 primary education was reduced from 8 years to 7. Therefore the base is Standard 1 enrollment for both 1963 and 1964.

Table III-9. Number of Primary and Secondary Male and Female Students and Teachers

Year	Number of Students			Percent		Number of Teachers			Teacher:Pupil ratios
	Male	Female	Total	Male	Female	Qualified	Unqualified	Total	
					Primary				
1967	65,671	102,132	167,803	39.1	60.9	2116	949	3065	1:57.7
1968	71,206	198,180	179,386	39.7	60.3	2151	1268	3419	1:52.5
1969	73,154	107,749	180,903	40.4	59.6	2329	1254	3583	1:50.5
1979	73,441	109,954	183,395	40.0	60.0	2615	1349	3964	1:46.3
1971	68,582	102,872	171,454	40.0	60.0	2470	1407	3877	1:44.2
1972	69,506	103,706	173,212	40.1	59.9	2619	1317	3936	1:44.0
1973	75,650	111,809	187,459	40.4	59.6	2823	1128	3951	1:47.4
1974	88,057	129,981	218,038	40.4	59.6	2924	1215	4139	1:52.7
1975	90,915	131,017	221,932	41.0	59.0	2948	1280	4228	1:52.5
1976	91,168	130,849	222,017	41.1	58.9	2975	1260	4235	1:52.4
					Secondary				
1970	2,860	3,168	6,028	47.4	52.6	188	68	256	1:23.5
1971	3,643	4,173	7,816	46.6	53.4	186	120	306	1:25.5
1972	5,551	6,217	11,768	47.2	52.8	297	271	568	1:20.7
1973	5,957	6,602	12,559	47.4	52.6	308	243	551	1:22.8
1974	6,953	7,955	14,908	46.6	53.4	365	202	567	1:26.3
1975	7,059	8,552	15,611	45.2	54.8	412	193	605	1:25.8
1976	7,333	9,393	16,726	43.9	56.2	447	174	621	1:26.9

Source: BOS 1976, 1977 and Ministry of Education 1973, 1975, 1977

Table III-10. Primary and Secondary Enrollment of Male and Female by District: 1973-1976

District	1973			1974			1975			1976		
	Total	% M	% F	Total	% M	% F	Total	% M	% F	Total	% M	% F
						Primary Enrollment						
Butha-Buthe	12983	43.3	56.7	15291	43.4	56.6	15548	44.0	56.0	15143	44.2	55.8
Leribe	34367	43.7	56.3	40171	44.0	56.0	39898	44.7	55.3	40607	44.8	55.2
Berea	24438	43.8	56.2	28111	43.7	56.3	29031	44.2	55.8	29210	44.2	55.[illegible]
Maseru	40234	40.4	59.6	46307	40.5	59.5	48408	41.2	58.8	48211	41.4	58.6
Mafeteng	24665	37.4	62.6	28240	37.6	62.4	28051	38.8	61.2	28019	38.8	61.2
Mohale's Hoek	18605	35.9	64.1	21135	36.2	63.8	22094	37.1	62.9	21757	37.3	62.7
Quthing	12473	38.3	61.7	14795	38.0	62.0	14742	37.7	62.3	14845	37.5	62.5
Qacha's Nek	10547	40.1	59.9	12687	39.4	60.6	12725	39.6	60.4	12972	39.6	60.4
Mokhotlong	9147	34.6	65.4	11301	33.8	66.2	11435	33.3	66.7	11253	33.0	67.0
						Secondary Enrollment						
Butha-Buthe	525	43.8	56.2	839	46.5	53.5	891	47.7	52.3	939	50.4	49.[illegible]
Leribe	2505	50.0	50.0	2913	48.3	51.7	3210	48.9	51.1	3334	47.0	53.0
Berea	1408	41.0	59.0	1590	44.0	56.0	1837	40.7	59.3	1993	39.6	60.4
Maseru	4518	48.0	52.0	5327	46.9	53.1	5244	44.9	55.1	5587	44.0	56.0
Mafeteng	1591	48.7	51.3	1889	45.6	54.4	1905	44.3	55.7	1903	40.4	59.6
Mohale's Hoek	561	41.9	58.1	807	43.5	56.5	1024	42.5	57.5	1452	41.3	58.7
Quthing	474	46.8	53.2	606	44.7	55.3	606	42.7	57.3	617	44.4	55.[illegible]
Qacha's Nek	585	54.5	45.5	541	52.5	47.5	493	51.7	48.3	511	4[illegible]	51.5
Mokhotlong	392	45.2	54.8	396	49.0	51.0	401	41.9	58.1	390	40.3	59.[illegible]

Source: BOS (1977) and Ministry of Education (1973, 1975, 1977).

Secondary School

General secondary education is composed of 3 years in lower secondary school (Form A, B, and C) and 2 years of upper secondary or high school (Form D and E). The student to teacher ratio approximates 25:1, which is a marked improvement over primary levels. Entrance to secondary schools is by competitive examination, but as Table III-7 shows, only 50-60 percent of eligible students pass the Standard 7 examination. Less than 15 percent of Standard 1 enrollment in any given year progresses to Form A. At the end of Form C another examination is taken for a Junior Certificate (JC) which is necessary for admission into the upper secondary level or high school. The Cambridge Overseas Certificate Examination (CDSC), taken after Form E, is a requirement for degree or diploma level courses.

The curriculum reform introduced since the First Five Year Plan, is evident to a greater extent in the secondary schools than in the primary. The subject of developmental studies was initiated in the early 1970's in an attempt to offer more diversified and practical orientation in secondary courses. A new core curriculum includes Sesotho, English, Math, Science, Developmental Studies, and Practical Work in agriculture, elementary technology, domestic science, and commercial studies (MOE, 1977). Developmental studies is an integrative course to give students such information and involve them in activities which prepare them to contribute to Lesotho's development and become aware of their responsibilities as citizens. Along with classes, it is suggested there be compulsory manual, practical and productive work done in the community.

Three pilot schools began the program in 1973, and in 1977 during the Second Five Year Plan the experiment was expanded to 7. This curriculum development in secondary education has been carefully controlled in order not to exceed the country's capabilities. The program is self-sufficient in teachers for the courses now being held with the 37 teachers trained in Developmental Studies and all practical teachers being Basotho (MOE, 1977). Prevocational teachers are taught by joint programs between the National Teachers Training College, Lesotho Agricultural College, and the Lerotholi Technical Institute (Klaus, et al, 1977). To support the new direction in curriculum, the Junior Certificate Examination has been placed under the design and supervision of a three-country examination council from Botswana, Swaziland and Lesotho. This has allowed the test to be flexible to the needs of the Development Studies program and the practical course work.

An unanswered question and one which does not bode well as a measure of the quality of secondary education, is why the percentage of exam passes have dropped since 1975 when the tri-country examination council began examining on the new courses. There has been a significant and steady decline in test results for the COSC from 1962 when 74 percent of eligible students passed to 1978 when only 27 percent passed (See Table III-7).

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Other Courses and Programs

There are practical and specialized courses which come after primary, JC level and COSC level education. After primary school it is possible to enroll in vocational schools for industrial arts, Farmer Training Center courses, or housecraft schools for home economics. Post lower secondary education is given at technical schools such as Leloaleng Trade School, the Technical School of Leribe or the Lerotholi Technical Institute (LTI), the Lesotho Agricultural College (LAC), National Teachers Training College (NTTC), Lesotho Institute of Public Administration (LIPA), Commercial Training Institute (CTI), and nurses training courses. These schools emphasize practical skills or respond to the manpower needs of a specific Ministry. Post upper secondary includes diploma and degree courses at National University of Lesotho (NUL), diploma at NTTC or LAC and most recently some advanced engineering and technical courses at LTI.

The National University of Lesotho was established in 1975 but occupied the same site before that as University of Botswana, Lesotho, and Swaziland (est. 1964). The University is structured with 18 academic departments under 4 facilities - Education, Humanities, Science, and Social Sciences. The overall student:teacher ratio in recent years has average 6.5:1 with enrollment between 500 and 600. Table III-11 presents graduate numbers since 1968.

Current manpower estimates of the need for University graduates within Lesotho require an intake of 60 non-science degree and 140 science degree students per year. In actuality there have been more than 60 non-science and far less than 140 science majors even though the total is apparently on target. When the university was a three-country endeavor, the agricultural faculty was located in Swaziland. As yet NUL has not established a replacement facility in Lesotho. This means degree level agricultural training must be obtained out of country.

The National Teacher Training College was opened in 1975 to undertake quality instruction for both pre-service and in-service teachers. NTTC is responsible for training primary and lower secondary teachers while upper secondary teachers are trained at NUL. The NTTC offers courses for 3 teaching certificates which are 3-year programs, the Primary Teachers Certificate, Advanced Primary Teacher's Certificate, and the Secondary Teacher's Certificate. The first graduating class in 1978 will include an estimated 41 primary and 22 secondary teachers.

Although the Government's national education policy recognizes a need to reduce the nation's dependence on expatriate teachers, a study done in 1969 found an attrition rate in secondary teachers of 55 percent over 3 years. A more recent study found that of 122 Basotho teachers graduated from UBLS between 1965-1975, 104 were still in Lesotho in 1976 (Hudson and Khebele, 1976). The observation that teacher attrition was three times more prevalent for graduate versus non-graduate is important in terms of the Government's efforts to provide quality education for students. The emphasis of the Second Five Year Plan to replace as many unqualified and expatriate teachers as possible, leads to optimistic

recommendations suggesting a pupil:teacher ratio of 40:1 as a target for the primary schools by the late 1980's. A more recent publication for the Ministry of Education calls for a more moderate course achieving, by the year 2000, a total, qualified Basotho teaching force in both primary and secondary schools (UNDP, 1977).

The Ministry of Agriculture has two important training institutions directly under its control. There are five Farmer's Training Centers operating to carry on in-service training for Ministry staff, short courses for farmers, and a 10-month training course for young farmers. This resource will be especially important to BASP because one of the FTCs is to be devoted to expanding the training facilities for extension agents employed by the BASP program. Until this time the Ministry of Agriculture has attempted to meet the training requirements for extension agents through the Lesotho Agricultural College. LAC offers two year certificate courses in agriculture and home economics which require a JC for admission, and a new diploma level course which requires the COSC. The number of graduates during 1970-1975 averaged 16 for a Certificate in Agriculture and less than 10 in Home Economics. However, in 1977, 27 females and 14 males graduated with Certificates in Agriculture and 22 in Home Economics (Younger, 1977). The graduates of the agricultural course are incorporated as extension agents and those from home economics go into the Ministry of Agriculture's office of Nutrition and Home Economics. In 1977 the entire graduating class of 63 was placed within the Ministry. It is not clear what the attrition rate is from these posts, but in October 1976 there were 137 posts for agricultural coop extension assistants and only 78 were filled (IBRD, 1977).

Implications for Agriculture

The Ministry of Agriculture is necessarily involved in education to assure that its development efforts have an impact on the nation. Technical and policy information must be available to rural people if they are expected to respond intelligently in cooperative development programs. This exchange can take place either through an extension network or within the formal school system. Extension can be carried out through personal contact with people, published reports and documents, educational radio broadcasts, or training courses. Of concern to agricultural planners is which method is most effective and what resources it will demand.

A great majority of children attend some school at the primary level while relatively few go on to secondary school. It is, however, at the secondary level that agricultural education is presently being introduced, and then only in a limited number of schools. As a result, at least 90 percent of Lesotho's population is not exposed to any agricultural training in their formal education; an issue of continuing concern among the many branches of government in Lesotho.

Another common concern between the Ministries of Agriculture and Education is the education of herd boys. There is no question that herd boys fulfill an important function in the present system of agriculture in Lesotho. At the same time having half of the male population not being able to read or write is an obvious constraint on development

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potentials. Since the principle barrier to mandatory attendance in schools is the lack of alternatives for herd boy services, the Ministry of Agriculture may have to take the lead in exploring solutions. At the same time these boys are gaining some experience in animal husbandry (which perhaps should not be given up entirely for a more literary education in the classroom), an experience that might possibly be supplemented by guidance and direction from extension personnel in the field.

The success of extension education will depend to a great extent on the people involved in the Ministry's work. There will be demand for a great number of trained personnel as pointed out clearly by personnel requirements of BASP alone. A careful review of education statistics, however, is only a part of the data needed to analyze the manpower situation in agriculture. Additional information on civil service growth and vacancy rates, migration of trained people to the Republic and elsewhere, and other factors warrant further study in connection with Lesotho's needs and her capacity to satisfy them in the future.

Nutrition

It has been said that diet is the end-point of the economic organization of society (Ashton, 1939). This emphasis is not lacking in Lesotho. The Second Five Year Development Plan stresses the need to focus attention on nutrition as a major aspect of health care (Lesotho, Vol. II, p. 22). A recent survey reveals that there are more than fifty separate organizations or institutions in Lesotho that deal in one way or another with nutrition or nutrition education.*

The plethora of participating organizations raises the very real possibility of overlapping and duplicating efforts and of wasted resources in a country where under- and mal-nourishment are still problems of no small magnitude. For example, some 20 percent of the under-five children are reported to be stunted or chronically malnourished, 25 percent to be anemic, and 33 percent of households have insufficient income to provide a satisfactory diet for all the family (UC-NUL, 1978, UCLA 1976). Thus coordinating the welter of public and private efforts in the field of nutrition is of foremost importance. Recently the Prime Minister announced that he was forced to create a new unit in his offices, the Lesotho Food and Nutrition Council (LFNC). The unit, headed by a Cabinet subcommittee comprised of the Ministers of Agriculture, Education, Health, and Rural Development, will coordinate all ministry, donor, and voluntary agency activities in food and nutrition with the goal of optimizing the nutritional status of the Basotho. In addition, LFNC with the support of its secretariat the Food and Nutrition Coordinating Office (FNCO) will formulate nutritional policy for Lesotho.

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*The list of organizations in Lesotho with a nutritional component is contained in J.H. Anderson, "Resource Guide for Nutrition Planners in Lesotho", LASA Discussion Paper No. 5 (in press), which also supplied much of the material for this section.

Examples of policy questions that would impact heavily on agriculture are:

- the nutritional implications of subsistence versus commercial production.
- decreased dependency on South Africa either through import substitution or consumption reduction.
- local manufacture of food products, especially those that contribute most directly to improved nutrition (e.g., weaning and children foods).
- food aid as a direct measure against under-nourishment versus the disincentives it brings to domestic production (Polman 1977).
- emphasis of nutrition efforts, whether nationwide or focussed on identified at-risk groups.
- positive and negative impacts of establishing food standards legislation.

These few policy issues will serve to illustrate the close connection between the traditionally production-oriented Ministry of Agriculture and the growing concern with consumer-oriented nutrition problems in Lesotho.

Historical Context

Sorghum (*mabele*) was the indigenous grain of the Basotho. Maize (*poone*) probably entered the Basotho diet in the 18th century and wheat (*koro*) together with the plow, was introduced by foreign traders and missionaries in the 19th century. Wheat proved very successful and by 1886 more than 100,000 bags (ca. 5,000 m. tons) per year were being exported to the diamond fields of South Africa (Ashton, 1939).

Improving health conditions, including vaccinations against such diseases as smallpox in the early 20th century, reduced mortality rates and began the upward spiral of population that continues to the present. The food surplus soon disappeared: a series of droughts and crop failures in the 1930's precipitated a food crisis. In 1938 "malnutrition was seen in every village dispensary, school, and recruiting office, and the root cause is overpopulation" (E.A.C. 1938).* By 1946 kwashiorkor was clearly identified and pellagra and other avitaminoses were rampant. A severe goiter problem was reported in the 1956-60 nutrition survey of 1956-60 (Munoz and Anderson, 1960).

The same survey resulted in the establishment in 1962, of the successful Applied Nutrition Programme (ANP) with its emphasis on gardening, poultry and fish ponds. In 1975 a collaborative planning conference

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*The "root cause" was a population estimated at about 650,000, or slightly more than one-half of Lesotho's present population of 1,200,000.

called at Roma to review the situation resulted in the establishment of the Lesotho Food and Nutrition Council with its Secretariat, the Food and Nutrition Coordinating Office. The conference also initiated two research surveys; the Lesotho National Nutrition Survey and the Food System of Lesotho Study. These revealed some improvement amongst under-fives (e.g., an extra 1 kg. in average weight and an extra 2 cm in average height) compared with the 1956-1960 survey. However, they also showed that 20% of the under-fives were still chronically malnourished and below their full growth potential.

Incidence of Nutritional Disorders

Estimating the prevalence of nutritional disorders is especially difficult in developing countries. Lesotho is no exception. Data is sparse, occasionally ambiguous and sometimes conflicting. Nevertheless the general picture to emerge on the nutritional status of the country, in the absence of National Food Consumption Survey data, is that while the more dramatic presentations of malnutrition (e.g., the pot-belly, skin and hair changes of "florid kwashiorkor") have low incidence, there exists various degrees of nutritional disorder in approximately one-third of the nation's families.

In the event the delicate balance between agricultural production, food imports, food aid, miners remittances and population growth is upset, there are certain sub-groups of the population who generally will be the first to experience hunger and the debilitating sicknesses of a malnourished body. These groups are said to be the *at-risk groups*, and include children under five years of age, expectant mothers, families of crippled miners, etc. The best available information on the universal sets children, mothers, families is as follows:

Children: 20% of under-fives are chronically malnourished and below their full growth potential (11% in Maseru: 25% in the Mountains). (UCLA, 1976).

Mothers: 5% are undernourished (but 21% are obese!). 5% are suffering from goitre (was 15% in 1956). (UCLA, 1976).

Families: 33% of all families probably experience a shortfall in their basic energy requirements (in 1976 they received a monthly income in cash and kind of less than R40 per month for a 4.3 member household). (UC-NUL, 1978).

It is essential that the at-risk groups within these universal sets be more specifically identified so that (1) measures can be taken to alleviate their immediate distress, and (2) policies formulated for the development of the population as a whole can include measures to specifically eradicate the causes of their distress. In addition, there is a need to specifically define the at-risk groups with reference to their real and potential nutritional disorders, and their correlations with various geographic and socio-economic parameters. With limited resources, sound planning dictates that groups be targeted for specific action.

Correlates of child malnutrition revealed so far by the Lesotho National Nutrition Survey and the Food Systems of Lesotho Study, and by clinic and hospital returns of the Ministry of Health are summarized below. Except perhaps for missing foods (e.g., meat/legume relish; milk) none of these factors by itself is highly correlated. But if more than five factors are present it is highly likely that the child is a member of at at-risk group and is already suffering from some form of malnutrition.

- Mountain-dweller (especially in a band across the districts of Mafeteng, Mohale's Hoek, and Qacha's Nek).
- Father a miner in South Africa.
- Total household budget of less than Rands 40 per month (R1.00 = US$1.15).
- In age range of 6 to 24 months (the crucial weaning period).
- Male child.
- Mother illiterate.
- Fifth or later child in family.
- Less than two years between child and its following sibling.
- Meat/legume relish usually missing in diet.
- Milk missing from diet.

Per Capita Food Consumption (May 78)

The Food System of Lesotho Study and the National Nutrition Survey confirm that the basic diet for 94% of the population (i.e., the rural sector) is still very limited in its variety of foods. The main daily dish for thousands is still two or more cupfuls of stiff maize porridge (*papa*) together with a meat/legume relish, or, more often, a green vegetable relish (*meroho*). However, the crucial issue of how much is eaten is still not resolved and awaits the results of the proposed National Food Consumption and Household Budget Survey, for which the Bureau of Statistics is presently seeking assistance.

In the absence of national research data, interpolations will have to be made using the following three sources (of contradictory figures for certain commodities):

1978 - Attitude Survey on Senqu Project Area Farmers (data gathered by J. Gay and T. Guma from a sample of 100 ordinary and 48 progressive farming households in Mohale's Hoek District). Only a few commodities were investigated. (Gay, 1978).

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1972-1974 - FAO Food Balance Sheets for Lesotho. These give average figures for "apparent consumption" calculated by use of available statistics and "estimates" in the equation:

Consumption = production + imports - exports - changes in national stocks.

1976 - Urban Household Budget Survey Calculations. The Household Budget Survey gives the amounts spent on different food commodities by different socio-economic urban groups. Use of 72/73 price lists enables quantities to be calculated. Transposing to a national aggregate for 1976 comes by appropriate equating of the national model household to the socio-economic urban group with the same (low) purchasing power. The 1976 income in cash and kind, for the national model household, was assumed to be R570 per annum for a 4.3 member household (based on the findings of the Food System Study) (CU/NUL, 1978) and the household was consuming R25 per month of food out of a budget of R47.50 per month (c.f., a poverty datum line budget of about R96 per month, based on Morres and Van Der Wiel, 1975).

For comparison with these figures a possible model diet has been drawn up based on latest FAO/WHO recommended daily allowances of nutrients, and allowing for perceived realities of the Lesotho agricultural, economic and geographical situation. It should be borne in mind this is a recommended diet averaged over all Basotho household members (c.f., UC-NUL 1978, p. 91 for the weighting factors for individual household members).

The discrepancies in reported and calculated figures point up the need for a comprehensive national food consumption and household budget survey. With inadequate data, only preliminary comparisons and comments can be made:

Beans/Peas: The Gay-Guma figures act as a check on the assumption that a low socio-economic urban situation can be transposed to a largely rural national aggregate. Beans and peas are available for direct consumption mainly in rural areas. Thus the national beans/peas consumption is more likely to be on the order of the "ordinary farmer's" 20 gr/day, as is also indicated by FAO figures.

Meat : The higher consumption figures from Mohale's Hoek (Gay-Guma) may be a local phenomenon, even though FAO Balance Sheet data are in approximate agreement. At 90 gr/day, total annual consumption would be on the order of 40,000 m. tons, a figure far in excess of reported or estimated supplies.

Table III-23. Various National Average Daily Per Capita Food Consumption Estimates, by Commodity, 1976. (per capita grams per day)

Food Commodities	Ordinary household	Progressive household	FAO '72-'74 Average Food Balance Sheets	Household Budget Calculations	One Possible Recommended Diet for Lesotho*
Body Builders					
Milk	NA	NA	40	50	80 (1/2 litre)
Eggs	NA	NA	3	3	15 (1/4 egg)
Meat/fish	90	190	60	20	30
Beans/peas	20	50	20	2	30
Disease Preventers					
Vegetables	NA	NA	50	90	120
Fruits	NA	NA	40	10	30
Energy-Producers					
Maize	100	210	250	270	180
Sorghum	80	140	100	50	60
Wheat	16	90	150	150	100
Potatoes, etc.	1	5	20	30	30
Sugar	NA	NA	30	40	30
Oil/fat	NA	NA	4	4	10
Luxury foods	NA	NA	100**	25***	
Flavorings					
Tea	NA	NA	NA	1	3
Salt	NA	NA	NA	6	5

*FAO-WHO recommended daily allowances expressed in foods commonly consumed in Lesotho.
**Mainly beer (*joala*).
***Mainly sweetstuffs, soups and baby foods; beer has been counted as a sorghum.

Sources: Gay and Guma, 1978; BOS, 1973 and FAO, 1977.

Maize, Sorghum, Wheat	:	Grain figures for the Mohale's Hoek household would seem more in agreement with those of other surveys. Wastage of cereals is an important factor that needs further investigation.

As the Household Budget calculations stand, the average diet contains about 2100 kilocalories (8.0 MJ) and 41 g. protein. This means it is more than adequate in energy (model average diet contains about 1800 kilocalories (7.2 MJ) but is barely sufficient in protein). (Model average diet contains about 42 g. protein). The chief problem of the consumption of at-risk groups is therefore one of variations about the mean. However, the diet is also deficient in calcium, vitamin A, riboflavin and niacin (e.g., it needs more milk, green vegetables and yellow vegetables).

Current Nutrition Programs

Lesotho Food and Nutrition Council (LFNC) and its Secretariat, the Food and Nutrition Coordinating Office (FNCO) were established in March 1977 for the general purpose of optimizing the nutritional status of the Basotho through coordination of all activities directly or indirectly related to food production, food distribution, food consumption/utilization, nutrition education, food and nutrition research and food and nutrition policy formulation. Its four sections are linked together through the Deputy Senior Permanent Secretary. They are the Cabinet Subcommittee, the Secretariat, the Advisory Group, and Technical Resources persons. Its goals are as follows:

1. To formulate nutrition policy and recommend nutrition laws and regulations.

2. To coordinate the planning and implementation of food and nutrition programs.

3. To follow up and assist the implementation of food and nutrition programs.

4. To evaluate nutrition program effectiveness.

Pre School Clinics: Working with the Maternal Child Health Department of the Ministry of Health, Catholic Relief Services (CRS) supplies supplementary rations to 50,000 of the nation's 186,000 under-fives along with their 38,000 mothers, on a monthly basis at 63 out of Lesotho's 145 clinics and outstations.

