STAFF PAPER

RURAL DEVELOPMENT IN BOTSWANA: A CASE STUDY

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NOVEMBER 1993
No. 94-4

Department of Agricultural Economics
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RURAL DEVELOPMENT IN BOTSWANA: A CASE STUDY[1]

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RURAL DEVELOPMENT IN BOTSWANA: A CASE STUDY

1 INTRODUCTION

The objective of this presentation is, using Botswana as an example, to address some of the issues and strategic questions that will be discussed in the working group sessions. Obviously, in one case study and a one hour presentation, it is not possible to address all the issues and questions, but we hope that we will present enough material to be both interesting and sufficient to stimulate discussion and thinking in both this and later sessions.

After providing a brief introductory profile on Botswana, we discuss the continuing commitment to rural development in the country. We provide a justification for this and outline the elements of a strategy for accomplishing this goal. This is followed by a description and evaluation of some of the initiatives being implemented for this purpose. Once again, it is not possible to provide a comprehensive treatment of these but hopefully there is sufficient information to stimulate discussion. The specific areas focused on are the macro/institutional framework, drought relief strategies, and initiatives to encourage production and sustainability. At the same time we hope this somewhat generalised discussion does not detract from our conviction that a multipronged strategy is required to achieve sustainable rural development as resources vary between and within regions and districts in the country.

2 A BOTSWANA PROFILE

2.1 Physical Characteristics

Botswana, which is about the size of France (582,000 sq kms), is landlocked and straddles the Tropic of Capricorn in the centre of the Southern African Plateau, at a mean altitude of 1000 metres above sea level. It is bordered by South Africa, Zimbabwe, Zambia, Angola and Namibia). Much of country is fairly flat with occasional rocky outcrops. The Okavango Swamps in the north contrast with the Kalahari Desert, which accounts for two-thirds of the area of Botswana and is located in the western part of the country. The eastern part of the country, where most of the people live, has a somewhat less harsh climate and more fertile soils than elsewhere.

In general, however, the physical environment is not favourable for growing crops, although extensive livestock farming systems are present. The country is largely arid or semi-arid, with mean annual rainfall varying from over 650 mm in the extreme northeast to less than 250 mm in the extreme southwest. Almost all the rainfall, which is highly variable in time and space, occurs in localised showers and thunderstorms during the summer months from October to April. Drought, often lasting several years (e.g., 1981-82 to 1986-87), is a recurring hazard.

Along with climate, soils also represent a major constraint in Botswana. The predominant soil structure is sandy. In general, the soils are geologically old, highly leached, poorly structured, and usually infertile. Soil fertility is decreasing from overuse, soil erosion, and the lack of fertilisation. Nevertheless, the most important natural resource in Botswana is water. Access to water is a critically important determinant of all aspects of rural development, including arable and livestock production,

rangelands, wildlife and forests. Given the limited availability of water in the country, the Government of Botswana (GOB) has to make difficult decisions regarding water allocation among competing interests such as mining, agriculture (arable crops), livestock, and domestic use. Most of Botswana's water supply is from underground aquifers which naturally pose serious developmental challenges in such a drought prone country.

Given the above physical conditions, much of the country supports scrub and tree savanna with lower scrub savanna in the drier areas. This provides rich wildlife habitats with large animal populations and large areas of rangeland supporting domestic livestock -- particularly extensive beef production systems. Arable land constitutes less than 5% of the country's land area. However the country is rich in minerals, particularly diamonds (i.e., both industrial and gem).

Table 1: Vital Statistics on the Population

Characteristic	1981	1991
Total population (million)	0.941	1.334
Age distribution (percent):		
0- 4	19.7	18.6
5-14	27.3	29.5
15-64	48.4	48.8
64 +	4.6	3.1
Sex ratio (males/100 females)	89.0	92.3
Population growth rate	3.4	3.1
Births per woman	7.1	6.0
Crude (/1000):		
Birth rate	47.2	40.4
Death rate	13.0	9.7
Life expectancy (years):		
Male	52.3	57.0
Female	59.7	63.1
Percent urban	17.1	33.1
Population density (/sq. km.)	1.6	2.3

Source: MFDP, 1991: p. 11

2.2 The People

Most of Botswana's citizens (i.e., Botswana) are members of Setswana-speaking tribes and clans. Figures summarising some of the major features relating to the population of Botswana are given in Table 1. The population growth rate is about 3.4% per year (i.e., sufficiently high that the population will double within the next 25 years), and although the average population density is one of the lowest in the world, it is still high compared with the fragile natural resource base. Other significant features of the population are that the age structure is skewed towards the young, infant mortality is declining, life expectancy is increasing, and an increasing proportion of the population is living in the urban areas although most still live in the rural areas. In fact , even by the year 2011, it is expected that 66% of the population will still live in the rural areas.