Primary School Feeding: Save the Children Fund (SCF), using World Food Program (WFP) food aid, has, since 1962, been distributing food for school dinners to upwards of 170,000 of the nation's 200,000 primary school pupils at 760 out of approximately 1000 primary schools. SCF has also attempted to establish clean water systems and school gardens.

Secondary School and Institutional Feeding: WFP also provides food aid for feeding in secondary and high schools, and in hospitals. In each case fees are levied for this service which are afterwards returned to the government for use in a savings fund for the capital development of the institutions involved.

Food-for-Work Projects: CRS and WFP continue to supply food aid packages for road-building, dam-building, soil conservation, and fish pond projects. Approximately 19% of Lesotho's total food consumption is from food aid and it is now being allocated from a special Food Management Unit (FMU) created in the Prime Minister's office (along with FNCO).

Mountain Region Food Reserves: FMU and WFP are implementing a program to build stores at seven mountain sites for storage of an emergency supply to 5000 MT of grain. Food stocks will be rotated every year and their contents sold. In a crisis, food may be given out free.

Home Economics Extension and General Nutrition Education: The LFNC report "The Current Status of Nutrition Education in Lesotho-1977" concludes that some 50 agencies/departments are using about 1000 resource or contact centers, such as schools and clinics, to reach only 25% of the nation with basic information on diet and nutrition. It further concludes that food-for-work activities are not being used as vehicles for nutrition education as they potentially could be.

Nutrition Training: There are a total of 34 tertiary training centers that offer some measure of nutrition training in their syllabae (e.g., National Teacher Training College; Lesotho Agricultural College; National University of Lesotho) plus 12 secondary schools that offer Home Economics as a subject. Most of these courses feature a distinct agricultural component. A recent FAO report (Truswell, 1977) recommends links with Kenya and the U.K. for further professional training, while World Bank is prospectively interested in funding a R7 million expansion of agricultural training and extension over the next decade in conjunction with the Basic Agricultural Services Project (BASP).

Nutrition Research: FNCO has set up procedures for collecting and monitoring all program information in the country, and research is underway for setting up a Food and Nutrition Resource Center. A meeting has been held to expedite the 1980 National Food Consumption Survey and a FNCO Nutrition Coloring Book for primary schools is being evaluated by the Lesotho Distance Teaching Center. Synectics Corporation is just completing a year-long longitudinal study on the educational impact of the "Road to Health" growth chart used in MCH clinics, and CRS, with the Ministry of Health, is planning the introduction of new charts which will serve as a nutrition surveillance system for young children in situations of nutritional vulnerability.

Nutrition Policy Issues Affecting the Agricultural Sector

If good nutrition for the whole nation is accepted as a basic planning goal for the Agricultural Sector, three policy issues become fundamental:

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1. How can the at-risk groups be educated to make use of limited food resources?

2. How can available food supplies be equitably distributed?

3. How can food production be influenced in favor of a more nutritious pattern?

For such goals to be accepted there needs to be agreement on planning criteria and the coordination of planning activities. A format for multi-sectoral food and nutrition planning has been incorporated in the FNCO Plan of Work and will thus come under review at the next National Nutrition Conference (under the auspices of LFNC) and in the meetings of the LFNC Advisory Group. The resolution of basic policy issues will only be possible as suitable research is carried out.

As an example of the type of data that would support analysis of policy issues, a table has been prepared demonstrating what changes in agricultural production would be needed to provide the FAO-recommended diet presented earlier. The table is preliminary and based upon admittedly inadequate data. Nevertheless, it illustrates how, starting from a focus on nutrition, production goals and shortfalls can be indicated, with consequent implications for agricultural planning.

Table III-12. Target Productions of Food Commodities for Agricultural Self-Sufficiency. (Units: metric tons unless otherwise indicated; data from year 1975/76).

Food Commodity	A Target Production for Self-Sufficiency 75/76	Provisional Estimates of Actual Production 75/76*	Deficiency (-) (+) Surplus
Milk	35,040	27,000	- 8,040
Eggs	9,125,000 dozen	1,258,000 dozen	- 7,867,000 dozen
Meat/fish	13,140	8,722	- 4,418
Beans/Peas	13,140	14,413	+ 1,273
Fruit & Vegetables	65,700	7,700	- 58,000
Maize	84,840	49,128	- 35,712
Sorghum	25,280	24,540	- 1,740
Wheat	45,800	44,640	- 1,160
Potatoes & Rice	6,570	4,960	- 1,610

Notes: (1) In addition, the following items would have been needed as imports: 13,140 MT sugar, 4,380 MT oil, 1,315 MT tea, 2,190 MT salt.

(2) The most deficient items are eggs, fruits, and vegetables, and maize in terms of self-sufficiency (c.f., most urgently needed items in the event of a blockade: beans, vegetables, maize and fortified margarine).

*Bureau of Statistics, 1977.

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CHAPTER IV

EMPLOYMENT AND MIGRATION

Employment issues constitute one of the more interesting sets of problems facing the Government of Lesotho. An extremely close economic dependency results from the high levels of migration of Basotho to jobs in the Republic of South Africa. For this reason as well as sociological and academic interests, the migration phenomenon is probably the most intensively studied aspect of Lesotho's economy. Chapter I briefly discussed some of the more important implications of migration. The present chapter attempts to set a more definitive context for discussing employment concerns, summarizes salient points with respect to migration and then brings various pieces of evidence to bear on significant issues to be faced in the future.

Labor Force Characteristics

Size and Distribution by Sex

In 1976 Lesotho's *de jure* population stood at 1,216,883 including 586,870 males and 629,963 women (Table III-1). While age criteria for defining potential labor force are necessarily arbitrary it is convenient to use the 15-64 bracket adopted by the Second Five Year Plan (Lesotho, 1975). Accordingly, Table IV-1 draws on the age and sex compositions given in the previous chapter to estimate work age population for Lesotho. Then using participation rates from the Second Five Year Plan, estimates are given for those actively involved in employment activities.

Table IV-1 Estimated Working Age Basotho and Their Involvement in Employment (1976)

Item	Males		Females		Both Sexes
	15-24	25-64	15-24	25-64	15-64
% of 1976 Population*	18.8	37.4	18.4	37.8	56.2
Numbers (000)	110.3	219.6	116.1	238.0	684.0
Participation Rate (%)**	68	94	58	86	81
Engaged in Employment (000)	75	206	67	205	553
Subtotals by Sex					
Numbers (000)	329.9		354.1		
Employed (000)	281		272		

*Percent of sex specific population total only.

**Source states "Employment figures include all self-employed, employed, and family workers, and persons underemployed in the various senses of that term". Data are projections from the 1966 Population Census and must be considered approximations only for 1976.

Sources: Jilbert, 1977 as reported in Chapter III; Lesotho, 1975 for participation rates.

Working age *de jure* population is split among women and men in the ratio 52:48. However, given the somewhat lower participation rates estimated for women, approximately equal numbers are listed as "engaged in employment activities". Recent estimates indicate a current total of 250,000 households in Lesotho (Eckert, 1978). Therefore, the average household contains 1.32 men and 1.42 women of prime working age, approximately 1.1 of each being engaged in some form of employment.

Distribution by Source of Employment

Some confusion exists in the proportions and absolute magnitude of employment by sector as well as domestic vs. foreign employment. Several surveys as well as both the Population and Agricultural Censuses contribute data on the subject, unfortunately with different definitions, age categories and years of enumeration. What follows is an attempt at a synthesis.

The most complete disaggregation is found in the Second Five Year Plan (Lesotho, 1975) and is reproduced as Table IV-2 below. The total of 540,000 employed is consistent with the 553,000 given above for the following year.

Table IV-2. Employment of Basotho aged 15-64, by Sector, 1975
(Thousands of people, aged 15-64)

INTERNAL EMPLOYMENT	From Source	Adjusted*
Manufacturing	2.0	
Construction and Civil Engineering	2.5	
Government	9.2	
Tourism	0.5	
Other Services	13.3	
Subtotal, Modern Sector	27.5	Same
Handicrafts and Informal Activities	22.5	20.1
Agriculture	340.0	304.4
Subtotal, Traditional Sector	362.5	324.5
Subtotal, Internal Employment	390.0	352.0
EXTERNAL (MIGRATION) EMPLOYMENT	150.0	188.0
GRAND TOTAL, INTERNAL AND EXTERNAL	540.0	Same

*Reflecting van der Wiel, 1977; see text below.

Source: Lesotho, 1975, p. 48.

Van der Wiel has suggested that the 150,000 migrants above represent an understatement, possibly representing only migrants moving through official recruitment channels. Van der Wiel's detailed surveys support a total figure of 200,000 migrants in 1976, approximately 180,000 men and 20,000 women (van der Wiel, 1977). These two figures form the upper and lower bounds of currently accepted estimates, with the balance of opinion, in 1978, accepting the higher figure. In fact, Breytenbach had postulated more than 200,000 Basotho migrants as early as 1972, though at the time less than 100,000 were "officially" counted (Breytenbach, 1972).

Van der Wiel found that "56 percent of the adult male population (18 years and oder) and 6 percent of the adult female population (18 years and older) are employed in the Republic of South Africa". By assuming no migration occurs before age 18 or after 65, his figures can be related to those in Table IV-1.* The following results:

Table IV-3. Employment in South Africa Related to Total Basotho Labor Force and Employment. (thousands, 1976)

Item	Male	Female
A. Labor Force (Population 15-64)	330	354
B. Employed (A. x participation)	281	272
C. Migrants (van der Wiel's est.)	177	21
D. C. as Percent of A	54	6
E. C as Percent of B	63	8
F. Employed in Lesotho (B -C)	104	251
G. Unemployed, Work Age (A -B)	49	82
H. Unemployment Rate (G as % of A)	15	23

Van der Wiel's estimates have the advantage of field data using sound methodology. There is no reason to suspect that his percentages do not reflect the nation as a whole. Adjusting to 1975 by deleting the 10,000 additional migrants employed in 1976, this suggests that the Second Five Year Plan underestimates migration for 1975 by 38,000 individuals. Since the total employed matches other calculations exactly, and is thus considered accurate, domestic employment must be overestimated by an equivalent amount. One can assume reasonable precision in estimates for the modern sector. Hence Table IV-2 contains an adjusted column deducting the 38,000 by a proportional reduction in each of the traditional industries listed and adding them to migrant employment.

*Population aged 15-17 derived from Table III-3 is excluded and that 65 and older included to determine migrant numbers. These are then related to labor force from Table IV-1.

One concludes, from the above rather complex narrative, the following points:

1. Migration to the Republic removes 54 percent of Lesotho's male labor force; 63 percent of those actually employed. This rate is believed to be the highest in the world (IBRD, 1978).

2. The positive view is that these same men each earn a cash wage of R875/annum or higher (26 shifts/mo. at min. wage).

3. Female migration is inconsequential compared to male migration, although it is undoubtedly significant to the households concerned.

4. Unemployment rates differ significantly between the sexes with females being the most affected.

5. After allowing for migration, Lesotho's residual domestic mix of employed persons is 71 percent female. This fact has not been taken into account by development programs, the extenstion service and other institutions to date.

6. Lesotho's "unemployment problem" (those persons without work but who are of working age) is 63 percent female.

Van der Wiel further disaggregates domestic employment for males according to source. While his estimates are for ages 18 and over, we again assume no active involvement except in agriculture between 15 and 18 and no involvement at all after 65 years of age. The following estimates are derived by combining van der Wiel's data and Table IV-2.

Table IV-4. Employment by Sex in Modern and Traditional Sectors of Lesotho, 1975. (Thousands, ages 15-64 inclusive)

	Modern Sector	Traditional Sectors	
		Handicrafts, etc.	Agriculture
Total Employment*	27.5	20.1	304.4
Males Employed**	20.2	(assumed 0)	83.9
Females Employed***	7.3	20.1	220.5

*From Table IV-2, adjusted figures.

**Calculated from van der Wiel, 1975; and 1976 labor force adjusted to 1975.

***Residual.

Two conclusions appear. First, despite the predonimance of females in the domestic employed and unemployed labor force, growth in the modern sector (including government) has employed largely males. Second Lesotho's labor force employed in agriculture exceeds 72 percent female.

The Micro-View of the Migration Phenomenon

Migration to employment outside Lesotho has been a significant phenomenon for Basotho since the end of the last century when mineral extraction, predominantly gold, emerged as the principle growth sector in South Africa. In the last 100 years Lesotho's dominant economic relationship with the Republic has shifted from one of export trade in food grains to massive export of Basotho labor. There is at least one analysis that suggests this transition resulted from conscious policy implemented by South Africa (Murray, 1976). With some fluctuation migration of Basotho has grown since, in absolute terms and as a proportion of the male labor force. The magnitudes shown in Table IV-3 represent highs for Lesotho, and as far as is known the highest rate prevailing world wide (IBRD, 1978). In 1978, Basotho constituted the largest single national component of South Africa's imported work force (RDM).

Previous portions of this report have developed measures of the more significant macroeconomic impacts of migration from Lesotho. This section concentrates on the micro-view. We borrow copiously from A.C.A. van der Wiel's excellent study (1977) in which he reviews most previous work while analyzing and presenting his own primary data.

The form of migration of concern is classified as "oscillating" or "circulatory" migration, characterized by employment abroad with periodic returns to a home residence maintained in the village and in which, at least the immediate family is resident. Excluded from this description is rural-urban migration even though recent data suggest this to be a growing phenomenon in Lesotho (see Chapter III).

Viewed by the individual Mosotho, migratory employment constitutes 90 percent of his cash wage opportunities at present. Incomes from traditional domestic resources are low. Per capita land allocations are declining (see following chapter), yields of most crops have been stagnant to declining and little increase in incomes has resulted from livestock activities (Chapters VI and VII). Gross Domestic Product is estimated to have remained completely stagnant in real income terms since 1956 (IBRD, 1978, p. 7 and Table I- above). The only current bright spot is the emerging growth of the modern sector, and this at present cannot be relied on to absorb no more than 15-20 percent of annual additions to the labor force.

Obviously to the young Mosotho, ready to assume responsibilities of providing for his own or his parental family, migration for employment is the overwhelming, single opportunity. His propensity to migrate is encouraged by two factors. First, and least important, employment in the mines has long had the aura of legitimizing one's manhood among

the people's of southern Africa. This factor, however, is dissipating in the face of modern cultural contacts. Much more important recently has been the phenomenal increase in real wages in the mines. Entry levels stood at R0.42/shift January 1, 1972 and R2.80/shift on the same date in 1978. Deflated by the rising cost of living this is still a 338 percent rise in real earnings in five years, a growth rate unmatched by wages in any other major sector of any country in the region.

Todaro (1969) postulated a model of the motivations to migrate which related this decision to 1) differentials in income between source and destination plus 2) the probabilities of finding employment at the destination. Other authors have shown that cost of living differentials between source and destination plus the cost of the move also serve as determinant factors (Eckert, forthcoming). Applying these concepts to Lesotho, we find a minimum wage in the Republic exceeding that of government service in Lesotho by 40 percent (R2.80 vs. R2.00), and approximately 3-4 times that prevailing for unskilled labor in the village. Attractive wage differentials therefore exist. The Mosotho does not have to worry about the probability of finding a job since he is not permitted to migrate unless he has a signed contract. Nearly all migration therefore is to an assured opening. Costs of the move are usually borne by the employing firm which provides transportation, medical examinations and training. And finally, the cost of living at the destination is not a factor since accommodation and food are provided by the employer. In fact diets consumed while employed undoubtedly exceed those consumed at home in both quality and quantity.

The incentive structure, therefore, strongly encourages migration. Coupled with very slow growth in domestic cash employment and no growth in real incomes from agriculture, the results are obvious. Migration is not only the dominant realistic option for young men but remains so throughout most of their active employment careers as shown in Table IV-5.

Calculations in Table IV-5 weight van der Wiel's age group percentages by the age distribution of the 1976 male population. They suggest that van der Wiel himself may have underestimated migrant numbers slightly in that his weights were drawn from the age distribution of his samples.

Table IV-5. Extent of Migration by Age Group for the Basotho Male Labor Force (1976).

Age Group	Migrants		Non-Migrants	
	Number*	Percent	Number*	Percent
18-19**	8.7	37	14.9	63
20-24	38.0	74	13.4	26
25-29	36.9	83	7.6	17
30-34	31.3	81	7.3	19
35-39	24.0	72	9.4	28
40-44	16.9	59	11.8	41
45-49	11.5	47	12.9	53
50-59	12.9	35	24.1	65
60 and over	3.9	11	31.3	89
Total	184.1	58	132.7	42

*In thousands.
**No migration of significance occurs prior to 18 years.

Source: van der Wiel, p. 32, 1977; and Chapter III.

Migrant Profile

Given this wide participation in migration a definitive migrant personal profile is difficult. They simply represent a cross section of Lesotho's able-bodied manpower. In fact, medical screening for work two miles underground insures that these men are the most physically fit Basotho available and therefore potentially the most productive in sheer physical capacity terms. Most migrants (70%) are married. Approximately equal numbers list themselves as either household head (41%) or son of the household head (43%). There is a slightly higher propensity to migrate among less educated persons and from households with lower income status in Lesotho but it is not pronounced.

The more affluent households tend to have sons in migrant employment while the poorer ones send the household head. However, cause and affect are unclear in the last conclusion of van der Wiel's above. It seems logical that the resource poor households are likely to be recently established and therefore without sons old enough to work. It has been shown elsewhere that in a mature household the father usually remains at home if one or more sons can take a job outside the village (Eckert, 1972). These households would be expected to have accumulated assets and be more affluent, at least among households involved in migration. One would expect, therefore, the pattern noted by van der Wiel.

Men enter their first migrant employment at an average of 20. Of these, one third had retired from migration by 40 and two-thirds by 50. Over his working life (an average of 25 years) the migrant spends approximately 15 years outside Lesotho on a succession of contracts interspersed with periods of leave or unemployment at home. At any one point in time some 25 percent of men actively engaged in a migrant career will be at home on leave (Guma, 1978). These findings are identical with those of McDowall (1973).

Migrant Incomes

The average Mosotho miner receives a wage 70 percent higher than the prevailing minimum shift rate. During fiscal year 1977/78 miners received R1077 as an annual wage. Non-mining migrants are estimated to have earned R834 for the same year (CPDO, 1978). McDowall (1973) estimated that migrants repatriated two-thirds of their salary. Van der Wiel found this proportion had risen to nearly three-quarters by 1976. Currently a figure of 72.6 percent is used by the Ministry of Finance although this percentage has been seen to vary with real wage levels in the Republic.

For individuals employed as miners between 1974-1975, van der Wiel found the following distribution of earnings.

Average annual earnings	R839	100%
Of which spent in RSA	232	28
Remittances to Lesotho	240	29
Deferred Pay (to Lesotho)	146	17
Cash in hand on return	91	11
Goods returned to Lesotho	130	15
Total Return Flow	607	72

Of goods returned with the migrant, the bulk (70%) was clothing. Food and clothing accounted for 55 percent of the distribution of cash return flows with the rest being distributed among a wide range of family needs. Significantly only five percent of return cash flows (R23) find their way into agriculture while 11 percent are spent on livestock.

Cash flows of this magnitude must have a very significant impact on household incomes. Table IV-6 summarizes household incomes by source for various income strata. Nationally, 71 percent of the income of rural households is derived from migration and an additional 12 percent from off-farm work in Lesotho. Village resources contribute only 17 percent to the total. The resulting balance of incentives should be obvious and its impacts on agriculture are suggested in a subsequent section.

Table IV-6. Household Income Distribution by Source (Rand). (Rural Households, 1976)

Source	Income Strata (Rand) 0-199	200-599	600-999	1000+	National Totals
Crops	26	66	30	75	47
Livestock	20	85	41	204	90
Subtotal:Agric.	46	151	81	279	137
In Lesotho, Off-Farm	15	42	80	222	92
Migrant Labor	5	215	698	1238	554
Subtotal:Off-Farm	20	257	778	1460	646
TOTAL	66	408	859	1730	783
% of HH in Strata	27%	20%	27%	26%	

Source: van der Wiel, 1977, p. 88.

Current Employment Issues

The Future of Migration

Given the critical importance of migrant employment to the national and household economies of Lesotho, Government needs the best possible estimates of the likelihood that these opportunities will continue. This issue has surfaced in recent months as analysis has begun to show that the employment market for Basotho and others in RSA may not continue.

South Africa's indigenous black population, now in excess of 15 million persons, is growing at rates exceeding 3 percent per annum. Total employment in the Republic since 1970 has increased at only 2 percent annually. Unemployment among all classes within the work force stands at 22 percent or a total of 2.3 million individuals in 1977. This problem is concentrated among the non-white population, particularly among Africans. This single factor is sufficient cause for the South African Government to be seriously concerned and could well result in a downward revision of their interest in imported labor (Simkins and Clarke, 1978).

It was noted above that wages in the mines were increased substantially in 1974-76. One of the alleged motivations for this development was a decision to equalize mine wages with those in other industries in order to make mine employment attractive to South Africa's indigenous population. This step was seen as necessary to reduce the 80 percent dominance of imported labor in the mining industry. It was coupled with active recruitment from domestic sources. There is some indication that these policies have lead to a slow-down in the hiring of foreign migrants without previous experience in the mines.

Many of South Africa's gold mines, which have historically provided the largest external source of employment for Basotho, are nearing the point of exhaustion in ore of an economically exploitable grade. Some mines in fact were closed and only reopened following the freeing of the gold price and its consequent rise during the early 1970's. There are indications that unless there are further dramatic price increases for gold or spectular new discoveries, these mines will again become economically obsolete before the turn of the century. While other types of minerals are in a period of expansion, it is not clear whether employment so generated will be sufficient to offset declines currently anticipated in gold and possibly diamonds.

Finally, the wage increases recently instituted have significantly increased incentives within the industry to mechanize mining operations, particularly with respect to gold. While there is disagreement within the industry as to the extent mechanization will be feasible, it seems a certainty that as new mines open they will be more capital intensive than the older mines which will be closing. The general consensus within the gold mining industry in particular is that mine employment will continue to decline for the next two decades. One estimate from within the industry is that African employment in gold mining will decline 40 percent by 1990 (IBRD, 1978).

McDowall (1974) concludes that a reduction in demand for Basotho labor appears to be indicated. He further predicts that it will begin to appear in 1977 or 1978 and will constitute a major national concern by 1985.

It is clear that precise estimates of the future foreign demand for Basotho labor are needed as soon as possible. Equally important are estimates of the absorptive capacity of various domestic sectors. Lesotho's employment problem over the next two decades stems from the growth at about 2.0 percent per year of its labor force. This natural phenomenon will result in an additional 4-500,000 entrants to the labor market by the year 2000. To this supply must be added any reduction in foreign employment that might be projected. Even if migrant numbers remain constant, apparently an optimistic assumption, Lesotho must nearly double domestic employment opportunities. The problem could be even worse depending on events in South Africa. In the face of a stagnant economy as depicted in Chapter I and elsewhere, this problem poses a serious challenge.

Labor Shortages in Agriculture?

Many current observers suggest that the attractiveness of migrant employment has drained off enough of Lesotho's manpower to affect agricultural output negatively. Analysts observe that yields of most crops have declined in the last decade, that fallow percentages are rising and now account for 30 percent of total summer acreage, that weed populations are rank in most fields and other symptoms. The hypothesis is that there is not enough labor to adequately perform agricultural operations.

Data presented in Chapter VI below would suggest that adequate labor is present in-country. The alternative view is developed by Wykstra, using different sets of data concerning the amount of labor required per operation and differing assumptions on the length of an effective working day (Wykstra, 1978). He concludes that, while on an annual basis a surplus exists, for peak seasons a scarcity prevails and significantly constrains the number of acres that can be effectively cropped. Unfortunately both studies are based on aggregated data. The subject has not been empirically researched in the field. Given the apparent magnitude of Lesotho's employment absorption problem in the next 20 years it would seem imperative to develop solid field data on this issue in the near future.

An alternative explanation for declines in crop agriculture is suggested by the household income data given above. Cropping contributes only 6 percent to the income of the average rural household, less than one-tenth the Rand value contributed by migration. While in some households cropping activities are important, it would appear that there is little incentive for most to seriously invest time or money into crop farming. Wykstra estimates 20-25 mandays required per acre for most crops under present technology. With 4.9 acres held by the average farm household, a farm labor input in excess of 100 mandays per household is suggested for a return of R47. At current wages, an average miner earns the same amount in 10 shifts, or less than two weeks. Two shifts (days) in the mine return exactly as much net income as one acre averages under prevailing Basotho crop husbandry. While motivations and incentives are hard to quantify, the hypothesis that rural Basotho simply don't care because cropping is hardly worth the effort must remain a viable proposition, pending further work.

Income Distribution and Migratory Employment

The Second Five Year Plan presents data purporting to show a remarkably uniform income distribution in Lesotho. Several authors have since questioned this conclusion (IBRD, 1978; Wykstra, 1978; van der Wiel, 1977). Data are presented in Chapter V which suggest that the distribution of land resources is skewed. Van der Wiel shows livestock distributions to be even more distorted. There is evidence in the statistics of a positive correlation between land and livestock holdings (BOS, 1972). And Chapter V points out that the social institution of share cropping results in biasing the effective distribution of use rights to land towards those farmers who have livestock and can thus provide tillage services.

One cannot conclude that the distribution of productive assets contributes to income equality. However, access to migrant employment does not depend on any factor except the presence of a male over 18 able to work. Van der Wiel finds that 60 percent of rural households have access to migrant earnings. To this must be added an additional 10 percent with access to cash wages, usually urban, from within Lesotho. One must conclude that whatever income equality exists in Lesotho is preserved by fairly equal access to these employment sources plus the fact that the propensity to migrate is somewhat higher among resource poor households.

Skilled Manpower Shortages

Migration creates serious problems of a specific nature in terms of the drain on skilled manpower as well as for the unskilled. Although most migrants have only a minimal education, some 10 percent of the migrants have attended school beyond primary (Standard 7). One exhaustive study noted:

> "There are shortages in most categories of the labor force in Lesotho. ---Shortages exist of artisans, certain categories of clerical workers, technicians, managers, teachers and university graduates in all fields. ---The shortages are due to migratory employment opportunities in the RSA---, the inability of training institutions to keep up with the recent increases in demand and the small number of graduates from the secondary school system who are prepared for technically-oriented or academically-rigorous postsecondary training". (Collins, et. al., 1976).

This study noted adequate supplies only of "unskilled secondary school leavers, unskilled women in general and old men".

The Second Five Year Plan states:

> "The manpower situation in Lesotho is acknowledged to be extremely serious. In recent years, some projects in the development programme have been hindered by the lack of skilled and high level manpower, and planned projects have been postponed because of lack of staff to implement them". (Lesotho, 1975).

Finally, Collins, et. al. (1976) note that "The chief manpower constraint to development, or at least to implementation of the Second Five Year Plan, is the shortage of people to manage, administer, implement, and supervise projects and enterprises in the public and private sectors."

In many other countries such as India and Pakistan it has been found that the motive for the immigration of skilled and professional people is often, if not predominately, professional challenge. To this must be added the desire to travel, career advancement and other stimuli. Unfortunately this is not the case in Lesotho. The principle motives cited by 85 percent of the respondents in a recent study were "No job in Lesotho" (65%) and "Higher wages in RSA" (20%). (Claus, et. al., 1977). Technical students being trained by Lesotho's institutions interviewed in the same study showed the following:

Would seek work in RSA	56%
Would migrate if no job available in Lesotho	26%
(Subtotal: Considering RSA)	82%
Did not intend to migrate	18%

Yet another report confirms the absence of acceptable employment opportunities in Lesotho as the prime motive.

> "The existence of higher wages for artisans in the RSA than in Lesotho has contributed greatly to the shortage of artisans, particularly in the construction industry. Higher wages have drained other skilled workers away, including teachers, nurses and certificate and diploma holders in agriculture." (Collins, et. al., 1976).

Apparently domestic employment prospects for skilled and semi-skilled persons are nearly as gloomy as for the unskilled. Not only is Lesotho losing important components of its best manpower, but to a significant extent the investment in training programs in Lesotho is generating benefits for the Republic of South Africa.

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CHAPTER V

LAND TENURE IN LESOTHO

The system of land tenure in Lesotho is unusual, if not unique, by international comparison. It is complicated in structure and operation. It is deeply embedded in the history, culture and social organization of the Basotho and therefore is treasured highly by them. It shows considerable flexibility, consequently analytical conclusions about the various conditions or influences of land tenure may, over time, become obsolete. It differs radically from freehold tenure systems with which western observers are familiar. As a result the tenure system, or more accurately, systems found in Lesotho have generated considerable controversy over the last several decades.

More specific to agriculture, land tenure is one of the principle structural forces in the agricultural sector. Tenure systems, therefore, are among the few central determinants of cropping patterns, husbandry practices, income distribution and many other sectoral parameters. Much has been written on land tenure in Lesotho. Our purpose here is not to provide new information but to summarize existing work in some detail and to suggest analytically some of the more important implications for agricultural development planning. Not all of the existing studies are completely unbiased. Many take an advocacy position and marshall their facts accordingly to prove their point, usually that significant revisions are necessary as a precondition to economic progress. If there is a bias in what follows it is that Lesotho's land tenure complex can also be viewed as an asset; one that can, perhaps, strengthen development efforts.

General Overview

The Laws of Lerotholi form the traditional legal base of Basotho life. Section 7 codifies those components relating to land tenure. Hammett (1975, pp. 67-86) finds that underlying this legal framework is a set of norms and maxims concerning land use rights which are central to the Basotho culture and social organization. However, ambiguities exist in the meaning of some of the Sesotho terms embodied in these maxims. He further finds the Laws of Lerotholi to be a general, as opposed to specific, statement of the accepted principles of land use. Allocative decisions and dispute resolution may both rest at times on the maxims and at times on the written law. Litigation results from implicit or assumed differences between the two with successive levels of appellate courts reversing lower court decisions by using the alternate point of reference.

As a result the actual details of the system in operation vary somewhat between administrative units and between cases. The resulting flexibility generates both positive and negative consequences, as discussed below. A further result is the serious difficulty encountered

when attempting a concise summary. The generalizations that follow are offered with this caveat.

Lesotho's particular tenure complex has been described as communal to distinguish it from individual freehold systems. However, the word "communal" must be used guardedly, if at all. While some aspects would fit the accepted definition of communal tenure, others very nearly approach a life-time freehold while the bulk of uses falls into intermediate categories. The system is, in fact, a hierarchy of governmental rights, rights of the chieftainship and both public, private and mixed usufruct rights for individuals (Stevens, 1970). It should be mentioned that common Western terminology may be seriously inadequate, conceptually, for describing African tenure systems. Unfortunately, there exists no accepted terminological framework for the purpose (Bentsi-Enchill, 1964).

Land and the produce thereof is considered by the Basotho to belong to the nation, or to the people as a group. No Mosotho can own land outright. In Basotho eyes, all land and associated rights of use are "vested solely in the office of the Paramount Chief (now King) as its guardian and trustee on behalf of the nation". The position of the Paramount Chief in relation to the land has been clearly defined by Moshoeshoe I himself, who wrote:

> "I could not, according to the custom of my tribe, alienate any portion of my Territory without the consent of the people...The people I govern look upon me as being entrusted with the preservation of their country and I would not forfeit or cede my right to any part of it without being considered as having robbed the community." (emphasis added).

In this statement Moshoeshoe asserted that the rights were "his" but "in trust" for his people. All subsequent Paramount Chiefs have consistently maintained that position. (Sheddick, 1954, p. 8).

To this point, communal tenure is suggested. However, no Mosotho can claim rights to land or its use simply because of his existance or citizenship. Rights are associated with adulthood, allegiance and physical presence, *inter alia* , and receipt of one's entitlement is constrained by land scarcity.

The Paramount Chief is the ultimate administrator of land and his court is the highest authority on land disputes. For practical purposes, the Paramount's authority is delegated to district, ward and village chiefs for most allocation decisions, each within the area over which he or she has jurisdiction. This permits the interplay of local physical and socio-political conditions a determinant influence on the *de facto* balance of land allocations at the village or ward level. Administering land in its various forms and uses is a complex process and occupies large segments of the Chieftainship's time as well as that of their courts.

The fundamental principle of both administration and tenure of land in Lesotho is that "the land belongs to the nation" (*mobu ke oa sechaba*) (Hamnett, 1975, p. 63). In its original conception, this implied that its use was to be administered to meet the needs of the "nation" defined as the Basotho people. Accordingly, use rights became identified and differentiated around the more basic needs of village life; residential space, foodgrain production, grazing, building materials and other natural or wild products useful in daily life or commerce. With the onset of British administration in 1867, the concept of "nation" was broadened to include government. The British administration retained, at least to a limited degree, the right to take land for public purposes; for Government camps, roads, police posts and more recently for soil conservation schemes (Sheddick, 1954, p. 8).

Sheddick (1954, pp. 2, 137-156) distinguishes between administrative and usufructory rights for analytical purposes. Administrative rights derive from the vesting of land resources in trust with the Chieftainship which then has the responsibility and authority to allocate land to various uses as their people and government require.

A description of the origins of administrative titles is in part a history of Lesotho. Prior to amalgamation under Moshoeshoe I, the individual population groups in the territory had loose title to the use of land. In the process of national association, these separate group titles were surrendered to the national authority which then was in a position to redistribute some of these administrative titles without, however, relinquishing its claim to ultimate control.

Moshoeshoe I and his successor Letsie established an important precedent when they refused to subdivide the nation among their sons. Instead ultimate control over the entire nation remained with the Paramount Chief. Had Moshoeshoe subdivided the ultimate authority of his office, the integrity of the nation could have been seriously eroded.

Instead, beginning with his three major sons, subordinate administrative titles were granted over large geographic subdivisions. With the exception of Thaba Tseka, the origin of the present districts of Lesotho may be traced largely to the definition of the areas of subordinate Chieftainship for the principle sons of Moshoeshoe I and their sons.

The allocation of subsidiary rights takes place at the provisional level, usually in the form of "placings". Placing is a process whereby a Chief installs one of his sons as Chief over an area, thereby assuring him a place to live and a unit over which he has administrative rights. The extent to which the placee has political authority depends on the degree of concurrence obtained from potential subjects in consultations prior to the placing. Whether or not land administration is transferred depends on the relative rank of the existing leadership

being subordinated. Where an important person is placed over a leader of Area Chief or higher rank, the administrative title remains with the previous leadership and only political authority is transferred. Thus, the practice of placings retains a concentration of political authority, even more so than of land administration rights, within the lineally defined family. The system has been an essential element in sustaining the political integration of Lesotho.

There is a strong tendency in Lesotho to regard administrative rights as the possession of the lineally linked family rather than of individuals. A man acquires the right to administer land (becomes a Chief) primarily by being born within one of the family groups associated with the originally defined provinces. Thus, while Sesotho contains a maxim that "land is not an inheritance" (*ts'imo hase lefa*), administrative rights over land are largely heritable.

A limited qualification to the above description is necessary. Certain tribally distinct groups, notably the Khoakhoa and the Taung of Moletsane, affiliated with Moshoeshoe I on the specific condition that they retain their own system of land use and administration. In their areas today, notable autonomy still exists.

Two special attributes of administrative authority have been historically significant. First is the Chieftainship fields (*ts'imo ea lira*). These are fields, held by the Chief on behalf of the people. In normal times the produce of these lands is used to support the operations of the local court, feed messengers visiting from other areas and in other ways to support the office of the Chief, not his family. In times of crisis these areas serve as a food or grazing resource for the people of the area.

Second is the Chief's right to command free labor (*matsema*) from his subjects. Traditionally this labor was used to work the Chieftainship fields, and perform many other tasks in support of the Chief's house or office. This right has, over the years, been legally restricted to the Paramount and Area Chiefs, and abolished with respect to most tasks relating to their personal households. The decline in the practice of *matsema* has been largely due to a growing scarcity of labor in the rural setting, a phenomenon discussed in greater detail elsewhere in this review.

Usufruct Rights

Of more central interest to a review of the agricultural sector is the collection of usufruct rights that govern the use of land as a productive resource. As noted above, no Mosotho owns land but upon satisfying certain criteria every adult male may expect to be allocated rights to the produce of land. Land is conceptually viewed as a productive resource of the nation to be used to ensure insofar as possible the basic needs of the people. This principle has been codified

to mean ensuring subsistence needs. Under Section 7(2) of the 1959 Laws of Lerotholi, a Chief may take away lands if, in his opinion, a person has more lands than necessary for his and his families "subsistence". In the modern context of the word subsistence, this has caused much concern and criticism (e.g., Williams, 1972; Bentsi-Enchill, et. al., 1963). Before examining this and other issues, a description of the principle types of use rights is necessary.

Residential Rights

The right to residential land is the primary right within Lesotho's land tenure. Without a residence there can be no claim to other land rights. Sheddick (1954, p. 157) identifies five conditions that must be met prior to application for a site. The potential applicant must:

1. be a citizen of Lesotho accepting the superior and overall authority of the Paramount Chief and behave towards him in a manner befitting a loyal subject.

2. secure a regional affiliation by accepting one of the regional or ward chiefs.

3. be an adult male.

4. be married.

5. pay taxes with reasonable regularity.

The emphasis on married males ensures a household bias to land allocation and by implication reinforces the concept that the produce of land is intended to meet the needs of the people. Males without dependents do not qualify; it is essentially the household that qualifies, although through the male household head.

Given the above criteria, allocation of a dwelling site simultaneously formalizes a young man's emergence as an adult, his acceptance into the community and his own acceptance of the leadership of that community and his roles in it. It is basically at this level of relationship that tenure is maintained. Should a man not meet any one of these tests, he normally will not qualify, or if already allotted a site and fields, may have them taken away. Sheddick comments, "Acquisition and retention depends ultimately on good behavior, observance of a fitting attitude of respect towards the land officials (Chieftainship) and the ability to cooperate with one's neighbors". (1954, p. 157).

A residential allocation is important, quite apart from social considerations, in that residence is an additional criterion for the receipt of rights to arable land, grazing and all other types of land produce. A man may apply for a share in the community land rights

only if he has met the above five qualifications and been accepted into the community sufficiently to have received a residential allocation, popularly called a "site".

Use Rights to Arable Land

One maxim in Basotho culture is that every entitled Mosotho has a right to three "lands" (arable fields). A local proverb suggests one land is for tax, one is for the home (support of, not site of) and the third is for the children. Another conception is that one land is intended for production of each of the principle foodgrains; maize, sorghum and wheat. In actual practice, arable land scarcity in the face of a rising population prevents a growing number of households from attaining the norm. Even so, the norm is adhered to though it represents more of a moral rather than an actual expectation. A man with fewer lands considers that he has a good case for requesting more. A man with four or more must be prepared to show special justification. A man with three lands is in the "proper condition" for a Mosotho and can expect to be left with them (Hamnett, 1975, pp. 67-70).

Procedurally, a young man will apply for his residence site shortly before or at the time of his marriage. Once this is allocated, he applies for lands. Rarely does he receive his full entitlement immediatley since few villages have surplus arable land. One field will usually be allocated as soon as possible although in recent years the waiting period has extended to one or two years in some areas. In the course of time, he can probably expect a second field. A third field appears problematical in the context of current population:land pressures, but if received it will normally be several years after his marriage. During this time his family size will grow and thus so will his "subsistence" needs. Allocations spaced over an extended period appear to match his needs with an expanded resource base.

Traditionally the man is entitled three fields for his first marriage and two more for the support of each additional wife and her children. Again, actual receipt of the second field may be quite delayed. If the husband dies leaving a widow with dependent children, she can expect to lose one of the three fields. Once her children cease to be dependent she can expect to lose another. Thus, it appears that the expansion and contraction of land allocations parallels household needs in a rough fashion and serves as a practical expression of the concept that land belongs to the nation and should be used to meet the subsistence needs of everyone.

One of the more novel aspects of Basotho land tenure is the seasonality of usufruct rights. Traditionally, all private rights to the produce of arable lands lapse at the end of the growing season. Public grazing rights prevail in winter for whatever stover, crop residue, weeds and grasses are on the field. However, it is relatively common for farmers to remove to their household stover required for their own needs prior to the field's being declared available for grazing. From

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a theoretical standpoint, then, arable land alternates between essentially private use rights and communal use on a seasonal basis. It has been postulated that this practice is a disincentive to permanent investments in land improvement. A further consequence is that although crop residues are left in the field they are not available to replenish the soil since they are fairly completely consumed by livestock whose dung is, furthermore, burned as fuel. Fencing of lands is also prohibited in order to permit unrestricted grazing in winter.

It must be mentioned that these practices are changing significantly at present. Over the last decade it has been increasingly common for winter grazing of residues to be considered the exclusive right of the person holding the lands. It seems possible that the nature of winter use rights may alter significantly during the balance of this century.

A man may usually retain his lands as long as he continues to fulfill the conditions listed above. The principle reason for loss of land is "removal". If a man establishes a household in the area of another Chief it becomes the responsibility of the new Chief to provide land allocations. In cases of removals of this type both site and lands vacated revert to the control of the Chief and may be reallocated. Men who work in the mines or in urban employment, however, may maintain their residence if the wife and children (or occasionally a more distant relative) remain in the village.

According to the Laws of Lerotholi, land can be taken away if it is left uncultivated for two years. Among available sources there is no good data on the frequency with which this occurs. Part of the causes of non-cultivation are beyond the farmer's control since rainfall patterns are one of the principle determinants of acreage planted. In practice, except in cases of obvious removal, land must lie idle 4-5 years before it is possible to suggest successfully that it is unused (Sheddick, 1954, pp. 76-77). Whether or not recent population pressure has altered this situation has not been assessed.

Land may also be taken away from individuals who have more than their subsistence needs. This practice rests on the norm that land belongs to the nation and is in principle available for the subsistence of all. The result is the tendency for land allocations to reflect family size noted above. Data from the latest Census of Agriculture show a modest positive correlation between family size and size of holding. (BOS, 1972).

Other causes by which a man can lose his land theoretically include failure to pay taxes and overt acts signifying a change of allegiance to a new Chief. Since a woman obtains access to the produce of land through her husband, she loses it if divorced. If widowed she will retain an amount roughly related to her number of dependents as described above. The threat of loss of lands due to divorce or abandonment is serious when the bulk of the adult males work abroad under

conditions conducive to the dissolution of marriages. The woman thus has a strong incentive to claim an intact marriage as long as possible after all other manifestations of the relationship have disappeared.

Grazing Rights

Rights to grazing resources differ from those over arable land in that land is grazed in common by all the individuals so entitled. While there are individual cultivation rights, there are no individual grazing rights. Each Chief or administrative unit has various types of grazing resources and any one under his jurisdiction can graze however many cattle he possesses. When an arable field, individually used during the growing season, reverts to winter grazing the right of use reverts to communal property, with the caveat concerning recent changes noted above.

The simplistic view of grazing in Lesotho suggests that cattle are grazed at cattle posts in the mountains during summer, returning to the lowlands in winter to subsist on whatever plant material remains on fields. In fact the situation is much more complex. In the first place, not all Lowland Chiefs have access to mountain cattle posts. In the second place, several types of grazing exist. At the first level of disaggregation grazing rights may be subdivided into open grazing and reserved grazing. Open grazing such as found in the cattle posts is characterized by the fact that stock attendants are not required to be continuously present. Cattle are merely turned loose in an area and allowed to graze at will. Reserved grazing is found where alternate or specified uses of the range are recognized and control of livestock is necessary to prevent resource damage or conflict.

When not grazing open pastures, stock use a number of differentiable kinds of reserved grazing: (Sheddick, 1954, pp. 110-111).

1. Village commonage, grass verges and steep slopes in the neighborhood of villages which have no other productive uses.

2. Grazing plots which when closed to grazing have no other use other than to allow the range to recuperate. Every Chief will have one such grazing reserve, usually two. Access is carefully restricted to meet forage needs during lean winter months when other sources are exhausted. One grazing reserve will be opened in May or June while the second will be held back until August or September when grass supplies are most critically short. All reserves will be closed again by December.

3. Grazing plots which have alternate uses such as the production of thatching grass or thatching reeds. In this instance grazing is usually the subsidiary right and is permitted only after harvest of the primary produce.

4. Arable fields after arable rights have temporarily lapsed.

5. The special case of lowland summer grazing areas. They are in many respects similar to item 2 above except that their purpose is as a substitute for summer open grazing.

Unlike arable land from which produce is consumed directly, range resources are utilized through an intermediate possession, livestock. A man acquires grazing rights by means of acquiring stock. There are no limits recognized or enforced by society or the Chieftainship in terms of the number of stock a man may own. Nor is there a viable slaughter market that would offer an incentive to herd reduction. Large herds are therefore built up by individuals, and by the nation as a whole with serious consequences for the commonly shared grazing resource. These dynamics are discussed in greater depth in the chapters on livestock and conservation below.

The social institution of cattle loaning (*mafisa*) contributes to the capacity of some individuals to accumulate inordinately large herds. In *mafisa* cattle are "loaned" to others for an indefinite period. The recipient has limited usufruct rights (milk, draft power) to the cattle loaned while they are under his husbandry. The owner avails himself of additional grazing rights as well as herding and husbandry services. One significant effect of this system is discussed below in the section on the relationship between land tenure and rural income equality.

Gathering Rights to Wild Products and Natural Resources

Due to the almost total depletion of wild fauna of any size, hunting as a source of food has been of no consequence in Lesotho in this century. Rural residents still actively incorporate wild flora and materials gathered locally in their daily needs. Collection rights have been differentiated on the basis of scarcity and other factors. While the importance of these activities is declining due to increasing incomes and market orientation of the population, gathering rights are worth passing reference to complete the coverage of this Review.

Sheddick distinguishes three commodity groupings. The first class includes commodities that are sufficiently abundant that they can be gathered at will. At the time of his research, these "free commodities" included earths, clays and building materials (sod or stone), medicinal herbs and plants, wild vegetables, fruits and certain plaiting grasses.

Water is an important additional free commodity. Given its importance to human life, Basotho culture contains the behavioral norm that no one can be refused water, even in very dry periods. Rights to water in time of crisis extend beyond Chieftainship boundaries in that when the springs in one area dry up, the neighboring areas cannot refuse them subsistence water supplies.

A final free gathering right covers whatever stubble or stalks remain in the fields after the cattle have finished their winter grazing. During the short period before plowing begins the people are free to collect this residue from any field, primarily for fuel uses. Thus one field actually passes through three types of tenure or usufruct titles in a year. As arable land it has a use title vested in an individual. After harvest, community grazing rights prevail until finally, for a short period of communal gathering right is recognized. The latter right, however, is of minor consequence.

The second class of gathering rights is, in fact, a prohibition on the collection of certain materials. Coal and diamonds are cited as the principle examples in which once the presence of the resource was suspected, a prohibition was established against all use and all free access to the areas. The reasoning behind this policy is obscure in Sheddick's work (1954, p. 116).

The third and most significant set of gathering rights are those to scarce commodities. Included are thatching grass, thatching reeds and other grasses with specialized uses. The harvest of these items is regulated by the Chief and their distribution among the community subject to traditional norms and rules. Reserved areas in which these items are protected are opened to grazing after harvest.

Gardens and Trees

De facto rights over gardens and trees constitute the final major dimension of land rights in Lesotho. Gardens result ordinarily from the agricultural use of the residential site. As part of the site they are not counted against the norm of three arable fields, regardless of their size. They cannot, therefore, be removed for the reason of having more than enough land for subsistence. Since the site is not required to be tilled, garden areas cannot be taken away for non-cultivation or neglect. Use rights do not lapse seasonally. They are the one area that can be legitimately fenced. Use rights are essentially permanent as long as residence is maintained. For practical purposes then, gardens and trees are the two instances of essentially individual ownership and control, although this right is not formally recognized in traditional law.

Historically gardens were not found in the land patterns of Lesotho, hence they are not covered by traditional land law in any way. In earlier times a household might have had a plot of not more than five square meters for growing tobacco. Vegetables, vegetable gardening and fruit trees were introduced by Europeans, beginning at the time of Moshoeshoe I. The Department of Agriculture, in the 1940s, succeeded in generating a major expansion in "individually owned" gardens and trees to the point of making them a standard feature of many houses in nearly every rural village.

Over time there has been some expansion in average size of gardens, particularly in and around urban areas. With this has come diversity of use, including cereals production, tree crops and occasionally livestock and poultry. Some villages have adapted local springs to irrigate garden plots. Sheddick (1954, p. 79) sees a significant dynamic element of change with respect to gardens and concludes, "...the simple vegetable garden, which has no formal place in Basotho land tenure, already promises to develop into a major feature dictating the shape of future land systems".

Implications and Issues for Agriculture

Several elements of Lesotho's land tenure complex have generated controversy over the years. Many analysts, almost exclusively expatriates (Williams, 1972; Leistner, 1966), have concluded that substantial reforms are necessary as a precondition to progress in agriculture. Others (notably IBRD, 1975; Stevens, 1970) have challenged these assertions. The reception to such ideas of reform among the Basotho has varied but in general has been negative. An additional complication in addressing the impact of land tenure arises from the pace of change in Lesotho which has accelerated markedly since independence. Rising population, urban sprawl and the various use requirements of development projects and programs all strain the tenure system and induce, over time, a metamorphosis adapting to changing needs. The sections below isolate current tenure related issues.