2.3 Governance

Botswana is a multi-party democracy having been independent since 1966. The Constitution provides

for a non-racial democracy; freedom of speech; press and association; equal rights for all citizens; and a unicameral legislature, the National Assembly. In addition, there is a House of Chiefs that advises on matters relating to custom and tradition.

There are no human rights problems, and there is an independent judiciary with a High Court presided over by the Chief Justice. Administratively, Botswana is divided into nine District Councils, four Town Councils, and one City Council (i.e., the capital, Gaborone).[2]

The guiding principles of Botswana, which are derived from traditional culture, are democracy, development, self-reliance, and unity [MFDP, 1991: p.82]. An important traditional forum for expressing views and making decisions on community matters and initiatives are participatory village-wide meetings of all inhabitants known as the **kgotla**.

Development plans have guided the progress of Botswana since independence. The GOB has always embraced the principles of a free market economy and, in the current development plan (i.e., Number 7 which covers the period 1991-97), has the specific stated task of achieving a better balance among its basic planning objectives, namely, rapid economic growth, social justice, economic independence, and sustained development [MFDP, 1991: p. 82]. Accordingly, the current development plan is giving greater weight to [MFDP, 1991: p. 82]:

- "Improving the pattern of development through greater diversification of production and markets and the identification of new sources of growth."
- "Promoting social justice by enabling Batswana to participate more fully and effectively in the development of the nation and, hence, to share more widely in the benefits of that development."

Table 2 gives a breakdown of the actual expenditures for development and recurrent purposes during two recent years. These figures give some idea of the priorities GOB attaches to the development of the different sectors of the economy. However, these are modified to some extent by the absorptive capacities of the different sectors. Obviously, major concern exists for the direct welfare of the people (i.e., education and health); for the provision of infrastructure; and for rural development (i.e., agriculture and local government and lands). However, the large increase in the proportion of the developmental budget spent on agriculture is misleading because of the increase in funds spent on drought relief during the period -- which were not truly developmental in nature. "Without drought relief, the allocations of development expenditure are not substantially higher than the contribution of the agricultural sector to gross domestic product (GDP), which was about 3.5% in 1987-88, but it falls far short of the proportion of the population that depends on agriculture as one of their sources of income." [Edwards et al., 1989: p. 39].

In the international arena, Botswana in recent years has been one of the major recipients of donor funds when expressed in per capita terms. One of the major reasons has been because it was considered as one of the frontline states vis-a-vis South Africa, but no doubt a contributing factor has been its progressive government and lack of problems associated with many other countries relating to human rights, lack of a democratically elected government, and absence of a market economy.

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[2]. Administratively, agriculture is organised somewhat differently with six Regions and 25 Districts, which are delineated according to agro-ecological conditions. Each District is divided into Extension Areas, each one staffed by an extension agent.

With reference to international relationships and agreements, three that are particularly important to Botswana politically and/or economically are:

- Being a member of the Southern African Coordinating Council (SADC) [Sigwele, 1991], originally set up as a coalition of countries opposed to the repression in South Africa.
- Being associated with the Southern African Customs Union Agreement (SACUA) with South Africa, Swaziland, and Lesotho.
- Having preferential access to the European Economic Community (EEC) particularly with respect to beef exports.

Table 2: Actual Recurrent and Developmental Expenditures, 1983-84 and 1987-88

Category	Developmental		Recurrent	
	1983/4	1987/8	1983/4	1987/8
Total pula[1] (millions)	140.7	558.1	259.6	622.7
By area (percent):				
Education	9.1	10.6	21.1	21.8
Health	3.8	8.0	7.0	6.8
Work, transport and communications	27.0	13.0	15.1	16.9
Local government and lands	23.0	14.9	14.3	15.7
Mineral resources and water affairs	14.6	13.8	4.3	2.7
Commerce and industry	2.2	0.7	1.8	1.2
Agriculture	7.7	13.9	9.1	8.1
Other	12.6	25.1	27.3	26.8

Source: Edwards et al., 1989: p. 36-38.