Security of Tenure

Perhaps the most frequent criticism of land tenure is the lack of security seen in the Chief's right to reallocate fields away from individuals for reasons of non-use, disloyalty or rights surplus to needs. Williams (1972) for example, concludes that with the farmer's present insecurity of tenure, he is unlikely to invest time and capital in land improvements or to adopt farming innovations. He then goes on to recommend reform toward individual title to land, drawing support from two other expatriate reports and a conversation with a local Mosotho Cooperative Society secretary. Parenthetically, one of his sources wrote again three years after the cited document and after field survey experience that, "The Basotho form of communal tenure, at least as related to crop land, seems to be workable" (Stevens, 1970, p. 135). Nevertheless, having thus convinced himself, Williams goes on to state "The principle question is to what degree is individualization to proceed." (p. 30). Reforms are thus taken for granted as needed and the question shifted to how far and how fast to proceed.

There is at least some evidence to support the view that tenure security is fairly adequate in Lesotho. Most often cited is Douglas and Tennant (1952) who estimated the "mean period during which land has been continuously occupied" to be 18 years. Their sample approximated 3000 respondents using an FAO established survey procedure and constituted the first agricultural census in Lesotho. Recognizing that this figure is a mean and that average male life expectancy in 1949-50

was little over 40 years, the reported length of tenure coincides well with what one would expect as the average length of active farming. Length of tenure decreases moving eastward from a high of 22 years in the Border Lowlands to a low of 15 years in the Mountains. The authors find (pp. 79-80) this consistent with patterns of recent settlement in the Foothills and Mountains that were occuring as a result of population pressure. It should be noted that 18 years is a considerably longer average tenure than currently prevails in the United States.

Douglas and Tennant conclude with the suggestion that deprivation or exchange of fields is relatively infrequent. In his more exhaustive study of the subject, Sheddick (1954, p. 11) states:

> "Once the rights are acquired they may be held during the holder's lifetime provided he is fitted to, and does in fact, use them. His private rights he may be able to hand on to his descendants, though not by any formal or implicit law of inheritance. Subject to this fulfillment of all the obligations of his tenure, he may not have his rights expropriated without being duly compensated with similar rights elsewhere."

He further notes (p. 165); "Above all else the everyday relationship between the land administrator on the one hand and the land user on the other is of paramount importance. If the land user is a troublesome or difficult person, his security of tenure will decline rapidly despite any customary or legal rules which may favor him."

Even with respect to non-use, he finds (p. 77) that such non-use must continue for "four to five" years before a Chief can act. Where changes in dependent numbers dicate expropriation of part of the holding, the household head has the right to indicate which field he will release. He or she may thus retain the best or most improved parcels.

Sheddick did admit to the possibility of land administrators who were "difficult persons willing to sacrifice the proper execution of their duty to the satisfaction of personal jealousies, quarrels and ambitions" and further attributed some insecurity to careless or negligent administration. But he finally concludes (p. 165) that, "It may be said as a generalization that the degree of security of tenure of usufructory rights over production units <u>is very considerable</u> in Basutoland" (emphasis added).

The analysis above does not lay the question completely to rest. A University of Chicago team of lawyers visited Lesotho in December 1962 at the request of the Paramount Chief to examine land tenure in relation to its legal foundations. Their report (Bentsi-Enchill, <u>et. al</u>., 1963) indicates they received considerable testimony suggesting at least a perception of insecurity in tenure. That the question remains under discussion in the 1970's is evidence that such perceptions persist. Unfortunately, no recent quantitative data bear

on the issue. Perhaps perceived levels of insecurity exceed actual levels. If true, it would seem important to identify those perceptions and relate them to farmer behavior, particularly to their influence on farm management decisions.

A note on the transition of property rights between generations is in order. Western analysts value freehold tenure highly in part because it allows a person to pass on his land and all improvements thereon to his heirs. This possibility is seen as an additional incentive inducing investment in conservation and soil improvement.

Basotho culture contains the maxim that "land is not an inheritance". However, the Laws of Lerotholi since 1946 provide as follows:

> "7(3) On the death of a person who has been allocated the use of property consisting of lands, gardens or tree plantations, his heir, or in the absence of his heir, the dependents of such persons, shall be entitled to the use of such property as long as he or they continue to dwell thereon or in the immediate vicinity thereof; provided that the chief or headman of the area in which such property is situated may, for the purpose of reallocation ...take away such lands as he deems to be more than necessary for the subsistence of such heir or dependents."

In practice, this statute permits some transmission of personal use rights over arable land. Fields under full title by a simple family remain in that family to meet the needs of the holder, his wife or wives, and their minor children. When the family ceases to exist lands revert to the Chief for reallocation. If there is an heir, then the lands may be allocated to him, provided he meets the residency and allegiance tests and has need of the fields within the context of his own family status. If fields or some part of them are granted to the heir, the grant is viewed as a new transaction and is in no way considered inheritance. (Sheddick, 1954, pp. 168-69). It would seem, therefore, that under normal circumstances a man can receive at least part of his father's lands if he so desires. In practice the recipient is usually a younger son, since the elder sons have often married and received their own allocation by the time the parental household disintegrates.

Two quotes, in summary. Chakela (1973, p. 8) notes that Sheddick was asked as an anthropologist to investiage the land tenure system "which everybody <u>except the peasants</u> thought (and still think) was a hindrance to development" (emphasis added). Finally, Stevens (1970, p. 135) after field work expressly to investiage whether or not land tenure stood as an impediment to growth, concluded that communal tenure in the Lesotho context "seems to be workable" and recommended that emphasis be placed on improved cultural practices, weeding and better seed because "such techniques might be easier to implement and might have a better chance of success than revision of a traditional system of land tenure."

Growing of Cash Crops

Many observers have noted that under Section 7(2) of the Laws of Lerotholi land use is allocated to meet the subsistence needs of the people. The implication usually drawn is that cash crops or production of cereals for market is prohibited. It is also asserted that under this provision, success at raising productivity on the land will be rewarded by a reduction of allotment. The Chicago team noted this but recommended only that the term "subsistence" be replaced by "reasonable family living expenses" (Bentsi-Enchill et. al., 1963, pp. 34-38). Coming from a team of lawyers, the imprecision of this recommendation is remarkable. It must be taken as recognition, first, of the general guideline nature of the traditional law and second, of the practical impossibility of codifying specifics with respect to this item.

The subsistence provision obtains actual content only through its implementation by the various land administrators. Unfortunately no data is available to identify how subsistence is defined in village level land decisions. However, Sheddick (1954, pp. 73, 180-190) notes that cash cropping does occur and that trade, both internal and external, has characterized Lesotho's history.

Variability in tenure administration is shown by the introduction of winter wheat, grown largely for sale. The crop challenged existing land use practices by requiring land for crop use in winter when grazing rights normally prevailed. In the North, the Provincial Chief refused to alter existing practice to permit its cultivation with the result that the southern Lowlands now have an established dominance in winter wheat production.

During the 1970's, two of the cash crops, beans and onions, have experienced significant variations in their real prices. These have been followed quickly with adjustments, up or down, of acreage planted (BOS, various years). It seems, therefore, that cash cropping does occur and with sufficient individual control that a supply response to price is possible. Further research to quantify the extent of this responsiveness would be worthwhile.

Land Tenure and Income Equality

The Second Five Year Plan (Lesotho, 1975/76) presents data showing a remarkably uniform distribution of rural income. While information from some area-based development projects calls this into question, it is widely believed to be true. It is tempting to suggest that the land tenure system with its emphasis on minimum subsistence needs and with allotments varied in relation to family size should receive credit for preserving equality. We attempt below to examine whether such an attribution is valid.

While a positive correlation was noted above between land holdings and family size, the correlation is far from perfect. In Table V-1 data from the 1970 Census of Agriculture (BOS, 1972) have been

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converted into per capita holdings to address the question of whether or not land is equally distributed. A frequency distribution was then constructed and subdivided into deciles (10 percent increments). The first decile, for example, contains that 10 percent of farm households with the lowest per capita land allocation. This tabulation differs from the standard format for distributional questions (the Lorenz curve) in that our deciles are constructed on a per capita basis rather than simply farm size in acres. The more conventional measure is used in Table V-2, based on published sample data.

Table V-1. Estimated Distribution of Per Capita Arable Land Holdings and Associated Acreages Held, by Deciles for Lesotho, 1969-70.*

Decile Number	Boundaries (percapita acreage)	Land held by decile members (acres)	(% of total)
1st	0 - .193	17,077	2.3
2nd	.193 - .349	22,419	3.0
3rd	.349 - .511	44,469	5.9
4th	.511 - .662	66,562	8.8
5th	.662 - .826(median)	69,529	9.2
6th	.826 - .967	72,520	9.6
7th	.967 - 1.275	94,249	12.4
8th	1.275 - 1.498	85,790	11.3
9th	1.498 - 2.295	140,307	18.5
10th	2.295 - 12.500	144,795	19.0

*Holdings larger than 14.99 acres and households larger than 9 members excluded.

Source: Calculated from BOS, 1972, p. 49.

Data for two groups, families larger than 9 and holdings larger than 15 acres, could not be used due to being open ended categories in the source; 16,647 households (8.9%) are thus excluded from the distribution. We were, however, able to determine that the 4603 holdings of 15 acres or larger average 17.7 acres each. Median household size for the same group is 7.2 members suggesting an approximate average per capita land holding of 2.46 acres among these larger farms.

It must be admitted that if the context of subsistence is strictly enforced one would expect variation in size of holding due to the variable productivity of different soils. Additional variation should occur because of different historical rates of population growth as well as differentials in land area available for allocation under the various Chiefs. Nevertheless, for a land system that purports to allocate land according to need, there is an unexpectedly large dispersion in actual per capita holdings. Twenty percent of farm households with the smallest per capita holdings control only 5.3 percent of the land base. On the other hand, the twenty percent best endowed operate 37.5 percent of Lesotho's arable land. Undoubtedly the distribution would appear worse if all households were included, especially those with fifteen acres or more.

Median per capita allocation, a useful figure for planning, is given by the upper bound of the 5th decile as .826 acres per person. Under enivronmental conditions, average yield levels and fallow percentages of Lesotho, the median land holding would be just sufficient to produce the household's annual supply of basic foodgrains. Households with below median allocations can be considered net deficit in foodgrain production capacity on the average.

Sheddick (1954, pp. 88-90) presents several measures of the distribution of selected land parameters. His sample sizes are relatively large and believed representative since it is probable that he was using raw data from Douglas and Tennant's agricultural census. In a later section (pp. 99-101) he develops similar data for the distribution of livestock. Table V-2 re-tabulates this information in terms of population deciles. It should be noted that individual households may fall in different deciles depending on whether measured on a land holding or livestock ownership basis. While it is not possible to convert these data to per capita estimates, it is doubtful that household size could be distributed with such dispersion.

Table IV-2. Distributions for Field Size, Field Allocations, Arable Acreage per Holding and Cattle Held by Household Heads from Various Samples (ca. 1950).

Decile	Acreages per Field	Fields per Household	Acreage Per Household	Cattle Holdings
1st	1.0	0.7	3.1	0
2nd	1.6	1.2	4.6	2.2
3rd	2.0	1.5	6.1	4.5
4th	2.6	1.9	7.9	6.7
5th (median)	2.8	2.3	9.6	9.5
6th	3.2	2.6	12.0	13.2
7th	3.8	2.9	15.3	17.9
8th	4.9	3.6	19.3	22.2
9th	6.9	4.8	24.7	30.1
10th (maximum observation)	55.0	35.0	145.0	230.0
Sample Size	1438	732	498	480

Source: Calculated from Sheddick, 1954, pp. 88-101

Note: Deciles are developed for the distribution depicted in each column. No correspondence between columns may be assumed.

From the data presented in Tables V-1 and V-2 one must conclude that substantial inequalities exist in the distributions of the two principle agricultural income sources; land allocations and cattle ownership. Sheddick goes to great pains to show the existence of "non-administrative" or "commoner" families with large holdings of one resource or the other. He very carefully states (p. 99) "the commoner is by no means excluded" (from accumulation) and he is technically correct. Yet his own data very clearly show a marked concentration of land and cattle in the hands of administrative families (Chiefs and Headmen).

Tenure in Lesotho affects the distribution of productive assets directly and only determines income distribution if incomes and asset control are related. Two social institutions serve to weaken the linkage between asset holdings and income.

Share Cropping: Obtaining essential productive services from fellow villagers in return for half the crop is believed a common practice. In the 1970 Agricultural Census (BOS, 1972) 13.5 percent of the rural households reported contributions of various types from share-cropping partners. Contributions reported nearly always included oxen services, labor and the use of tools or equipment. More than half of these reported share croppers received seeds as well. Proportionately more large farms (>8 acres) share cropped.

It seems possible that the share cropping proportion is underreported in the census, perhaps because the question required people to admit being the recipient rather than the donor. Share cropping is an established practice in Lesotho, most frequently mentioned as a means of obtaining plowing services. Sheddick (1954, p. 76) says, "The Basotho suffer not so much from a shortage of arable land as from a shortage of oxen and this lack of oxen frequently ensures that one field in three is uncultivated in any one season". Figures from southern Lesotho indicate that only 28 percent of farm households own oxen for farming purposes (Guma, 1976). Coupled with the relative scarcity of tractors, a much higher incidence of share cropping seems possible.

The customary share, regardless of services rendered, is fifty percent of the produce. Those who have the economic capacity to render this service can obviously expand their *de facto* land holdings in this manner. Since it is the small holdings which generally have the smaller herds, the share cropping system would seem to operate to the benefit of the larger farms.

Livestock Loans (*Mafisa*): *Mafisa* was identified above as a social system in which owners of large herds place their cattle on loan with others. The recipient obtains certain products and services from the livestock while the owner utilizes grazing rights that would have been the recipients if he had more cattle. This arrangement has never been studied economically and it is thus unclear as to the relative net benefits to each party. It does, however, mean that the distribution of real income from livestock may not parallel livestock ownership.

From the foregoing there seems very little to substantiate the hypothesis that the land tenure system contributes equality to the distribution of incomes among rural households. Not only are basic productive resources unequally distributed but institutions exist whereby some individuals can accumulate the produce of land or grazing rights of others. Finally, even if agricultural incomes were perfectly equitable, they could not insure equity in total household income. In the peculiar context of rural Lesotho, crops and livestock contribute only seventeen percent of household income (van der Wiel, 1977, p. 88). It is much more likely that whatever rural income equity exists is derived from the relatively equal opportunity for each household to send a family member to the Republic of South Africa for employment, or to intra-village transfers.

Urbanization and Governmental Needs

The gradual transition to a more modern economy, with a growing commercial and manufacturing sector and a burgeoning governmental sector have subjected the tenure system to additional strains. Historically, missions and traders considered the occupancy rights received from Chiefs to be adequate. Foreign industrial investors in the present era, however, were deterred by the absence of freehold or contractual leasehold possibilities. In the last decade, partial solutions have been worked out by the Lesotho National Development Corporation (LNDC). Industrial sites in Maseru, Mapotsoe, and other towns are being developed in which long-term leases are possible and have proved attractive.

An additional problem arose in which banks did not consider the occupancy rights granted to individuals sufficient collateral for mortgage loans. A partial solution was achieved with the 1968 Deeds Registry Act which permits the Law Office to issue "Certificates of Registered Title". With these, it has become possible to obtain mortgage loans on immobilities associated with property (IBRD, 1975).

In a previous chapter it was shown that almost all of the internal migration in Lesotho is toward the Lowlands and particularly to the Maseru urban area. The result is evident in a rapidly advancing sprawl of small residences that now extend several kilometers along the main highways leading North and South from the old Maseru Camp. These developments are largely unplanned, without roads, utilities or social services. Even with this expansion, the housing situation in Maseru cannot be described without using crisis terminology. The Government's present policy of gradually phasing most civil servants out of government housing and onto the commercial house market will exacerbate land pressures in peri-urban areas.

Development programs themselves are growing rapidly and with them come additional pressures on the land tenure system. The recent decision to move the Research Station from Maseru to a 4000 acre site at Teyateyaneng is illustrative, as is the decision expected soon to build a large international airport on what is now strictly agricultural land.

The impact of these various developments during the late 1960's and the 1970's has not been examined. Those who have looked at land tenure in the last ten years have chosen to focus on the traditional system. Yet it seems that the points of contact and possibly conflict between the traditional system and the modern world are of great importance if growth consistent with tradition is desired. A deeper examination is called for.

Population Growth and Land Distribution

Population growth inevitably increases demand for land and its products. In countries where land is owned outright and can be sold these pressures are partially reflected in an escalating land price. In Lesotho other manifestations are evident. Several authors (Sheddick,

1954; Morojele, 1962) noted that rapid settlement in the mountain areas occuring at the time was related to population growth and land pressure in the Lowlands. More recently internal migration has shifted toward urban centers in the Lowlands. (Jilbert, 1977)*

At the village level population pressure has lengthened the time required before a new married man may receive his first field. For the same reason it may be many years before he obtains the third and final field. Increasingly farmers face the prospect of never reaching this Basotho norm.

These trends are evident in national aggregate statistics. Tables V-3 and V-4 summarize comparable data from the three agricultural censuses from which several conclusions can be clearly drawn.

Table V-3. Effects of Population Growth on Arable Land Resources Per Household and Per Capita for Three Census Years

	1949-50[1]	1960-61	1969-70
No. of Farming Households[2]	149,800	158,172	185,309
No. of Fields	389,600	388,657	402,220
No. of Arable Acres Held	930,000	871,687	909,788
Acres per Field	2.39	2.24	2.26
Fields/Farming Household	2.60	2.46	2.17
Acres/Farming Household	6.21	5.51	4.91
Population/Household[3]	3.60[4]	4.09	4.48
Per Capita (average) Acreage[5]	1.72	1.35	1.10

[1]Principal and Ward Chiefs plus all holdings over 80 acres not included, hence these figures underestimate land holdings.

[2]Households with arable land holdings.

[3]Includes only resident population.

[4]Estimated by adjusting the 1946 Population Census figure of 3.48 forward by three years along trend evident above.

[5]Acreage in households holding land divided by resident population of the household.

Sources: 1959-50: Douglas and Tennant, 1952
1960-61: Morojele, 1962, vols. 2 & 3.
1959-70: BOS, 1972

*Discussed more thoroughly in Chapter III above.

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Table V-4. Arable Land Distributions in Three Censuses

Size of Holding	1949-50	1960-61	1969-70
0.01 - 3.99	35.7	44.3	50.0
4.00 - 7.99	39.8	35.9	34.1
8.00 - 14.99	20.0	16.0	13.4
≥15.00	4.5	3.8	2.5

Sources: 1959-50 and 1960-61: Morojele, 1962
1969-70: BOS, 1972

First there has been no significant change in size of fields, implying that land administrators do not subdivide fields to meet increasing claims for land. Second, the principle impact of population growth appears in the declining number of fields per household. Third, the total arable land base has not expanded to match growth in household numbers. Presumably, as presently defined and demarcated, most of the available arable land has already been allocated.

Resulting from these factors, the land base per household declined 21 percent during the two decades measured. This, coupled with an apparently increasing resident household size, has resulted in a 28 percent decline in per capita arable land. The mean of 1.10 from Table V-3 is consistent with the median of .826 developed in Table V-1 given the skewed distribution of holdings that prevails.

An additional impact of population pressure on the land base is summarized in Table V-5. The number of landless households in Lesotho grew at a compound rate of 4.25 percent during the period, or three times the growth rate recorded for all households. While the latter rate (1.37%) may seem low it is quite consistent with population growth rates that prevailed at the time these new household heads were born, roughly 1925-45 (see Table III-2).

Table V-5. Landless Households as Percent of Total Households* for Three Census Years

	1949-50	1960-61	1969-70
Total Households*	161,500	172,956	212,228
Landless Households	11,700	14,780	26,919
Percent Landless	7.2	8.5	12.7

*Household numbers differ from Table V-3 in that this table counts all households in Lesotho and Table V-3 counts only those with one or more arable fields allocated.

Source: Same as Table V-3.

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Table V-4 summarizes the shifting distribution pattern of holdings. Land holdings are obviously declining in size. Each successive reduction makes it that much more difficult to conceive of agriculture as a viable income source for the average rural household.

Summary

Lesotho's land tenure is an interesting and controversial phenomenon. Land tenure has been frequently criticized by expatriates as an impedement to growth. Recently this criticism has been reflected by policy-makers within the Government of Lesotho. Yet to our knowledge, no analytical study of land tenure in Lesotho, its advantages and disadvantages, has ever been undertaken by a Mosotho scholar. It would seem that for something as integral to the culture and society of the country as land tenure, the perception of Basotho who must earn their living within the tenure system is the appropriate framework for evaluation.

As noted frequently above, Lesotho's tenural structure has shown a flexibility over time in the face of evolving needs. Such flexibility implies at the same time a fragility which must be brought to the attention of all concerned individuals. The tenure system has resulted in the structure of rural Lesotho today. It has had a major developmental influence on socieity, politics and cultural values. Changes, should they be implemented, will cause fundamental ramifications throughout the nation and should be approached with a great deal of sensitivity and caution.

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CHAPTER VI

CROPPING SYSTEMS

Introduction

Food grains have been cultivated in Lesotho for over 150 years. Present farming practices, while not totally subsistence in nature, are largely so and unlike every other country in Southern Africa, "white" enclaves of modern agriculture have never existed. Concerted efforts to modernize farming methods, which can be traced to the early 1930's, have met with limited success. Farming in Lesotho does have considerable potential, however, even though significant improvements in the near future are by no means certain.

In this chapter the principal features of crop farming in Lesotho are described. A 'systems' perspective is adopted as a means to identifying linkages between the crops subsector and other activities, notably livestock husbandry. Attention is given to the importance of crop production in the traditional sense as well as the potentials for improved productivity and income in the commercial sense. Constraints to production are identified, and Government policies and development programs which attempt to remove such constraints discussed.

The Current Situation

This section briefly describes some of the more important economic and technical aspects of current farming practices in Lesotho. The discussion is developed around the following topics: production and income, land use and farming methods, the supply and demand for agricultural labor, and marketing and institutional resources. The section concludes with a review of near-term growth potentials.

Subsector Product and Income

In exceptional weather years crop production can generate the largest contribution to gross domestic product from agriculture. Normally, however, crop income is exceeded by livestock earnings in terms of both domestic production and export revenue. Since only wheat, peas, and beans are exported, sound information on subsistence production and utilization is very limited in Lesotho. Drawing upon available survey and census data, estimates were obtained for crop production levels and gross revenue (or equivalent values for non-marketed crops) to establish the relative importance of different enterprises in the crops subsector. These results are summarized in Table VI-1.

Food grains production accounts for over R11 million of an estimated R18 million annual gross income in Lesotho's crop subsector. Slightly less than half of the total is attributed to marketed produce, namely wheat, beans and peas for export to the Republic. It is interesting to note that fruit production, an activity which has been all but forgotten in the planning literature of recent years, contributes some

Table VI-1. Estimated Annual Production and Gross Value for the Crop Subsector Excluding Processing (in 1978 Rand)

Subsector	Area[1/] (Ha)	Yield[2/] (Kg/Ha)	Farm Price[3/] (R/Kg)	Gross Value
Field Crops				
Maize	80,336	630	.072	R3,644,040
Sorghum	42,485	690	.079	2,315,857
Wheat	41,676	580	.108	2,610,585
Beans	19,649	310	.290	1,766,445
Peas	9,410	450	.230	973,935
Barley-oats	1,531	590	.095	85,813
Sub-Total	195,565			R11,396,675
Fruit Crops[4/]	(trees in 1000's)	(Kg/tree)		
Peaches	1,000	9	.45	4,050,000
Apricots	60	7	.42	176,400
Applies & others	45	8	.40	144,000
Sub-Total	1,105 (trees)			R4,370,400
Forage Crops[5/]	226	5 (tons)	.07	79,100
Vegetable Crops[6/]				
Potatoes	90	12,000	.12	129,600
Cabbage	40	10,000	.35	140,000
Asparagus	90	800	.20	14,400
Home Gardens (1,000's)	130 (plots)		...R15/plot....	1,950,000
Sub-Total	220+			R2,233,000
Forestry Crops[7/]	886	N.A.	N.A.	N.A.
TOTAL SUBSECTOR	196,897+			R18,079,175

1/ Harvested area was estimated for the 1977 production year (BOS, 1978). In instances where aggregate production statistics were unavailable, area-based project reports were consulted to provide rough approximations for the less extensively grown crops.

2/ Yields were based on a six-year average, 1971-1976 (BOS, 1978). Average yields for vegetables and fruit were obtained from available project data and from 'best guesses' on part of project officials and government agencies concerned with the production and marketing of non-grain crops.

3/ Average producer prices during the 1977 growing season adjusted to 1978 Rand (Tuoane, 1978; and PMC, 1978).

4/ Adapted in part from Bureau of Statistics data (BOS, 1973). Gross revenue estimates for tree crops are highly tenative; the extent of producing trees and average yields are not well established. Accordingly, the revenue estimates are largely based on assumption and should be regarded as illustrative only.

5/ Assumes approximately 90 Ha. of lucerne and 137 Ha. of teff and other grasses in current production (primarily grown in demonstration projects).

6/ Compiled from data obtained in numerous project reports and 'best guesses' of project and government officials. The breakdown in hectarage by principal vegetable crop was based on an assumed total area comprised of about 20 communal gardens (110 Ha.), area-based vegetables projects (150 Ha.), and some 10 irrigation projects (415 Ha., of which only 25 percent is devoted to vegetable production). The market-value equivalent of home grown vegetables, as in the case of fruit (footnote 4), is a highly speculative guess.

7/ Source: (BOS, 1978).

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R4 million (in non-market revenue terms) annually to total sector income. Forage and vegetable production is limited primarily to area-based project efforts and consequently the contribution of these crops to national income is relatively small. About half of the families in Lesotho raise garden vegetables, and conservative estimates place the value of home consumption at about R2 million or approximately 11 percent of total annual gross revenue. Some additional revenues are also derived from canning and vegetable processing, but such value-added contributions are very minor at the present time.

It is fairly clear from Table VI-1 that the productivity levels in crop production are quite low. Gross revenue per hectare averages about R60 for field crops annually, and can vary from less than R20 in a dry year to over R120 in an exceptionally good year. At present grain yields of less than 1,000 kg. per hectare, Lesotho has a production deficit of approximately 40 percent of annual consumption needs (see Chapters I and III). Available historical data suggest that grain production has apparently increased during the past 40 years, most signifigantly since the early 1960's (Figure VI-1). Production and yields are highly variable over time, however, and reliable trends will be difficult to establish in the absence of better information on the influences of weather. Simple comparisons of census year data has been found to be an unreliable indicator of such trends.

Land Use and Production Practices

The main cropping region in Lesotho is the Lowland western portion of the country, although significant cropping does occur on sloping lands in the Foothills and Mountains. Arable lands are estimated at about 390,000 hectares, but there is no evidence that this amount has ever been fully croppped at one time (Bawden and Carroll, 1968). The regional cropping mix for selected years since 1950 is reported in Table VI-2.

In general these data indicate that considerable shifts in land use have occurred over time in all four principle ecological zones. The Mountain and Orange River Valley regions indicate a decline in cropped hectarage during the period, while the Lowland and Foothills show a slight increase between 1950 and 1970. Cropped acreage in all regions has declined sharply since 1970. Significant changes have also occurred in the cropping mix. For example, in 1950 maize and sorghum (the two principle subsistence crops) accounted for nearly 80 percent of the total cropped area, whereas in recent years they represent less than 60 percent of planted hectarage. The reduction in maize production reflects a shift to cash crops, primarily wheat and beans. Currently wheat and beans account for about 35 percent of cropped hectarage in Lesotho.

The reason behind the wide variation in fallowed land for the selected years of data is unknown. The trend observed for Lesotho as a whole is fairly consistently reflected in the separate ecological zones, hence climate conditions might be a possible explanation. In

Figure VI-1. CROP PRODUCTION IN LESOTHO 1934-1976

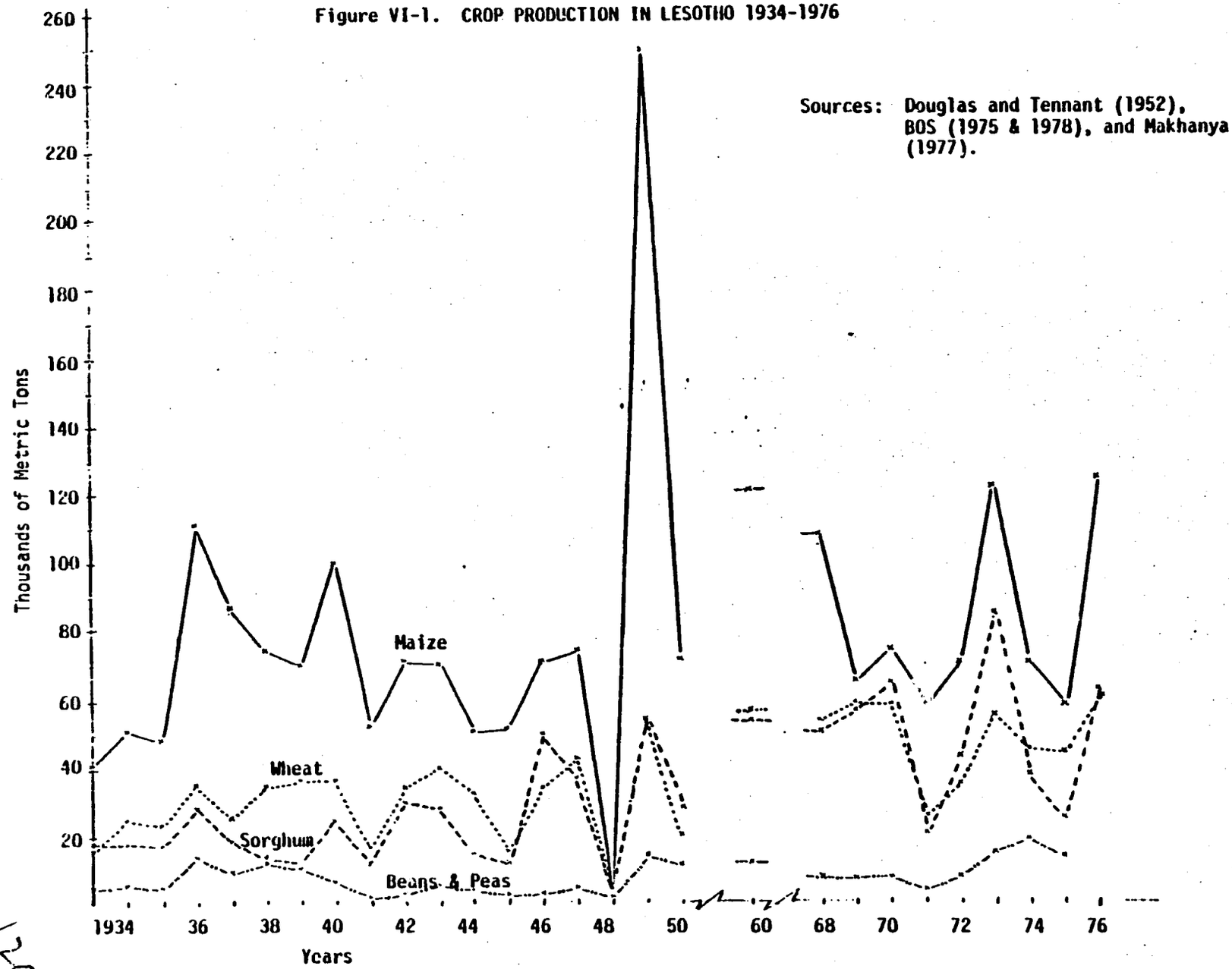

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Table VI-2. Cropping Mix in Lesotho's Principal Ecological Zones: A Comparison of Selected Years

Crop	Lowlands				Foothills				Mountains				Orange River Valley				Lesotho			
	1950	1960	1970	1976	1950	1960	1970	1976	1950	1960	1970	1976	1950	1960	1970	1976	1950	1960	1970	1976
	Percentage of Annual Regional Totals																			
Maize	66.04	49.46	34.87	41.17	55.30	54.47	38.67	42.27	42.89	32.73	35.88	27.31	63.17	45.62	48.42	45.97	60.50	50.02	37.17	37.75
Sorghum	21.38	24.54	22.89	23.20	22.20	26.76	29.64	26.22	4.91	7.20	11.35	5.72	25.37	32.68	34.81	34.94	18.96	20.95	23.74	19.69
Wheat	10.76	10.77	34.50	14.39	8.50	14.04	23.90	13.15	38.62	43.74	39.10	52.57	9.99	15.00	11.21	10.32	16.60	20.73	30.59	24.86
Beans	1.08	2.25	5.76	19.34	.90	1.73	5.53	16.33	0.13	0.43	0.76	3.40	0.78	2.75	3.60	7.51	0.16	1.71	4.70	13.20
Peas	0.74	2.53	1.85	1.90	2.30	2.54	2.19	2.03	9.43	12.60	11.37	10.94	0.59	3.55	1.96	1.44	2.85	5.37	3.51	4.50
Others	0.00	0.45	0.04	N.A.	.60	0.46	0.07	N.A.	4.02	3.30	1.53	N.A.	0.10	0.40	0.00	N.A.	0.93	1.22	0.29	N.A.
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Total Hectares (1000's)																			
	157.1	154.[illegible]	176.0	115.6	40.7	58.0	90.9	68.3	65.8	91.4	58.2	56.1	42.2	31.0	30.4	21.4	305.8	335.8	355.5	261.5
	Percent Fallow*																			
	26.0	9.5	7.4	29.4	9.6	4.3	7.2	30.0	7.2	4.6	11.7	14.9	12.1	2.0	4.1	23.0	18.9	6.3	7.9	32.3

Sources: BOS, 1973; Morojele, 1963

*Estimates are based on the arable hectarage reported for each year in question (BOS, 1973 and 1978).

recent years, however, there is a fairly consistent upward trend in percent fallow. Fallowed land was only 8 percent in 1970 and over 30 percent in 1976. Preliminary data for the 1977 production year indicates a major decline in planted hectarage (refer to Table VI-1) in comparison to the previous year, amounting to approximately 42 percent of the arable base (BOS, 1978). This recent trend in increased fallow is believed to be related to improved wages for mine labor. This hypothesis is developed more fully in Chapter IV.

Summer crops are planted in Lesotho during the months of September to December, depending upon the availability of spring moisture to facilitate plowing and seed bed preparation. The plowing season begins with the first heavy spring rain. Most draft operations are performed by ox teams although an estimated 800 tractors are also employed at this time of year. Winter crops are typically planted in the fall (April through June) and harvested during the following spring to early summer. The main winter crops are wheat and peas, roughly ten percent of annual crop hectarage. The main harvest season in Lesotho occurs after the summer rains subside, and usually extends into mid winter (June and July). A calendar of operations for typical crop production practices is summarized in Table VI-3.

Seasonal Labor Demand

Crop production activities in Lesotho consume more labor hours than all other productive activities combined. Because significant numbers of men and women of working age are employed outside the country for most of the year, the possibility of seasonal labor shortages in the crops subsector is a question that needs careful examination. Elsewhere it has been shown that at certain times in the production cycle, labor requirements in subsistence agriculture are difficult for farming families to meet, even in the absence of migrant labor (Cleave, 1974; Dalton, 1975; Kline, 1970). The supply and demand for agricultural labor in Lesotho has not been examined in sufficient detail to answer this question. An attempt is made in this section to briefly explore the possibility of labor shortages, and to identify gaps in information with respect to labor use and employment in Lesotho's traditional agricultural sector.

Provisional estimates of annual labor requirements for current crop production practices are reported in Table VI-4. These data, expressed in man days per hectare, indicate that subsistence crops (maize and sorghum) typically require more labor to produce than cash crops. The exception is beans which require a time-consuming hand-sorting and sizing operation in the harvesting phase. By comparison with other countries in east and central Africa, Lesotho's average labor input per hectare (about 28 man days) is slightly lower for similar crops and farming methods (Kline, 1970; Cleave, 1974).

Table VI-3. Calendar of Operations for Typical Crop Production Practices in Lesotho.*

Production Operations	Timing and Duration											
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Summer Crops:												
Maize												
Land preparation	xxxxxxxxxxxx											xxx
Plant		xxxxxxxxxxxx										
Cultivate & weed		xxxxxxxxxxxxxxxxxxxxx										
Harvest								xxxxxxxxxxxxxxxxx				
Sorghum												
Land preparation	xxxxxxxxxxxx										xxxxxxxx	
Plant	xxxxxxxxxxxxxxxxx											
Cultivate & weed		xxxxxxxxxxxxxxxxxxxxx										
Harvest									xxxxxxxxxxxxx			
Beans												
Land preparation	xxxxxxxxxxx											xxx
Plant		xxxxxxxxxxxxx										
Cultivate & weed			xxxxxxxxxxxxxxxxxx									
Harvest						xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx						
Wheat												
Land preparation	xxxxxxxxxxxxxxxxxx											
Plant		xxxxxxxxxxxxx										
Harvest					xxxxxxxxxxxxxxxxxx							
Peas												
Land preparation		xxxxxxxx										
Plant		xxxxxxxx										
Harvest								xxxxxxxx				
Winter Crops:												
Wheat												
Land preparation							xxxxxxxxxxxxx					
Plant							xxxxxxxxxxxxxxxxxxxxxx					
Harvest			xxxxxxxxxxxxx									
Peas												
Land preparation										xxxxxxx		
Plant										xxxxxxx		
Harvest				xxxxxxxx								

Sources: LPAS, 1974; KRDP, 1976; Morse, 1960; McKee, 1978.

As most of the principal field crops are grown in all four ecological zones of Lesotho, the calendar of operations reported here reflects a composite schedule for the entire country and may not necessarily be representative of any particular zone. The timing of operations is also based on a normal water-year.

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Table VI-4. Annual Labor Input Requirements for Current Crop Production Practices in Lesotho (Provisional Estimates)*

	Labor Requirements per Hectare by Type of Operation					
	Traction Operations			Hand Operations		
Crop	Land Preparation	Planting	Cultivating	Weeding	Harvesting	Total
	Man Days per Ha					
Maize	4.2	1.5	1.2	8.5	17.5	32.9
Sorghum	4.2	1.5	1.2	8.5	13.6	29.0
Wheat	4.2	1.5			11.8	17.5
Beans	4.2	1.5	1.2	8.5	21.4	36.8
Peas	4.2	1.5			12.4	18.1

Source: Based on preliminary findings of an ongoing study by members of the LASA team. (Phakoana and Phoofolo, 1978).

* The estimates reported here have been aggregated to some extent from more detailed labor input budgets. The budgets represent typical production practices observed in Lesotho today, with the only exception being the assumption that oxen are the sole source of draft power. Production practices requiring ox power (traction operations) include: plowing and harrowing (land preparation), planting (including fertilizer application) and inter-row cultivation. Hand operations include weeding and harvesting (picking and/or cutting, stacking, threshing, winnowing, sizing (in the case of beans) and transport to village. Each operation is accomplished once during the growing season.

Gross returns per man day are compared for each crop in Table VI-5. Although sound data are not available to express earnings per man day in terms of net income, these data tend to suggest that labor earnings in agriculture are perhaps closer to the minimum wage (about R1.50 per day) than previously believed (Lesotho, 1975). Cash crops apparently yield higher gross returns to labor than subsistence crops in both absolute and relative terms.

Table VI-5. Average Yield, Price and Gross Returns per Man Day for the Principle Crops Grown in Lesotho.

Crop	Average Yield (Kg/Ha)*	Farm Price (R/Kg)**	Gross Returns per Hectare	Labor Input (Man days)***	Gross Returns per Man day
Maize	630	.072	R45.11	32.9	R1.37
Sorghum	690	.079	54.23	29.0	1.87
Wheat	580	.108	62.76	17.5	3.59
Beans	310	.290	89.90	36.8	2.44
Peas	450	.230	103.50	18.1	5.72

*Based on a six year average, 1971-1976 (BOS, 1978).

**Average unit prices received by farmers during the 1977 production year (Tarbox, 1978).

***Reproduced from Table VI-4.

Table VI-6 presents some provisional estimates of the seasonal labor requirements for the crop subsector. These data are based upon a standard calendar of operations, current cropping mix, and typical production operations as carried out in Lesotho at the present time. It should be pointed out, however, that the above estimates assume 100 percent animal traction and make no allowance for fallowed land. Accordingly, the estimated annual requirement of 11.5 million man days should be regarded as an upper bound estimate on actual requirements (FAO, 1975). It is important to note that maize alone accounts for almost half of Lesotho's annual labor demand for the crops subsector. Including sorghum the subsistence crops account for 70 percent of total labor requirements.

A more accurate estimate of labor demands was obtained by making an allowance for labor savings due to tractor operations (i.e., substituting tractors for ox teams). Currently, there are some 1,200 tractors in Lesotho of which about 800 are in running condition (TBRDP, 1976b; Jenness, 1973). Information on the extent of use of tractors in agriculture is scarce; what studies that have been undertaken indicate that annual running hours are quite low and operating costs are quite high (Guma, 1977; Helman, 1973a, b). Seasonal labor requirements adjusted for current tractor use in Lesotho are reported in Table VI-7.

By including tractor services the estimated annual requirements for draft power are reduced by 22 percent. Labor reduction as a result of substituting tractors for ox teams is especially evident in plowing operations. Since plowing accounts for over 60 percent of total draft power needs, significant labor savings are indicated during the plowing

Table VI-6. A Provisional Estimate of the Monthly Distribution of Annual Labor Requirements for the Crop Production Subsector*

Crop	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Annual
	Man Days in 1000's												
Summer Crops													
Maize	385	229	583	967	312	-	-	452	452	603	1,508	125	5,616
Sorghum	134	182	422	304	83	117	526	409	117	-	31	143	2,468
Beans	64	90	74	199	208	47	186	234	114	114	114	114	1,558
Wheat	103	103	44	44	-	355	532	-	-	-	-	-	1,181
Peas	-	19	45	-	-	-	-	53	-	-	-	-	117
Winter Crops													
Wheat	-	-	65	190	125	-	19	19	6	51	32	-	507
Peas	-	-	-	20	36	-	-	-	15	5	-	-	76
Total Requirements													
	686	623	1,233	1,724	764	519	1,263	1,167	704	773	1,685	382	11,551

Source: Phakoana and Phoofolo, 1978

*Based in part on the information reported in Tables VI-3 and VI-4. Labor input requirements were aggregated using the 1970 arable acreage base and the percentage distribution of harvested crops in the 1976 production year (BOS, 1973 and 1976). Accordingly, the above estimates do not include an appropriate reduction in aggregate labor demands to account for approximately 10 percent fallowed land.

Table VI-7. Seasonal Labor Requirements Adjusted for Current Tractor Use in Lesotho with Implications for Selected Parameters of Employment

Item	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Annual
A. Total Labor Requirements (Man Days in 1000's)													
without tractors[1/]	686	620	1,234	1,724	765	519	1,265	1,168	705	773	1,684	381	11,632
with tractors[2/]	494	503	1,177	1,709	758	519	1,259	1,162	699	757	1,650	299	10,986
percent reduction	28	19	5	1	1	0	0	0	1	2	2	22	6
B. Draft and Hand Labor Requirements (Man Days in 1000's)													
Draft:													
without tractors	686	550	514	200	57	-	19	19	22	56	32	283	2,437
with tractors	494	433	457	184	50	-	13	13	16	40	29	201	1,911
percent reduction	28	21	11	8	12	-	32	32	27	29	9	29	22
Hand labor:	-	70	720	1,525	708	519	1,246	1,149	683	717	1,621	98	9,075
percent of total[3/]	-	14	61	89	93	100	99	99	98	95	98	33	83
C. Work Force Requirements (Numbers in 1000's)[4/]													
Draft work (men)	25	22	23	9	3	-	1	1	1	2	-	10	96
Hand work (women)		7	72	152	71	52	125*	115*	68*	72	165	10	907
Total Persons	25	29	95	161	74	52	126	116	69	74	165	20	1,003
Draft animals	47	34	26	9	3	-	1	1	1	4	1	20	147

Source: Phakoana and Phoofolo (1978)

[1/] Reproduced from Table VI-6.

[2/] Assumes that 800 tractors, averaging 45 horsepower in size, are each productively employed for an average of 700 hours per year. Further, the annual supply of tractor service is distributed on a monthly basis according to the relative aggregated monthly demands for animal traction. Within a given month tractor services are allocated in proportion to crop-specific traction requirements. Annual traction requirements in 1000,s of man days work out to the following proportions by operation: plowing (61 percent), harrowing (5 percent), planting (19 percent), and cultivating (15 percent).

[3/] Calcualted using the "with" tractor estimates reported in Part A.

[4/] The numbers of men and women required to accomplish the crop labor activities in each month were estimated from two assumed participation rates: draft labor (accomplished largely by men) is based on an 8-hour day and 20 day work month; hand labor (primarily women's work) assumes a 4-hour day - 20 day month. The nubmers with an asterisk (*) denote specific months were female employment is likely overestimated (for example, in this case sorghum harvest which has traditionally been partly a male activity). The required number of draft animals assumes 6 oxen per team for plowing and 2 oxen per team for all other traction operations, using the "with" tractors requirements in Part B as the basis for the estimates.

season (August, September and October). The introduction of tractors, however, has not had much impact on total labor demands. This is true because hand labor operations make up approximately 83 percent of total labor inputs during the growing season (Part B in Table VI-7). Since these operations are traditionally 'women's work' in Lesotho, the vast majority of farm labor is supplied by the female members of the household.

In order to address the question of possible seasonal labor shortages, man days of labor are converted to work force requirements (Part C in Table VI-7). Peak work loads for men typically occur during the spring months and are fairly evenly distributed between August and December. During the months of greatest demand (September through November) 22,000-25,000 men are potentially fully employed. After draft work is completed very few males are employed in crop production for the balance of the growing season. Peak work loads for women occur during the weeding cycle for most crops, December through March, and during the harvesting phase which extends through the winter months. Depending upon weather conditions during the growing season, peak work loads can shift from one year to the next. This is particularly true with respect to weeding requirements. Accordingly, obvious peak demand periods for female labor are from December to March for weeding, and from April through July for harvest. On the basis of the above estimates, work force requirements can be as high as 150,000-165,000 women fully employed during these two phases of the cropping season.

Upper and lower bound estimates on the potential supply of labor for agriculture in Lesotho are reported in Table VI-8. Under present conditions and management practices, there does not appear to be any constraint to male labor. The female labor supply is constrained under lower bound assumptions but not at upper bound levels. These results neither confirm nor refute the possibility that seasonal labor constraints are important in Lesotho. Such findings do, however, raise further questions that are equally as important as physical numbers of the available work force. For example, it is generally accepted that Lesotho has an over-supply of cattle. But as shown in Table VI-7 (part C), up to 47,000 head of oxen are required during the peak plowing season. If such numbers are not available in the Lowlands at this time of year, a possible labor bottleneck could be created by a shortage of sufficient draft power (See Chapter VII). Similar constraints could be imposed by the supply of tools and implements as well as personal preferences for not working at certain times during the production season.

Table VI-8. Upper and Lower Bound Estimates on the Potential Supply of Agricultural Labor in Lesotho (Provisional)

Work Force Participation	Bounds on Assumed Labor Supply Lower	Upper
Men:		
Number available*	30,000	50,000
Man days per year (1000's)**	6,600	11,000
Man days per month (1000's)***	550	917
Women:		
Number available*	100,000	200,000
Man days per year (1000's)**	11,000	22,000
Man days per month (1000's)***	917	1,834
Total Participation:		
Number available	130,000	250,000
Man days per month (1000's)	17,600	33,000
Man days per month (1,000's)	1,467	2,751

*Adapted in part from an unpublished 'review draft' report prepared by the Lesotho Soil Conservation Evaluation Team (CSU, 1978).

**Assumes an 8-hour day - 5-day work week for men and 4-hour day - 5-day work week for women. Both estimates are based on an 11-month working year.

***Annual estimates divided by 12 months.

Marketing and Resource Infrastructure

Most of the market infrastructure development which has taken place since Independence has been directed to the needs of the crop sub-sector. The Produce Marketing Corporation (PMC) was established in 1974 to provide the primary marketing services for crops and crop products grown in Lesotho (Percy, 1976). PMC is charged with full responsibilities for marketing and pricing policy, for the provision of storage and transportation facilities, to monitor the marketing activities of private traders and individuals, and to establish and enforce quality standards. The Corporation has had limited success thus far, due largely to inexperience and difficulties in competing with services already provided by private traders.

Co-op Lesotho was formed prior to PMC, and has primary responsibility for input supplies. The Co-op is responsible for the procurement and disposition of farm inputs as well as maintaining regional outlets and storage facilities. The Basic Agricultural Services Program (BASP), which is a major effort designed to supplement the services extended by Co-op Lesotho, is currently in the implementation phase and is expected to substantially improve the availability of productive inputs through a nationwide supply system.

Included in the BASP program are components which address the credit needs of small farmers and the communication and logistics infrastructure. Both of these are viewed as severe constraints in Lesotho and BASP's efforts can potentially contribute much to open up channels of communication between farmers and government. Extension services, now virtually non-existent in many areas of the country, will be developed through BASP and PMC, and to some extent, Co-op Lesotho. Current programs, however, give little attention to the needs of livestock owners. This and other issues are further developed in Chapter VII.

Growth Potentials and Constraints

Potentials exist in nearly all aspects of food production, marketing and consumption for significant improvement in a relatively short period of time. It is also evident from the historical planning literature on Lesotho that similar observations have been made many times over the past 40 years. Among the main reasons cited for the poor performance of the crop subsector are: 1) the risky natural environment and its consequences for farmer incentives; 2) the consistent presence of external wage employment opportunities which create an important disincentive in the form of high opportunity cost to agricultural labor; 3) the system of land tenure with attendant consequences for spatial diseconomies; and 4) the lack of infrastructure, especially readily accessible markets and transportation (Phororo, 1976). Because many of these constraining factors can be expected to exist well into the future, it is perhaps useful here to focus on issues of a more immediate concern.

Food Grains: Crop yields on the west side of the Caledon River in the Orange Free State rank among the highest in the world for a rainfed agriculture. The soils and climate of the area are similar to Lesotho's; only the production practices and management systems differ. Recent work at the experiment station and yield experiments dating back as far as the 1930's have confirmed that such standards are obtainable in Lesotho (McKee, 1978; Morojele, 1963; and Wallman, 1968). Work carried out in the Thaba Bosiu and Leribe areas suggests that fairly simple changes in cultural practices could lead to marked improvements in crop production (TBRDP, 1976a; KRDP, 1976; BASP, 1977). For example, increasing the seeding rate (which is typically low) could increase yields in some cases by double or more at a relatively nominal cost, other practices remaining unchanged. In many cases

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timely weeding of row crops has a similar effect on yields and may not necessarily requ: : greater labor input than is currently being expended. For cases where labor supplies are constrained by various factors, herbicides have considerable potential in Lesotho and would not be necessarily beyond the limited resources of most farmers. Other examples might be cited but the above suffice to underscore an important point: technology is available to farmers in Lesotho at the present time to significantly improve production levels of basic food crops, but extension services and communicative links are practically absent in most parts of the country. Rural people simply do not have the opportunity they need to work with skilled people, and for the most part extension services are a new experience for Lesotho and could be more creatively pursued.

Fruit and Vegetables: Vegetable growing has been practiced since the arrival of missionaries in Lesotho. Nearly every rural (and urban) family has at least several fruit trees. Most Basotho have never practiced pruning and thinning as a means of increasing yield; pruning and grafting tools are not available through present marketing channels in the country. Careful studies have not been undertaken to examine the cost-effectiveness of preservation, and considerable quantities of produce are lost each year due to deterioration while significant amounts of dried and canned fruits and vegetables continue to be imported.

Commercial vegetable production has been (and is being) attempted but with limited success (see Chapter II, Water). Apparently there are sufficient groundwater supplies in most village areas to substantially increase the production of home and communal gardens if developed for that purpose. Perhaps individual initiative, with public support, could provide a viable alternative to current vegetable imports (amounting to R3 million in 1976) while commercial schemes have not been successful in doing so (MOA, 1977a, 1977b).

Forage Production: Under the original Laws of Lerotholi, as discussed in Chapter V, grass was not considered a 'crop'. Only in recent years has consideration been given to including grass and forage as genuine enterprises in the Lowland cropping mix (i.e., to give feed crops the same status as food crops). The need for Lowland winter grazing has long been recognized in Lesotho. The only locations which grow any significant quantities of forage are the area-based project and research sites. In terms of farmer benefits, forage and silage production rank among the most remunerative enterprises yet developed in Lesotho, and apparently some success has been achieved in demonstrating its potential to farmers in the project areas (LPAS, 1973a and 1974; TBRDP, 1976a).

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CHAPTER VII

LIVESTOCK SYSTEMS IN LESOTHO

Introduction

Domesticated animals hold a special place in Sesotho culture. Because of the different roles both large and small stock play in the everyday life of the majority of Basotho, it would be misleading to generalize the man-animal relationship as largely a social one. Similarly, to presume a western standard of production incentives and economic rationalism as somehow "embedded" in the apparent social functions which livestock fulfill would also be in error. Rather, there seems to be a mix of uses and purposes of holding livestock, both economic and social, and herein lies a critically important need for understanding upon which developmental work must build.

This paper examines in some detail the role and performance of the livestock subsector in Lesotho. Attention is given to the central issues and problems involving husbandry practices, productivity, ownership, overgrazing, and others, as well as the focus of government policy and development programs in recent years as means to improving animal production and income. The terms 'livestock system' and 'subsector' are perhaps misleading in the sense that their conventional meanings imply a 'commercial' model of behavior which may have limited applicability to rural life in Lesotho. Nonetheless, 'system' and 'sector' are used throughout the discussion to emphasize the interconnectedness of animal husbandry and other agricultural and nonagricultural activities; the purpose being to establish a macro-view of the social, technical and public policy dimensions of agricultural planning.

The Socio-Cultural Dimensions

The Basotho regard their animals as having multiple purposes and uses. Cattle, for instance, provide draft power, food, raw materials for clothing, and, in time of emergency or need for cash, marketable assets to the family. Because of their relative size in comparison to sheep and goats (which fulfill some of the same needs), and because of their greater utility to the family in terms of multiple uses and longevity, cattle are the most prestigious of all domesticated animals. Sheep and goats are largely valued by the Basotho for their market value in wool and mohair and for domestic consumption. In recent years sheep and goats have taken on an increased ritualistic value as substitutes for cattle (Shaw, 1974). Because of the limited road network, horses and donkeys will continue to be the most important means of transportation for the majority of Basotho for many years to come.

Within the context of customary Sesotho Law, land tenure, and traditional values, the function of livestock must also be interpreted in terms of the particular roles different animals play in the social constructs of community responsibility (reciprocity and redistribution) in Sesotho society (Polanyi, 1956 and Sansom, 1974). Cattle, being the

most prestigious animal, are prominent in important social events such as weddings, funerals, and special occasions of a religious nature. Rarely are cattle ever slaughtered simply for food. Consistent with sex-linked roles and responsibilities in Sesotho life, livestock husbandry practices also reflect this form of social organization: males are responsible for grazing animals (and herding) while females are responsible for home-grown stock (fowl, pigs). Considerable social consequences (taboos and ostracism) exist for the individual as a result of deviations from these roles. Animal use is also delineated according to the user's age. For example, the use of the donkey is exclusively the right of boys whereas use of the horse is typically limited to men.

Through the social conventions of *bohali* (bride price), *mafisa* (the letting-out of grazing animals to be managed by another family), and *mpho e famoeng* (gift giving), the effected transfer of grazing animals between families and villages over time has been considerable, encouraging an equitable sharing of the benefits and burdens of agrarian life (see also Chapter V). According to several historians such practices are believed to have contributed significantly to the survival of the Basotho as a nation (Ashton, 1967; Germond, 1967; and Hammond-Tooke, 1974).

Modification of present husbandry practices (which are in part accountable for the general common property resource management problem in Lesotho) leading to improved production and utilization can be successfully implemented only inasmuch as the 'social responsibility' aspect of livestock ownership can be replaced by something which satisfies these needs. This argument is supported by the fact that the condition of the cattle "industry" has virtually remained unchanged since the turn of the century despite the continuing efforts of colonial and other European specialists to commercialize it. The story is much different with respect to the chicken (an animal of little "social" standing): Lesotho is approaching self-sufficiency in egg production largely as a result of numerous, small family enterprises and an active marketing system.

Economic and Technical Aspects

This section briefly describes some basic characteristics of livestock systems as a background to the discussion of Lesotho's national policy and development programs and projects in the livestock sector. Special attention is given to the following aspects: production and income, animal numbers, veld resources and carrying capacity, the incidence of livestock ownership, imports and exports, productivity levels and potentials under existing conditions, and marketing and institutional resources.

Subsector Product and Income

With the exception of perhaps one year in ten when crop yields are well above average, the livestock sector generates the largest contribution to gross domestic product. In addition to providing the largest

share of farm income, the sales of livestock and livestock products account for as much as 60 to 70 percent of national export revenues. Apart from the trade statistics, however, there is a paucity of information on the relative importance of the different types of livestock raised in Lesotho (e.g., the monetary value of livestock and livestock products for home consumption, draft power, *bohali*, etc.). Accordingly, an attempt was made to estimate annual production levels and gross market values (or equivalent values for non-marketed products) for each livestock subsector. This information is summarized in Table VII-1.

A base year of 1970 was used as more recent information was either incomplete or missing altogether for some of the product categories. The data suggest that the annual domestic utilization of livestock and livestock products amounts to a market value equivalent of about three times the gross revenue earned from exports. The subsector outputs in order of relative importance are animal products (R15 million), fresh meat (R6.6 million), draft power and transport (R3.3 million), and live exports (R2.1 million). It is worth noting that of all the livestock subsectors, milk is the most important in terms of equivalent gross revenue (R5.1 million) -- a fact which is rarely mentioned in the planning literature.

Sound empirical estimates of net income for various livestock enterprises on a nationwide basis are unavailable. To bridge this information gap several surveys have been conducted as part of area-based project activities. In one such study, Guma and Mafoso (1976) report annual net returns to the livestock-owning household of R61, representing an average return on invested capital of 14.4 percent. Out-of-pocket costs averaged only R21 annually. Similar findings have been reported at Thaba Tseka and Leribe. The upshot is that, in relation to crop production, livestock husbandry (i.e., grazing stock) appears to be less risky, requires less operating capital, and in most instances offers a higher payoff in terms of net returns to family labor. (These findings should be considered as important hypotheses for careful empirical examination).

Animal Numbers

The first reasonably accurate census data on livestock numbers in Lesotho was obtained shortly before the turn of the century following the last major outbreak of rinderpest in 1897. It was estimated at that time that some 150,000 head of cattle had survived along with about one-half million sheep and goats and perhaps 60,000 horses. Until the 1930's, however, estimates of livestock numbers were fairly inconsistent and often unreliable. Even in modern times such statistics are still regarded with considerable suspiciion (Wacher, 1978). A continuing census, which was begun during the 1930's, is in Table VII-2.

Without digressing on the possible significance of the cyclic variation apparent in some of the time series, it is apparent that livestock numbers have remained reasonably stable during the past 40 years. It is interesting to note that the human population more than doubled during this period. Several species show an increasing trend, notably goats

Table VII-1. Estimated Annual Production and Gross Revenues for Livestock and Livestock Products, Base-Year 1970 (in 1978 Rand).

Item	Quantity[1/] Head	Quantity[1/] M. Tons	Unit Value[2/]	Market Value Equivalent (R)
A. Fresh Meat[3/]			(¢/Kg)	
Beef	23,535	3,674	94	R 3,453,560
Mutton	74,515	1,383	75	1,037,250
Goat	47,115	682	75	511,500
Pork	3,033	182	60	109,200
Poultry	628,000	942	90	847,800
Offals		1,048	60	628,800
Fish	40 Ha.	60	80	48,000
				R 6,636,110
B. Animal Products			(R/unit)	
Milk	33,867,000(l)		.15	R 5,080,050
Eggs	1,572,667(doz)		.50	786,333
Wool[4/]	4,744,809(kg)		1.00	4,744,809
Mohair[4/]	983,009(kg)		3.80	3,735,434
Hides	37,346		.06	224,076
Skins	209,960		.02	419,920
				R14,990,622
C. Live Exports			(R/head)	
Cattle	11,408		145	R 1,664,600
Sheep	13,372		13	173,836
Goats	2,771		11	30,481
Horses, donkeys	2,900		95	275,500
				R 2,144,417
D. Draft Power[5/]			(R/head)[6/]	
Oxen	129,608		13.05	R 1,691,384
Horses	109,703		9.00	987,327
Donkeys, mules	95,803		6.30	603,559
TOTAL GROSS REVENUES				R27,053,419

[1/] With the exception of fish production data (Le Blanc, 1975), the principal source of production and revenue information is contained in a report by the Bureau of Statistics (1975).

[2/] Average producer prices are for January, 1978 (Tuoane, 1978).

[3/] These estimates reflect only "slaughter" statistics as reported in footnote 1 (above). The Thaba Tseka studies suggest, however, that such statistics may grossly underestimate the actual quantities (and monetary value) of meat consumed in Lesotho (Jensen, 1976).

[4/] These estimates are considerably higher than "reported exports" in recent years. However, due to increased domestic consumption and the possibility of considerable smuggling along the mountain border areas, the 1970 base production levels are used as representative of current industry output.

[5/] Refer to Table 2 (1970 data).

[6/] Sound economic analyses of the value of livestock for draft power and transportation in Lesotho are scarce (Guma, 1977). The above estimates were obtained by the income capitalization method using current market values per head and 9 percent rate of interest. As such, these estimates should be regarded as an "upper bound" on actual earned income since a portion of the market price can be attributed to the slaughter value of replaced animals.

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Table VII-2. Livestock Inventories and Large Stock Grazing Units for Selected Years, 1935-1976.

Year	Sheep	Goats	Cattle	Horses	Mules	Donkeys	Large Stock Grazing Units *
1935	1,285,596	432,230	352,311	79,701	1,986	18,911	691,852
1937	1,283,394	411,931	418,921	85,017	1,068	22,766	745,738
1939	1,598,812	568,687	447,763	87,960	1,165	27,360	867,660
1945	1,544,723	541,974	437,217	81,771	1,240	37,731	843,964
1947	1,702,977	647,013	429,158	108,284	1,946	51,920	916,251
1949	1,557,546	609,267	430,998	98,832	2,468	48,905	873,776
1951	1,564,001	637,065	401,221	102,903	3,089	59,188	864,669
1953	1,303,325	550,612	406,454	92,384	3,550	53,543	789,981
1955	1,339,019	654,800	408,144	102,001	4,829	48,855	824,005
1957	1,220,769	535,286	381,770	81,661	3,559	48,616	740,257
1959	1,300,657	594,395	387,769	84,874	4,220	55,813	782,576
1961	1,227,386	632,032	376,740	89,333	4,316	53,013	764,205
1963	1,431,631	791,726	366,146	85,562	2,695	44,796	821,471
1965	1,661,502	877,820	346,079	73,810	2,775	46,488	861,303
1967	1,526,442	890,628	375,709	96,894	2,654	58,945	882,872
1969	1,437,803	631,972	392,717	88,322	2,881	43,302	813,625
1970	1,655,100	973,800	551,500	109,700	4,100	89,700	1,091,098
1973	1,556,900	961,900	465,500	114,000	2,500	97,400	1,006,160
1975	1,364,000	808,000	482,000	93,000	1,800	88,000	939,900
1976	1,128,000	618,000	486,000	104,000	900	88,000	855,340

Source: Central Planning and Development Office Library open file report under the title "Documents Relating to Livestock Projects" (selected dates).

*Large stock units are the sum of livestock numbers multiplied by the following: cattle .8, horses .7, mules .6, donkeys .5, and sheep and goats .2. (CPDO, n.d.)

and donkeys. Using large stock grazing units (a weighted average of all types of grazing animals) as an index of grazing requirements, it is not obvious that a significant long-term trend exists in the data. It should be pointed out, however, that an increase may be occurring in the 1970's with grazing units reaching their highest levels in the past four decades. This is consistent with the findings of Phororo (1976), indicating a general increase in numbers for all southern African countries with the exception of South Africa and Rhodesia.

Official trade statistics for cattle, corresponding approximately to the census years reported in Table VII-2 indicate that total imports and exports for the period 1939 to 1977 were 496,100 and 398,500 head respectively (BOS, 1977). A similar net import balance is also observed for sheep and goats during the same period. The incidence of imports and exports over time also reflects a cyclic trend similar to that observed in the livestock census data. During years of relatively high imports, exports tend to be low and vice versa. Some of the reasons behind this phenonomen are explored in the section to follow.

The Range Resource and Carrying Capacity

The high veld and mountain pasture grasslands are one of Lesotho's greatest natural resources. It is unlikely that diamonds, water resource developments, or the suspected commercial deposits of uranium and other precious metals will ever exceed the income earning potential of the grasslands. The small strip of arable land lying on the western (Lowland) side of the country is possibly the only other natural resource with a greater potential of providing a source of income and employment for the nations inhabitants in the years to come. Both resources are all too scarce not to be carefully managed for present and future generations.

The present condition of the grasslands can be characterized simply as exhibiting the classic symptoms of the common property resource problem (Ciriocy-Wantrup, 1962). Reports by missionaries as early as 1868 document many of the same conditions that can be observed today, namely severe sheet and gully erosion, undernourished and bastard animals, compaction of croplands, high death losses during the winters (Germond, 1967). The deleterious consequences of seasonal and localized overstocking and generally poor herd management have persisted in Lesotho for many years. Consequently, such conditions have come to be expected as normal and unavoidable (although unintended) side effects of livestock ownership.

Under the traditional communal grazing system, control and access to the foothill and mountain pastures was supervised by the chieftanship. Although the range was considered common to all, loosely defined boundaries corresponded to district chiefdoms and the principal chiefs through their sub chiefs and headmen recognized particular grazing areas as their own (Ashton, 1967). Ideally every village in every district had its own "cattle post(s)", and it was through these geographically identified areas that the chiefs could plan and manage seasonal grazing of

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the entire Maluti mountains. Further, certain areas were periodically set aside for nonuse (*leboella*) for various reasons including the resting of previously overgrazed sites.

The old system broke down as a result of the increasing population pressure (both animals and man) and the diminished power of the chiefs to control access to and use of the summer range. At present there is practically no control over livestock movement in the mountain grazing areas and consequently there are frequent disputes over prior rights at cattle posts and considerable theft of stock.

The carrying capacity of the grazable area of Lesotho has not been carefully measured empirically. Grass growth begins normally in October at the lower elevations and nearly all non-draft animals have been moved up into the foothills by late October. By late December or early January, the upper reaches are being grazed and usually by May most of the livestock have been returned to the Foothill areas where, depending upon the severity of the winter, many will stay throughout the months of June to September. Detailed estimates of carrying capacity vary widely from area to area, and sufficient information to generalize the carrying capacity of particular regions for comparative purposes is apparently not available. Data collected by the various area-based project staffs and information obtained through Madland (1978) were used to establish a representative range of stocking rates which could be applied to the country as a whole. The results are reported in Table VII-3.

Table VII-3. Upper and Lower Bound Estimates for the Annual Carrying Capacity of Veld and Pasture Resources

Grazable Area* (Ha.)	Stocking Rate** (Ha./G.U.)	Annual Carrying Capacity	
		Upper Bound	Lower Bound
Lowlands: 352,000	8 - 13.5	44,000	26,100
Highlands:*** 2,360,400	4 - 6.5	590,100	363,100
Total Large Stock Grazing Units		634,100	389,100

*Assumes a total surface area of 30,350 sq. km of which 11.6 percent is arable land (351,971 Ha.) and 12 percent of the balance is non-grazable due to rock outcrops, surface water, etc. (Bawden and Carroll, 1968).

**These estimates reflect the range stocking rates commonly found in the planning documents, although they should not necessarily be regarded as definitive. The difference between the lowland and highland estimates is based on the assumption that only half of the lowland area is available to grazing year-round. (Phakoana and Phoofolo, 1978). The estimates assume 12 animal unit months per large stock unit.

***Includes both the foothill and mountain ecological zones.

Recommended annual stocking rates for the non-arable area (based on 12 animal unit months per large stock unit) range from an average of 4 to 6.5 hectares per grazing unit. This range in recommended stocking rates places a lower and upper bound on total carrying capacity at about 390,000 to 630,000 large stock units, or approximately 41 to 67 percent of the 1975 livestock population (Table VII-2). Conceptually, the actual carrying capacity would vary from year to year depending on weather conditions and the ratio of small to large stock units, but such considerations were beyond the scope of the present review. Further, the above estimates assume a grazable area of approximately 2.4 million hectares which is slightly less than that reported by Phororo (1976) and considerably less than the grazable hectarage calculated by Morojele (1965) for the 1960 agricultural census. Thus, the above finding is consistent with the observations of numerous researchers dating back as far as the early 1900's.

In resource conservation terms, the animal-land relationship can be characterized as having reached a biological equilibrium at a livestock population in excess of the maximum sustainable yield of the land resource (Circiacy-Wantrup, 1962). Hence, a reduction in numbers (i.e., overall grazing pressure) and/or improved herd management (i.e., optimal intertemporal grazing) could theoretically result in increased animal output and at the same time reduce the deleterious side effects of periodic surface erosion and encroachment of less beneficial plant populations.

The phenonomen of perennial over-stocking raises the further question of the sensitivity of annual imports and exports to the seasonal conditions of the range. In other words, does the timing of imports and exports aggravate or moderate the possibility of seasonal overstocking? An attempt to examine this question empirically is summarized in Table VII-4. On the basis of monthly trade statistics for 1975 it would appear that exports of live grazing animals tend to follow the seasonal availability of forage. Some 70 to 80 percent of all exports occurred during the first half of the year, with the majority taking place in the fall months as the animals are returned to the Lowalnds. Thus, exports tend to occur when the animals are in their best condition, and herd reductions at this time are advantageous in terms of the limited forage supplies during the winter. Practically no exports take place after mid winter (July).

Imports follow a different monthly distribution. On the expectation that incoming stock is primarily a function of men returning from the mines, one would expect the pattern of animal imports to be more uniformly distributed (see Chapter IV). The data do suggest that imports pick up during the spring, perhaps to replace winter mortality losses. The overall net effects are that during the late summer-fall period there is a net export of grazing animals, and during the early spring-early summer period a net import occurs. Thus, the seasonal import-export pattern does not appear to aggravate the problem of overgrazing in Lesotho, but more conclusive study is clearly warranted.

Table VII-4. Monthly Distribution of Cattle, Sheep and Goat Imports and Exports During Calendar Year, 1975.

Month	Cattle		Sheep and Goats	
	Imports	Exports	Imports	Exports
	- - - - - - - - - - Percent - - - - - - - - - -			
January	3	15	9	20
February	5	13	9	11
March	4	15	10	8
April	9	14	9	17
May	10	20	5	14
June	9	16	4	22
July	9	4	7	3
August	8	2	7	1
September	12	1	9	0
October	11	0	13	0
November	9	0	11	0
December	10	0	7	4
	100	100	100	100
Total Head	7,944	3,443	6,365	7,948

Sources: Bureau of Statistics, 1976; and Vassiliou, 1977.

The Incidence of Livestock Ownership

Some 50 percent of all Farm households in Lesotho own some grazing stock (BOS, 1972). As mentioned earlier, income from livestock is apparently more important than income earned from crop farming for the average household. In Table VII-5 several sources of data are summarized in order to ascertain the regional distributions of animal numbers and livestock ownership.

These data suggest that the mountain zone of the country has the largest proportion of the nation's livestock and the greatest participation of rural households in livestock raising. Ownership of particular types of grazing animals varies between zones. For example, ownership of cattle and sheep is relatively higher in the Lowland in comparison to the non-arable areas of Lesotho. Although cattle numbers are small in relation to sheep and goats, a greater percentage of households own cattle than any other type of grazing animal.

The distribution of cattle ownership by size of cattle holding is examined in Table VII-6. According to the best available information, it would appear that cattle ownership, like land holdings, is somewhat biased towards fewer and larger owners. For example, 16 percent of households owning cattle have herds of nine or more, accounting for approximately 43 percent of total cattle numbers. Since only half of the

Table VII-5. Regional Distributions of Animal Numbers, Grazing Units and Animal-Owning Households

Zone	Animal Numbers and Percent of Households Owning Livestock*								Grazing Units		
	Cattle		Sheep		Goats		Horses, donkeys and mules				
	Numbers	Percent	Numbers	Percent	Numbers	Percent	Numbers	Percent	Total	Per Capita	Per Owning Household
Lowland**	139,000	44.7	259,200	25.8	176,200	23.6	52,400	19.9	278,400	.72	6.9
Foothill	93,600	42.9	191,800	21.5	249,200	29.4	42,800	42.1	224,600	.77	6.6
Mountain	200,600	58.6	993,100	44.8	432,600	47.2	101,600	79.3	587,340	2.78	15.95
Senqu River	32,300	45.1	112,800	27.2	103,900	33.9	17,100	43.8	92,740	.96	7.6
Total	465,500	48.0	1,556,900	29.9	961,900	32.3	213,900	33.6	1,183,160	1.04	9.6

*Adapted from information reported by the Bureau of Statistics (1973), Jensen (1976) and the Khomokhoana Project Office (1976).

**Includes the "Border" Lowland area which is sometimes considered a separate ecological zone (see, for example, Morojele, 1965).

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households in Lesotho have cattle, this means that less than ten percent of the population owns nearly half of the national herd. Thus, a question might be raised as to the efficacy of small vs. large cattle-holder development programs, especially in terms of the incidence of program benefits (i.e., the actual beneficiaries and long-term cost-effectiveness).

Table VII-6. Distribution of Cattle Ownership by Size of Holdings

Cattle Numbers per Holding	Percentage Distribution of: The National Herd	Percentage Distribution of: Households Owning Cattle
1 to 4 head	27.0	59.4
5 to 8 head	29.6	24.6
9 to 16 head	28.1	12.7
17+ head	15.3	3.3
	100.0	100.0

Source: Bureau of Statistics, 1975.

Animal Productivity

With the exception of cold winters and periodic draught, Lesotho's high altitude and temperate climate are idyllic for livestock raising. Few enzootic diseases exist, and until the recent outbreak of sheep scab in the fall of 1975, parasitic diseases have been reasonably well controlled. A national campaign against sheep scab could lead to eradication during 1979.

Because of generally poor nutrition and the lack of sound herd management to control cross breeding, the general condition and performance of most types of livestock is quite poor. Domestically-bred cattle are often stunted at maturity, of mixed breed, and of a generally poor conformation for satisfactory reproduction. The sheep and goat herds suffer from similar problems and are marginally productive by modern commercial standards. To complicate matters there is a strong indication that the genetic quality of privately imported animals is not much better (in modern, commercial terms) than the stock that now exists in Lesotho. However, the present genetic pool is probably superior to many of the standard breeds in terms of the 'ability to survive' the conditions under which animals are reared in Lesotho. A brief summary of some of the more important production parameters and herd characteristics is reported in Table VII-7.

With respect to herd composition, the cattle population is heavily dominated by mature animals. On the other hand, the sheep and goat flocks are basically comprised of young animals as it is the common practice to slaughter those over two years of age. Both cattle and small stock have an excessive male to female ratio owning to the large number of small, self-sustaining herds and the high incidence of infertility.

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Table VII-7. Herd and Production Characteristics for the Principal Livestock Enterprises.

Herd Characteristic	Cattle	Sheep	Goats
A. Numbers and Composition			
Total herd	551,524	1,655,128	973,767
		percentages of total herd	
Animals < 2 yrs	21.1	84.0	85.0
Mature females	45.9	73.0	79.0
Mature breeding males	6.2	5.0	5.0
Other animals[1/]	26.8	22.0	16.0
B. Production Parameters			
Birth Rate[2/]	12.7	16.7	17.7
Slaughter[3/]	4.3	4.5	4.8
Mortality Losses[4/]	5.6	8.3	6.5
Imports	2.3	.8	.4
Exports	2.9	1.0	.3
C. Annual Off-take			
Exports, slaughter, mortality	12.8	13.8	11.6
(less) Births, imports	15.0	17.5	17.7
Net Change	+2.2	+3.7	+6.1

Sources: Bureau of Statistics (1973), Jensen (1976), Edwards (1972), KRDP (1976), and Hirst (1968).

1/ Primarily castrated males. (oxen, wethers)

2/ Approximate weaning rates are 55 and 27 percent for sheep or goats and cattle, respectively.

3/ Average age at slaughter: Cattle -- 40 percent over 10 years, 91 percent over 4 years; sheep and goats -- 70 percent over 2 years, 93 percent over 1½ years of age.

4/ Deaths due to disease and accidents are approximately equally distributed while starvation accounts for roughly 20 percent of animal mortality.

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Birth rates are low for all species resulting in very poor weaning percentages (27 percent for cattle, 55 percent for sheep and goats). These rates of reproduction mean that livestock populations are apparently just self-sustaining in good grazing years. This is not true, however, for draught years. Livestock numbers have held fairly constant over time largely due to net imports.

In the three time periods for which animal utilization data is available (1960, 1970, and 1973), mortality losses (death from disease, starvation, and accidents) consistently exceed the rate of slaughter. This finding, along with evidence suggesting that most mortality losses are used for home consumption (see for example, Jensen, 1976) could mean that a possible relationship exists between mortality and slaughter, namely, that during severe winters when mortality is abnormally high, rates of slaughter for home consumption may drop off, thus helping to maintain a fairly consistent or "target" herd size over time (Table VII-2). In total, mortality and slaughter account for approximately 50 to 60 thousand head of cattle and 250 to 300 thousand head of sheep and goats in an average year. (Implications in terms of per capita consumption of meat are discussed in Chapter III).

Annual off-take amounts to 12 to 13 percent for each class of livestock. This is relatively low in relation to commercial standards. For example, the U.S. average for the cattle industry is 30 to 40 percent (Ward, et al, 1977). Nonetheless, it is on par and in some cases even higher than many other countries in southern Africa (Phororo, 1976).

Marketing and Resource Infrastructure

The present market system is much the same as it was during the early years of the colonialism. The market structure is characterized by a few large traders, oriented mainly to the export of raw materials and the import of finished goods. Although the materials of trade have changed over the years, this basic structure and function of the marketing system has remained relatively unchanged since the death of Moshoeshoe (Houghton, 1974).

European traders (notably English-Dutch and more recently Portuguese and Indian) are the primary suppliers of productive inputs and consumption goods in Lesotho. These same traders also provide the major outlets for raw products and finished goods. Hence, they function as 'middlemen' for nearly all commercial transactions between the Republic of South Africa and Lesotho, and for internal marketing within Lesotho itself. Albeit the efficiency of this arrangement has been a matter of continuing debate, it has only been in the last few years that the Government has actively intervened in the marketing system. The approach has been to establish parastatal organizations (e.g., the Livestock Marketing Corporation, the Produce Marketing Corporation) as nation-wide marketing agents. The purpose of these agencies was to increase competition in marketing and thereby improve the income opportunities of farmers. Where such organizations have been unable to cope, the Ministry of Agriculture or the Lesotho Cabinet has participated directly in the marketing process.

The Livestock Marketing Corporation (LMC) was formed in 1973. Initially mandated to encourage greater competition among the established European traders by offering an alternative market for the export of livestock and livestock products, the corporation has since exercised considerable powers of oversight and control (CPDO, 1977). The corporation is responsible for all 'product' market activities and functions associated with livestock, including control over the private traders and the enforcement of quality standards in production, handling and processing. In addition, the LMC is charged with developing new markets both within the Republic and internationally, and in formulating pricing policies to benefit domestic livestock producers.

Although it is premature to assess the impact of LMC on market infrastructure development in Lesotho, it seems reasonable to suggest that LMC has not been able to compete successfully with the services already provided by private traders and others (e.g., the Livestock Division of the Ministry of Agriculture, area-based projects, etc.). The corporation is currently inactive, pending a reorganization and realignment of the scope of operations consistent with staffing and resource constraints.

Other smaller marketing schemes have been more successful. A notable example is the marketing and distribution system for fresh eggs. Egg outlets (or "circles") were established in all of the major Lowland towns largely through self-help programs. The centralized marketing scheme vastly improved marketing efficiency thus benefitting both producers and consumers.

Currently there is no meat processing in Lesotho outside the services provided by local butcheries. Hides and skins are normally exported green although a limited supply is now being used locally by handicraft centers. Wool and mohair is processed to a limited extent locally, but for the most part these products are graded, bulked and shipped without processing. In effect, national income derived from livestock and livestock products is almost entirely direct income, whereas in countries with a commercial livestock industry the value added income component is typically double or triple that of direct income.

The principal source of capital for financing livestock production is wage labor. No national production credit services are available to farmers at present. Production loans are extended to interested farmers through the area-based projects and to some extent by traders, but such sources of credit are very limited in scope. Basotho who are not members of grazing and farming associations which have been set up in several parts of the country face severe capital constraints in terms of upgrading their herds and adopting improved management and feeding practices.

Extension and farmer training has been considered an integral part of development programs in Lesotho since the 1930's. In recent years farmer training centers and farmer associations have been established to encourage the adoption of improved management and husbandry practices, but their success has been mixed. A noteworthy feature of past extension

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efforts is the absence of continuity over time. The information, training and extension infrastructure is currently being reformulated by the Government with the objective being a continuous, evolving system of services consistent with people's needs and the capacity of the Government to deliver.

Prospects for Growth in the Near Term

This section concludes with a brief discussion of the growth potentials in the livestock subsector under current conditions. The remaining sections of the chapter examine the Government's policies, approach, and specific programs for livestock development through 1980.

Milk Production: The experience of the Leribe Pilot Project, the Khomokhoana Project and the Thaba Bosiu Rural Development Project suggests that the production of milk for human consumption could be significantly expanded with improved feeding practices. Separating calves from their mothers at one month of age (rather than the more usual nine to twelve months) would both reduce fresh milk imports and increase incomes of dairy cattle owners. The cost-effectiveness of supplemental feeding of young calves has been demonstrated in several studies, even when imported roughage and concentrates are used (for example, Edwards, 1972). If feed stuffs were purchased from local farmers to support a small scale dairy industry, net benefits could also accrue to the producers of fodder crops. In fact the net income potential of fodder production in Lesotho probably exceeds the income earning potential of traditional food grain production (Leribe Project, 1974).

The number of dairy animals (primarily of Fresian and Brown Swiss blood) has been increasing realtive to other types of cattle for many years in Lesotho (Hirst, 1968). This shift in emphasis is most evident near the Lowland urban centers where confinement feeding is becoming more common. The trend to more dairy stock and the attractiveness of fodders as a cash crop suggests that a development focus on milk production may also prove useful in coming to grips with the problem of overstocking the range with less beneficial cattle types.

Meat Production: Efforts to increase beef production (and consumption) in the past have been met with frustration. This is due in part to the fact that cattle are not held by the Basotho solely for economic gain. On the other hand, the Basotho do recognize the economic value of cattle as "beef" since significant numbers (10-15,000 head) are sold annually to meat packers in the Republic. It is important to note, however, that there is little evidence to suggest that significant numbers of cattle are sold within Lesotho itself, either to small butcheries or between Basotho themselves (Wacher, 1978). Although at one time the British were successful in establishing a modest domestic market for beef, essentially no such market exists at the present time.

It has been advanced that one of the principal reasons for not eating more beef is the almost complete absence of cold storage

(Grover, 1971). This is supported to some extent by the observation that more cattle are slaughtered during the winter motnhs when storage of fresh meat is not as much of a problem (Guma, 1977). However, a careful empirical study of demand and supply response is clearly warranted before definitive development strategies which focus on beef are implemented. Such studies have been underway for several years at Khomokhoana (Schleicher, 1978), and appear to be an integral part of the final planning phase of the Maseru abattoir project (Stobie, 1978).

Wool and Mohair: The natural environment of Lesotho is conducive to the production of very fine long staple wool and mohair. Merino sheep and angora goats were introduced nearly 100 years ago, and by 1910 export trade in wool and mohair was a well developed, thriving industry (Uys, 1971). From the outset, however, the wool and mohair industry was plagued by the 'boom and bust' cycles of international marketing. Unlike their South African counterparts, the Basotho were not accustomed to storing the raw product in years of abnormally low prices and consequently the exporter, not the producer, benefited most during the years that the industry was ir its zenith.

The decline of the mohair industry, in particular, is perhaps one of Lesotho's saddest experiences in the commercial sphere. In 1929, Basotho Long Blue mohair (BFM), the highest 3 or 4 classes, accounted for 50 percent of the nation's clip and was recognized throughout the world for its outstanding quality. Since 1950 there has been a sharp decline in quality: the percentage of BFM grade mohair in the national clip dropped to 22 in 1959, 10 in 1965, 7 in 1969, and slightly above 3 percent in 1976. This continuous reduction in quality, coupled with a very low yield per animal, has meant that Lesotho has not been able to take advantage of a vastly improved international market since the 1950's.

Uys (1971) suggests in a well documented analysis of Lesotho's mohair industry that the income of goat owners could be significantly increased (perhaps double or triple present levels) with a few relatively straightforward changes in husbandry practices. For example, although the majority of the clip is still of potentially high grade its quality is substantially reduced primarily due to craal stain and the presence of seeds and wool. Another complicating factor is that many sheep and goats are either shorn too often or at the wrong time of the year. Accordingly, even simple adjustments in husbandry practices like the cleaning of kraals to avoid stain could account for as much as 40 percent of the national clip being classed in the top four grades where the prices are two to three times higher than the lowest grades. The low yield of wool and mohair per animal will probably be very difficult to improve in the absence of improved nutrition and care. Hence, it appears that programs designed to educate sheep and goat herdsmen in appropriate management practices could yield significant benefits in the short term. Import controls, culling and upgrading of flocks, and controlled grazing are longer term propositions.

Poultry: Considerable improvements have been made in the poultry industry since independence. Flocks have been upgraded with commerical-type breeds for egg production and a broiler industry is becoming established to compete with the import of fresh meat from the Republic. The majority of flocks remain small and widely held, and this probably explains a large part of the new industry's success. Commerical duck production has received little attention in Lesotho thus far, but in conjunction with fish culture the potential of raising ducks on a commercial scale is being examined (Pruginin, n.d.). The supply of fresh duck in Southern Africa is very limited, thus the entire region is a potential market for excess production in Lesotho. In the short term, however, attention should be given to cost-effectiveness and scale of development for poultry enterprises (including all fowl), especially in light of the requirements for imported resources and the spatial considerations of infrastructure development.

Fish Production: Because of its particular natural resource endowment, fish culture in Lesotho has a high potential for commercial development. Recent studies of the resource requirements conducive to the development of a commercial carp fishery suggest that the country has the potential to become self-sufficient and even export substantial quantities of high protein fish and fish products (Le Blanc, 1975, and SWECO, 1977). The income earning potential from one hectare of land devoted to carp production exceeds that of any known alternative use in agriculture. However, a careful economic analysis of demand and supply relations has not yet been conducted and critical questions with respect to the support infrastructure necessary for commercial ponds to be successfully managed by Basotho remain unanswered. Evidence suggests that village ponds (i.e., water enpoundments constructed by the people themselves) are not as economically viable, by comparison, to the larger operations (2 hectares or more) which are currently managed by the fisheries section of the Ministry of Agriculture. Again the absence of an effective extension program aimed at improved management and infrastructure services (e.g., transportation to market, technical assistance, etc.) appears to be the major bottleneck to improved fish production and marketing.

The recreation potential of Lesotho's natural wild trout fishery, comprising some 5,000 miles of high altitude freestone rivers, streams and tributaries, is another form of fisheries development that could be of considerable importance in the longer term. Attempts to raise cold water species commercially have not been successful due primarily to higher water temperatures and an excessive silt load of runoff waters during the summer months.

A few Brown and Rainbow trout were introduced at Mokhotlong during the 1930's and 40's; within a few years their offspring were thriving in nearly every tributary of the Senqu River System. A recent stream survey has revealed, however, significantly reduced trout populations in the lower reaches of most rivers (MOA, 1973a). As the decline is attributed to the silting-up of spawning beds (rather than over-fishing), any serious attempt to promote recreational angling on a large scale

will apparently necessitate an effective, comprehensive range management program. The current South African record, a 14-pound Brown trout, was caught with a No. 10 Wickham's Fancy (dry fly) in 1974 on a reach of the Tsoelike River just below Sehlabathebe National Park.

Draft Power: Regardless of the importance of improved farm machinery and transport vehicles to Lesotho in the past decade or more, the simple fact that the vast majority of farming operations still rely on animal power has clearly been neglected in development efforts (see Chapter VI). Although the major area-based schemes and larger projects have recognized the importance of improving animal traction and tillage methods in conjunction with the introduction of mechanization, very little actual work was (or is now) devoted to this end. The potential benefits of simple improvements in such things as pulling yokes, work rations and animal implements apparently far exceed the costs of effecting such innovations in farming methods (Kline, et al, 1970 and Guma, 1977).

In other parts of the world horses are sometimes preferred to oxen for draft power and precision work (e.g., cultivating) under conditions similar to those found in Lesotho. Yet, horses are rarely (if ever) used in Lesotho for such purposes. In addition to the possibilities of modifying the present structure of animal power (e.g., substituting horses for oxen), consideration should also be given to the complementary uses of animals and machines.

Swine Production: Pigs were first introduced to Lesotho by the Boers (Dutch immigrant farmers) during the Great Trek of the mid-1840's (Germond, 1967). Today thirty percent of all rural household keep at least one pig, but the commercial development of swine husbandry among the Basotho has been very limited (Thornton and Leckie, 1945 and MOA, 1973b). Improved husbandry practices, including the introduction of better quality brood stock, where appropriate, would be a useful first step of a general swine production extension program in rural Lesotho.

Government Policy and Programs

Considerable efforts have been made since Independence to enhance livestock production and to improve marketing opportunities for the sale and consumption of livestock products. In most cases it is too early to assess the consequences of such efforts. None-the-less it is useful to trace the development of government policy toward the livestock subsector in order to fully appreciate the nature of present programs and the basis of current policy priorities.

Background to Present Policy

In a recent conference for the donors of development aid and assistance to Lesotho, the Government characterized the present state of the livestock subsector in the following terms: "...evidence...suggests that livestock suffers from the effects of poor herd management, an overgrazed and over-stocked range, inadequate disease control, and poor

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feeding methods. There is also the constraint that traditional herdsmen tend to regard livestock more as a reserve asset or property of pride than as a commercial commodity" (CPDO, 1977). Further, the Government identified bottlenecks in marketing, the limited availability of production credit, poor roads and limited access to major portions of the country, and limited farmer training and extension services as contributing factors to the present situation. Similar assessments are found in the planning documents of the old Department of Agriculture as early as 1936 and in the reports of several special commissions that visited Basutoland prior to Independence (Morse, 1969). What has changed over the years, however, are the policy prescriptions brought to bear and the means of implementation.

Early colonial policy was strongly focused on maintenance of a livestock products export sector. The rapidly developing commercial economy of the union provided the necessary infrastructure to facilitate this; secondary industries were not required in Lesotho, and consequently the few colonial officers in residence concentrated their efforts on improving raw materials products (primarily wool and mohair). From 1910 to 1936 the entire agricultural development effort in Basutoland was the responsibility of one individual.

The forties and fifties were dominated by major soil conservation efforts, and subsequently the policy focus shifted from animal improvement to range management and land use. This required a more concerted effort on part of the colonial authorities to work cooperatively with the Basotho in district and local administrative units. The 10-year development plan commencing in 1950 was oriented to infrastructure needs emphasizing the formation of grazing associations, credit societies, marketing cooperatives and the establishment of an extension service for farmer training, information dissemination and demonstration of improved production methods. In the latter part of the 1950's, when it became evident that Basutoland would not be absorbed by the Republic, greater emphasis was given to education and training of counterpart staff.

The 1960's before Independence was a period of rapid change in development policy. The orientation toward livestock product exports had gradually given way over the years to an emerging emphasis on food grains production. Ambitious area-based demonstration projects were initiated largely at the expense of earlier progress made in animal breeding, nutrition and deferred grazing programs (Wallman, 1967). "Africanization" of the civil service, while it recognized and acted upon the need to involve the many talented Basotho who heretofore played a limited role in decision-making, created a discontinuity in policy formulation.

The balance in emphasis on livestock and crop production which had been worked out over some 30 years gave way to the new concern for mechanizing crop production in the Lowlands. Subsequently, many of the well-established livestock programs of the colonial era (for example, livestock associations, credit societies, district shows and exhibitions which encouraged communication and exchange of ideas on husbandry practices, marketing opportunities, etc.) lost support and in some cases

were discontinued. The principal thrust of post-independence policy has been 'to start anew' and, consequently, many of the earlier approaches and programs have and are becoming rediscovered.

The First and Second Five-Year Plans

The first development plan for the newly independent Kingdom was largely concerned with improving the level of productivity of the livestock subsector in general. Numerous, small-scale programs were implemented focusing on 1) general breed improvement, 2) disease control, 3) improved feeding practices, 4) range management (including the control of grazing members in selected areas of the country), and 5) general infrastructure development emphasizing farmer training and marketing opportunities. By way of contrast the second five-year development plan, although quite similar in many respects to the first one, appears to place greater emphasis in specific areas of improvement within the livestock subsector.

The second plan has a large infrastructure component, namely market development and structural improvements such as roads and buildings. The allocation of funds during the plan period also suggests a policy emphasis on specific subsectors which apparently have more immediate (short term) growth potentials (e.g., milk production, commercial fisheries, and poultry products). Second five-year plan funding allocations are summarized in Table VII-8. Since the initiation of the plan, however, a number of changes have occurred, and these are discussed under the specific projects which form the basis of the current livestock development program.

Table VII-8. Second Five-Year Plan Funding Allocations for the Livestock Subsector

Project or Area	Form of Assistance		
	Capital	Technical	Total
	--------Rand in 1000's-----		
Thaba-Tseka (RDP)	4,631	1,201	5,832
Livestock Marketing	3,180	682	3,862
Dairy Herd and Plant	831	90	921
Tsokholo Fisheries	665	114	779
Technical Assistance	-	752	752
General Fisheries Development	270	158	428
Animal Health	98	277	375
National Pig Herd	222	101	323
Basotho Pony Development	228	60	288
Livestock Improvement Centers	258	-	258
Trout Development	197	53	250
Egg and Poultry Production	122	8	130
Range Management	66	56	122
Wool and Mohair Production	110	-	110
Breed Improvement	40	-	40
Totals	10,918	3,552	14,470

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Development Projects

Expenditures originally envisaged for the second plan have been augmented in the past year by an additional R5.6 million. At present some R20.1 million is commited through 1980; R17.8 million in structural investments and R2.3 million in technical (nonstructural) support. The principal projects and stages of implementation are reviewed below.

Thaba-Tseka Mountain Development Project: Funded by Canada (R5.6 million), this project is the first area-based effort specifically addressed to the livestock subsector. The project is designed to develop an integrated model of rural development which can be applied to other mountain regions of the country. The project area covers 46,500 hectares. A modern township at Thaba-Tseka is under construction to serve as a major commercial and administrative center for the central mountain region.

Since 1975 the project has made progress in each of its major program areas: Agriculture, Engineering and Roads Development. Promotion of improved cultural methods, extension programs and tractor and machinery hire facilities are under way, and sources of credit for farm equipment and livestock supplies are being extended to local farmers. Rangeland improvement has begun with promotion of rotational grazing practices, resting, reseeding and fertilization trials. A program for the purchase and movement of cattle to the Lowlands for finishing before sale has been attempted but with little success thus far. While methods and techniques to improve Range Management have been partly successful, comprehensive efforts to improve village and cattle post rangeland have not been initiated pending the implementation of national legislation to control animal numbers and pasture rotation.

Range Management: In addition to the Thaba-Tseka project, other schemes directed at range improvement and improved grazing management are the Mphaki and Sehlabathebe Range Management Projects. Both are new and therefore little can be said about probable impacts except that the promotion of proper range management practices is becoming a prominent policy objective within the Ministry of Agriculture. Assistance to broaden the scope of existing services is currently being sought, particularly in the areas of field staff and operating budget.

Animal Health and Nutrition: Assisted by the British Government (R1.7 million), several district veterinary centers are under construction. A major sheep scab eradication effort was mounted during the fall of 1976 in response to new outbreaks in several areas. While preliminary assessments indicate that excellent results have been achieved, continuing problems have occurred since the end of the dipping campaign. Another intensive campaign was initiated in 1977 and will carry through 1978 to bring this disease finally under control. Considerable progress was made in the repair of sheep dipping tanks throughout the country. Experience has shown, however, that a lack of readily available water at the dip tanks was a constraint in carrying out dipping of large numbers of sheep and goats. Construction of mini dip

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tanks has begun at border entry points to provide facilities for dipping of imported and exported animals.

Various types of intensive feeding experiments have been underway as a component of the major area-based projects. The purpose of these experiments is to test the efficacy of confinement feeding on different scales and under different methods. Further investigations are necessary before decisions can be made regarding the type and scale of feedlot operations most appropriate for Lesotho. A revolving fund for the purchase of breeding stock and anthelminties has been established within the Livestock Division, the purpose being to make available improved breeding stock and needed veterinary supplies to farmers through the livestock improvement centers. It is now proposed to extend the scope of the existing revolving fund by providing additional capital to be used for other necessary inputs of transport, storage and equipment.

Wool and Mohair Production: Implementation of a British funded project to establish a District Bulking Store and to improve existing woolsheds is underway. An additional seven district bulking stores and five wool sheds are being considered by the Government as recommended by the Farah Mission. With funds from the South African Wool Board, wool-production training activities are proceeding at Quthing and Mokhotlong. Pre-implementation planning is proceeding satisfactorily on the Mohair Industry Promotion Project, also assisted by South Africa.

National Dairy Program: As a result of the Emergency Program for the crops subsector, implementation of the Canadian funded (R3 million) Dairy Herd and Plant Project has been temporarily postponed. This project, however, remains a high priority in the livestock sector as the dairy development program remains an integral part of the economic justification of the Phuthiatsana Irrigation Project.

National Pig Breeding Herd: This project, funded by Britian (R34 million), is due to be implemented during 1978. The purpose of the project is to provide sound breeding stock for pig farmers who will be encouraged to supply the abattoir being built near Maseru.

Maseru Abattoir: A soft loan from the Danish Government (R3.7 million) has been secured for a large slaughter plant (abattoir) in Maseru. Designs are being finalized, including a proposal for incorporating a new, economical animal by-product processing system. By-products will be used as a high protein animal feed supplement. It is estimated that the abattoir will be operational in early 1980. The abattoir is expected to increase livestock earnings from secondary processing as well as providing a more flexible pricing policy to livestock owners. The abattoir is expected to play an important role in stimulating ongoing livestock improvement programs. In order to ensure a reliable flow of animals from the rural areas, a nation-wide procurement system is also being developed.

Egg and Poultry Production: Egg production continues to expand with the assistance received from UNICEF (R4 million). A major new

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project for the poultry industry is in preparation to provide additional income opportunities for some 500 egg producers, 244 broiler growers and 32 specialist rearers. By the end of the 5-year plan period every major town in Lesotho will have an 'egg circle' or marketing outlet.

Fisheries Development: An initial scheme comprising 40 hectares of an eventual 350 hectare operation has been prepared for funding within the next three years. It is proposed that the initial scheme will be supplied with water pumped from the existing Tsakholo dam; the 310 hectare scheme envisages the construction of a new dam and canal system to supply sufficient water. A new four hectare fish pond scheme was completed at Ramapepe, as well as extensions to existing village schemes in the Khomokhoana project area and at the Rakolo. A total of 24 hectares of fish ponds are currently in use in Lesotho. The brood hatchery in Maseru became fully operational in 1977. Further funding for rural fish development is requested by the Government as there is apparently a large demand for fresh fish by the rural population. Investigations of the potential of trout fishing as a tourist attraction is continuing. Restocking of rivers has been discontinued due to the low carryover as a result of silting.

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CHAPTER VIII

CONSERVATION

Topsoil and water are two of Lesotho's most valuable resources. Both are being wasted in a spectacular process of erosion. This erosion has been going on for more than a generation despite the installation of a basic protection system of contour banks on virtaully all arable land. The surge of water down inadequately vegetated slopes is obviously destroying topsoil by gully formation, particularly in the lowlands. But the widespread sheet erosion which accompanies such surge, although much less visible, is far more deleterious because it results in general reduction of fertility on both range land and cultivated land. The conservation of soil and water is particularly difficult in Lesotho because of physical factors which cannot be changed: rugged topography, intense summer rain storms, cold winters, and, in the lowland, highly dispersible soils. However, the natural potential for erosion is aggravated by forms of poor land use which can be changed, especially overgrazing, poor cropping, and cultivating of unsuitably steep land or of land without adequate protection.

The underlying concept of the land tenure system is that land is a national and social asset to be utilized for the benefit of the people. The King holds the land in trust for the nation.

Kingdom of Lesotho
Second Five Year Development Plan
1975/76-1979/80, Vol. 1, pp. 3; 111-112

Introduction

The two quotations from Lesotho's Second Five Year Development Plan that open this chapter succinctly outline some of the major problems facing analysts and planners when they confront the issue of conservation. The topic is complex, delving into some of the most technical aspects of environmental management but also into the basic social values and processes of society. Thus, the longer quote above mentions particular types of erosion and general physical conditions in Lesotho that exacerbate the problem. But behind the shorter statement on land tenure lies the whole value system of the Basotho regarding rights to land and land use, and thus of responsibility for its proper administration.

Forms of data are equally diverse. On the one hand erosion, water losses, and conservation measures are physical processes amenable to measurement and analysis by a variety of methods. On the other hand,

the relationship of destructive processes and preventative measures to economic and social systems can evoke some of the most fundamental feelings that exist in agrarian societies. In few other fields are such combinations of technical information and social and political sensitivity required of planners.

Furthermore, the concepts of erosion and conservation present some unique obstacles to objective analysis and rational planning. The term "erosion" has such negative connotations and "conservation" such positive ones that seldom are they subjected to the levels of critical evaluation common to other development topics. In most countries it is a postulate, a self-evident truth, that erosion should be stopped. A new, raw gully or a wasted field is seen as proof enough, and often such positions are not supported by more accurate evidence. Physical balance sheets are seldom completed: actual losses of soil and potential or realized savings of soil are unknown even after years of conservation experience. In even fewer cases are the costs of conservation weighed against potential gains in productivity.

Although the problems are many, it is possible to formulate realistic goals and objectives for a conservation program. Physical circumstances cannot be ignored: various combinations of climate, soil, topography, and hydrology set limits to what is possible and must be considered in any sound conservation policy. But equally important, goals and objectives must honestly reflect the political, social, and economic will of authorities and populace alike to support conservation measures. Data needs suggest themselves: sufficient information on climate, especially precipitation which supplies the driving force behind most erosion, sensitivity of soil to erosion, and hydrological characteristics so that the dynamics of the destructive processes can be analyzed. Soil and erosion surveys will indicate the extent of the problem.

Establishing social and economic parameters is more difficult and less precise. Once past truisms (e.g., erosion is bad and must be stopped) hard questions arise as to how much can be spent, how much is to be gained, and how much are national values affected. In Lesotho, for example, productivity of agricultural lands under present conditions is so low that it is doubtful whether net returns are sufficient to pay even maintenance costs of conservation works, much less toal costs. (Seckler and Nobe 1978, p. I-4). Thus benefit:cost analyses would likely be negative. But does that mean conservation is not of first priority? Social values and political realities argue against the purely economic analysis. Without firm economic support, planners must depend upon policy-makers to set forth realistic national policies with respect to erosion and conservation. Other forms of analysis, such as cost-effectiveness, are useful in providing needed bases for sound planning decisions.

In summary, the subjects of erosion and conservation are perhaps more complicated than most by interelationships between physical and socio-cultural considerations, and by a mystique of significance that

is now international in scope. Planners must cut through these obstacles, seek out the best technical data available, and supply policymakers with the most objective bases possible for sound decision making. Not only the national treasury but also the national resource base has much to gain from objective analysis and rational planning.

Fortunately, the subject of conservation has a long history in Lesotho. A great quantity of material is available and a high level of awareness can be found among public officials and farmers alike. Thus, unlike other african nations at similar stages of development, the population and administration of Lesotho already are sensitive to erosion problems and receptive to proposals for conservation programs. The most recent contribution to the literature will be a comprehensive reconnaissance of soil conservation methods and programs (Seckler and Nobe 1978). Since review of technical aspects and analytical methods will be presented in some detail in this forthcoming document, it will suffice here to briefly review past and present conservation efforts, and to suggest some policy directions based upon past experience.

Early Conservation Programs

Except for the suggested time frame ("more than a generation") the quotation from the Second Five Year Development Plan (FYDP) that opens this chapter is a fair summary of present thinking on erosion and conservation in Lesotho. But visible, even "spectacular" erosion has been mentioned in reports leading back at least to the turn of the century. For Example, Stockley (1947, p. 92) reports an observation on the general condition of the landscape in 1908 that sounds amazingly contemporary:

> Recent and superficial deposits cover the low grounds and consist of stratified clay, sands, and gravels. . .* The rivers in the course of ages have cut their way through them, and as they are loose and easily removed, the amount swept away by every storm is considerable. . . The destruction of the wood and bush of the country, together with the increase of cattle that eat off the grass, has powerfully assisted the formation of dongas. They not only reduce the area of arable land, but also drain off the water and disfigure the country. If nothing is done to check their formation, they will render the water problem a very serious one at no distant future.

The FYDP and Dorman reports together contain many key assumptions about conservation in Lesotho:

a) topsoil and water are valuable resources.

b) erosion is spectacular, not only in form (especially gullies) but also in amounts.

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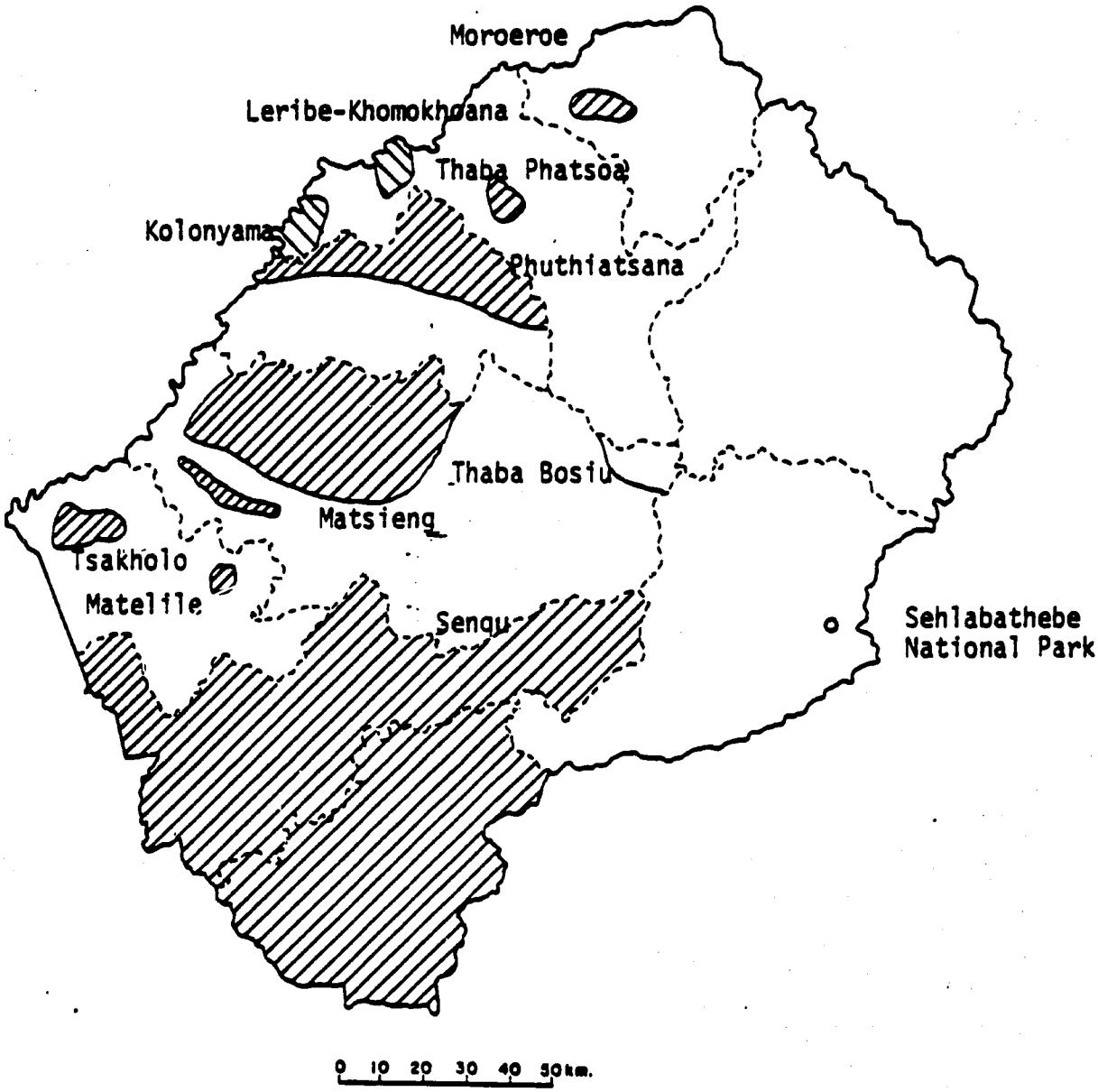
*Most gullying occurs in these "stratified" soils that are identified with the Sephula Group in the discussion of soils that appears in an earlier section of this Review.

Map

Relative Location of Project-Related Conservation Activities (not to scale)



Source: Conservation Division, MOA

c) physical factors such as intense summer rains are in part the cause of accelerated erosion.

d) cultural practices, such as overgrazing and poor cultivation systems aggravate the situation.

3) something must be done quickly or it will be too late.

Together, the assumptions can only suggest the need for a large-scale, project-organized approach to the erosion problem, an approach that has been followed fairly consistently since the mid-1930's when the British launched the first major erosion control and conservation program in Lesotho.

But consistency of approach, and similarity of descriptions of the erosion problem in documents almost three-quarters of a century apart in time raise nagging doubts with respect to assumptions and conclusions. If early documents seem surprisingly contemporary, is it because not only the problems of soil management but also the solutions have changed little in the intervening decades? This in turn suggests two possibilities: either conservation problems were correctly identified early on and little has been done to correct them, or else the situation in Lesotho originally was misinterpreted and these misinterpretations have not been corrected. Since as in most cases, the truth probably lies somewhere in between, a brief overview of soil conservation in Lesotho will serve the useful purpose of giving perspective.

Emphasis upon accelerated erosion, various physical and cultural causal factors, and a sense of impending edaphic doom can be traced back into the 19th century when warnings about overpopulation and too much plowing first appeared (Binnie & Partners 1972, Vol. 4, p. 408). However, it was not until the Pim Report (1935) that a nationwide survey of soil resources was conducted. Soils were treated descriptively (e.g., with terms such as "dark brown or red soils", "light sandy loams", "rich or fertile soils"). But perhaps most important, the widely read and influential Pim Report reiterated the already widely accepted opinion that erosion, especially gully (*donga*) erosion presented a clear and present danger: ("The whole fabric of the land is threatened by the erosion of *dongas*").

Based upon reconnaissance surveys, the Pim Report recommended specific conservation measures including contour banks, buffer strips, grassed meadows, dam building, and tree planting, plus small works for controlled irrigation from perennial streams.

These recommendations resulted in what was, and still is, the most extensive soil conservation effort ever launched in Lesotho, and one of the most notable in all of southern Africa (Fitzgerald-Lee, 1951). Over the next 20 years the concepts of contour banks and contour plowing were extended over thousands of hectares to the remotest parts of farmed regions. By 1952, the Basutoland Department of Agriculture could report that approximately two-thirds of the arable acreage in the Lowlands had

been protected by terraces and grass strips, about three-fourths of the Foothills had been protected with grass or buffer strips, and that the whole Mountain region should be completely protected by the next year (DOA, 1952). "The basic recommendations of the Pim Report . . . were substantially implemented by the mid-1950's" (Turner 1975, p. 17).*

Several other characteristics of the Pim Report merit attention:

a) the Report argued for changes in the land tenure system to give the farmers greater identification with the land and thus greater inducement to make long-term investments in erosion-control measures.

b) soil erosion in Lesotho was depicted at near-disaster levels, and arresting erosion was granted first priority without reference to other national needs.

c) strong emphasis was placed upon tree planting for erosion control.

d) provision for maintenance of conservation structures (e.g., terraces) is meagre or non-existent.

e) nowhere are claims of the seriousness of erosion, supported by quantative estimates of rates of erosion, nor are arguments for conservation programs supported by estimates of actual benefits to be gained.

It is of particular interest that although the new innovations were occasionally accepted by Basotho farmers and in a few cases where even voluntarily extended beyond project boundaries, for the most part they were greeted with apathy or even resentment (Binnie & Partners 1972, Vol. 4, p. 411; Turner 1975, p. 19). It now appears that Basotho farmers may have had a finer sense of economics than did the implementers of conservation efforts. For it is not at all obvious that high-cost conservation measures are justified by foreseeable benefits in Lesotho.

Soil conservation in the 1930's to 1950's mostly followed the guidelines set forth in the Pim Report.** Beginning in the 1950's greater emphasis was placed upon reclamation of heavily eroded areas and upon working with the so-called "progressive" farmers, or those who had been identified as receptive to modern management techniques.

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*The British conservation program of the 1930's-1950's is reviewed by Fitzgerald-Lee 1951; Seckler and Nobe 1978; and Turner 1975. For a general review of soil and water conservation programs see Chakela 1975.

**Or for that matter, to the present time. In many ways the conservation program outlined in the Lesotho's Second Five Year Plan (Vol. 2, pp 111-115) could easily be a response to the recommendations of the Pim Report. Emphasis is placed upon uncontrolled grazing, poor cropping practices, soil surveys, tree planting, and capital works. One new feature is the acknowledgement that conservation efforts are doomed unless

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Present Era

For convenience the present era can be identified with Independence (1966) and with the beginning of substantial donor-sponsored conservation projects and institution building. Carroll and Bascomb's milestone Notes on the Soils of Lesotho (1967) and Bawden and Carroll's The Land Resources of Lesotho (1968) provided a basis for systematic evaluation of soils.

Leribe/Khomokhoana Projects

The Leribe Project had extensive conservation objectives, including work plans, structures, conservation practices, surveys and research programs. The following Khomokhona Project included provisions for implementing the watershed plans developed in the Leribe Pilot Project and for improving and conserving soils through practices of conservation farming methods embracing both crops and livestock. By the end of the Leribe Project (April 1975) the following conservation work had been done both in the Pilot and the Khomokhoana Project areas:

- Reconstruction of the contour system on 2,000 ha.
- Construction of 25 fish ponds with a total surface of 2 ha.
- Construction of 8 small dams and repair of 9 old dams.
- Construction or repair of 30 km of roads and tracks.
- Establishment of a small nursery capable of producing 20,000 rooted cuttings per year.
- Construction of 35 groins and 2 silt traps.
- Installation of miscellaneous conservation works, including kikuyu plantings, gully treatments, and contour maintenance.
- Establishment of a meteorological station.

Evaluation of the Leraibe/Khomokhoana Projects focusses primarily on organizational/administrative factors. Technically the Projects were relatively well-designed, but lack of support and coordination has hampered effective implementation of conservation measures. In addition, prospects are poor for the continued operation of the integrated structural/practices conservation program after the Project ends (Seckler and Nobe 1978, p. V-142).

Senqu River Agricultural Extension Project

In the early 1970's the Government of Lesotho began to attack the particularly difficult agricultural problems of its two southern districts, Mohale's Hoek and Quthing. The Senqu River Agricultural Extension

Project, the first UNDP funded country program in Lesotho, included a total of 6,470 square kilometers, or about 20 percent of the entire country.

In addition to general improvement of agriculture in the area, the Senqu Project had specific objectives to "expand the application of sound crop production and conservation practices" (target: 800 ha.), and to "expand conservation works and practices in support of production and protection."

Achievement of conservation goals at Senqu suffered from lack of equipment, insufficient qualified Basotho personnel, and failure of interministerial coordination. In addition, great reliance was placed on equipment-produced conservation structures that are expensive to build, and which require maintenance beyond the physical and financial capacity of villagers.

Thaba Bosiu Rural Development Project

The Thaba Bosiu Rural Development Project had as a goal the improvement of livelihood of 17,500 farm families in a 120,000 hectare area comprising most of the Little Caledon River watershed and the Berea Plateau. The project area extends from a few miles east of Maseru to the watershed divide along the Maluti Range. Project objectives were ambitious, and included:

> ...the timely provision to about 12,000 peasant (sic) farmers of improved seed, fertilizer, and cultivation services; the credit to acquire them; technical agricultural guidance in their use; marketing for the resultant crop; road development; and soil conservation..." (IBRD-IDA, 1973).

The conservation component of this project was designed to treat no less than 40,000 acres comprising" . . . approximately 1690 km of diversion terraces; 600 drainage structures; repairs to, or reconstruction of 4,800 km of terraces; 400 km of 12-ft access roads, with associated protective fending, grass, and tree planting." (IBRD-IDA, 1973).

The ambitious conservation goals of the Thaba Bosiu Project now seem unrealistic. A serious lack of trained personnel and late delivery of conservation equipment, often of incorrect size, inhibited achievement of objectives, as did the sheer size of proposed works and absence of local leaders who could make decisions regarding proposed improvements (Seckler and Nobe 1978, p. V-62).

But perhaps the final evaluation should stress the continued reliance on expensive structural approaches to conservation. It has been estimated that equipment-created terraces, waterways, etc. ultimately cost about R360 (R1.00 = US$1.15) per protected hectare (Seckler and Nobe 1978, p. V-103). This is prohibitively high for soil protection anywhere and certainly beyond what Lesotho or donors could pay for any substantial area. But perhaps more important, such structures require

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maintenance, and maintenance costs on such expensive works probably exceed the revenue from much of Lesotho's farmland.

Land and Water Resource Development Project

The Land and Water Resource Development Project (LWRD) is an eight-year institutional and technical manpower development effort addressed primarily to Lesotho's soil erosion problem. It was initiated in April 1975 and is designed to be one of the major efforts in support of the agricultural self-sufficiency goal specified in the Second Five Year Development Plan. To accomplish its specific goal, "to increase agricultural production and rural income through improved utilization of land and water resources" the project is oriented to upgrading and expanding the capability of the Conservation Division of the Ministry of Agriculture (USAID 1974).

The two primary project purpses are to "promote incorporation of land and water use plans in all agricultural development projects and to assist Lesotho farmers to adopt proper land and management practices." (USAID 1974). LWRD Project goals and objectives together with indicators of achievement are summarized below: (Seckler and Nobe 1978, p. V-165-166).

Program or Sector Goal:	Objectively Verifiable Indicators
To increase agricultural production and rural income through improved systems of land and water resources utilization.	A net per-capita increase in agricultural productivity.
Purposes:	
1) Sound land use and management principles and practices are in corporated into the national agricultural development effort.	1-a Land use plans for all area-based and integrated conservation development projects.
	1-b Division is coordinating land use efforts of the Ministry with competent technical staff.
	1-c Land use management practices and conservation construction techniques in use are adapted to Lesotho conditions.
2) Proper land use and management practices are accepted and adopted by farmers and herdsmen within agricultural development project impact areas.	2-a Effective two-way communication linkages between GOL personnel and the farmer/herdsmen group.
	2-b Proper land use and management practices are adopted.
	2-c Net farm incomes are increased.

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Outputs

1) Appropriate land and water use management practices incorporated in GOL/MOA Integrated Area Devlopment projects (e.g., BASP).	1) Degree to which targets for preparation of land use plans, construction and management programs, as specified in the PROP, are achieved.
2) Adequate MOA capacity to design development projects which include appropriate conservation practices.	2) Degree to which staff positions in Conservation Division, Livestock Division and elsewhere in MOA are authorized and filled.
3) Adequate numbers of technically trained manpower for all levels of MOA administration and programs.	3) Degree to which manpower training targets specified in the PROP are met (and degree to which flexibility in training can be made to fill needs not originally anticipated, both in terms of numbers and kinds of discipline).
4) An expanded MOA capability to construct, repair and maintain conservation structures and to adequately maintain their equipment.	4) Increased output per unit of input as affected by use of mobile field service units, increased staff mobility, effective use of an adequate level of equipment and reduced down time.
5) Improved communication links between GOL personnel and rural farmers and herdsmen re: planning and implementation of agricultural development projects.	5) Degree to which development committees in all villages are participating in such efforts and the degree to which practices are continued after area-based project efforts have ended.
6) Incorporation of effective soil and conservation educational materials into Extension programs	6) Degree to which various materials, methods and programs are used <u>and</u> positively responded to in rural areas.
7) Relative cost analysis of alternative levels of labor utilization in conservation construction work is achieved and incorporated in MOA agricultural development policy.	7) Number of alternatives to be tested determined in first six months of project and study completed by 4/1/77--specifies viable policy recommendations.
(Note that no cost-effective analysis was specified for other program elements; nor was there a research component).	

The goals and objectives of LWRD are difficult to fault, as is the effective organization Conservation Division has developed in the last few years. The record of achievement supports confidence and suggest why the Division has been given wide responsibilities (e.g., management of Sehlabathebe National Park). Severe depletion of Basotho participation by training programs will gradually improve as students complete their programs and return to active posts. There is some evidence that the Division (and perhaps its Basotho trainees) focus too heavily upon capital-intensive, high cost structural approaches to conservation. This could be rectified by more in-country research and experimentation with alternative approaches.

Conclusions

Several points emerge from this brief review of past and present conservation efforts in Lesotho:

1) Conservation programs are heavily influenced by policies formulated in other subsectors and sectors. For example, the goal of self-sufficiency in food which has its origins outside the agricultural sector gives considerable direction to conservation efforts. It is not as apparent how the realities faced by Conservation Division are fed back into the decision- and policy-making processes.

2) The necessity for popular support for conservation projects and practices has been recognized for many years. Educational efforts, particularly in project areas, have been partially successful in creating an awareness of erosion hazards. However, the design of structures and practices that are within the labor and economic range of villages has not progressed as far.

3) Maintenance of conservation structures and continuation of conservation practices are as important as original installation. Appraisal of post-project maintenance and continuation potentials should be included in all evaluations of conservation proposals. As a corollary, it appears that more research on land treatments and management methods within the capabity of villages could prove fruitful.

4) Considerable progress has been made in surveying and analyzing the soils of Lesotho. However, the data base is far from complete. Soils, erosion, and hydrologic surveys are needed to identify the actual risk potential and thus the conservation needs of Lesotho. Area-based projects especially should pay more attention to environmental parameters than they have in the past to avoid setting unrealistic goals.

5) Although conservation is not necessarily amenable to strict benefit/cost analyses (see point 1), it still can be subjected to a variety of analytical processes (e.g., cost-effectiveness)

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to determine the most efficient method of achieving conservation objectives. (Seckler and Nobe 1978, Chapter IV).

For agricultural planners it is necessary to place conservation within the context of national goals and objectives. Alternative approaches merit consideration both from a cost-effectiveness point of view, and also as they might prove amenable to village identification, participation, and continuation.

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