1. The current exchange rate is about P2.00 to $US1.00.

2.4 The General Economy

When it became independent, Botswana was one of the poorest countries in Africa, with most of the population dependent on agriculture for their livelihood. Beef production was extremely important in terms of both output and export earnings. Since 1966, however, a remarkable economic transformation has occurred (Table 3) with an average increase in real annual GDP of 13% during the entire post-independence period. The current GDP per capita is about $US2,500. This transformation, fuelled to a large extent by mineral exploitation, especially diamonds, has greatly increased accessibility to water, roads, health, and education. For example, in 1989, 90% of the children of primary school age were enrolled in primary school, and 30% of the children of secondary school age were enrolled in secondary schools. In 1990, 80% of rural villages had access to potable water and 85% of the population was within 15 km of a health facility with the ratio of nurses to population being about 1:550 in 1989 [MFDP, 1991: pp. 11-12]. Accessibility to rural areas has increased dramatically with an aggressive road

construction programme.

Consequently, compared with most other African countries, Botswana appears to have been very successful as far as economic development is concerned. Foreign exchange reserves remain very healthy (e.g., at the end of 1988, 28 months of imports [Edwards et al., 1989: p. 14]) and terms of trade have been increasing, while the open nature of the economy is demonstrated through imports and exports each exceeding 50% of GDP [MFDP, 1991: p. 39]. Given this situation, pressures naturally exist for [Edwards et al., 1989: p. 14]:

- GOB to reduce taxes and service charges and to spend more on current services and quickly implementable projects, which are usually large scale.
- GOB and the mining industry to allow real wages to outstrip increases in productivity.
- The banking industry to maintain an overvalued exchange rate to keep the prices (i.e., in pula) of imported goods low and, in effect, increase real wages.

Table 3: Gross Domestic Product, 1966 to 1988-89

Category	1966	1977/8	1988/9
By area (percent):			
Agriculture	39.6	19.9	3.0
Mining	0.0	15.5	51.0
Manufacturing	7.9	6.8	4.2
Water and electricity	0.8	2.8	1.9
Construction	5.7	4.7	3.3
Trade, hotels	18.6	20.0	16.4
Transport	4.1	4.2	1.6
Other	23.3	26.1	13.4
GDP:			
Total (million pula)	313	1,554	4,988
Per capita (pula)	578	1,982	4,115

Source: MFDP, 1991: p. 13.

None of these actions would provide a firm foundation for the development of a sound economy in the future, although they would result in temporary benefits in terms of current consumption. The GOB is aware of this and has taken some initiatives to try and ensure that mineral revenues are allocated for future development and not frittered away in current consumption. The principal constraint to the more rapid use of such developmental funds is the lack of absorptive capacity because of the poor natural resource base outside of the mineral sector, the shortage of a skilled labour force, and the weak competitive position of most of the non-mineral private sector compared with external producers of Botswana's imports and exports [Edwards et al., 1989: p. 15, 18].

A major concern for GOB is the distribution of wealth in the economy. For example, in 1985-86 50% of the households in Botswana controlled only about 14% in the total disposable income of the country [MFDP, 1991: p. 34]. Although, because of measurement problems, accessibility to social services, etc., such a figure must be viewed with some caution, considerable concern is justified. Two factors that

undoubtedly contribute to this unfavourable situation are:

- The lack of success of the non-agricultural sector in creating jobs, particularly of an unskilled nature. The estimated overall unemployment rate approaches 25%, although this disguises the general need for skilled labour and the specific need for unskilled labour in certain parts of the country and at seasonal labour peaks.

- The lack of success in developing the agricultural sector, which still provides the main means of livelihood for more than 60% of the population. Although open unemployment is rare in rural areas, a high degree of under-employment exists which is heavily influenced by the variation of rainfall both between and within years.

2.5 The Agricultural Economy

Since independence, the agricultural sector has become much less significant in terms of its contribution to the GDP (Table 3). However, because of its significance as the residual employer of the labour force and the fact that it still employs most of the people in the country, the GOB continues to spend substantial resources in efforts to develop the sector.

In general, performance in the agricultural sector has not lived up to expectations, certainly in terms of

Table 4: Self-Reliancy of the Agricultural Sector

Percentage	1982	1983	1984	1985
Agricultural imports financed by agricultural exports	88.4	59.7	45.3	62.7
Essential food imports[1] financed by agricultural exports	275.3	143.5	137.6	191.9
Essential food imports[1] financed by net livestock exports	193.1	105.5	83.4	122.8

Source: Edwards et al., 1989: p. 25.

[1]. These consist of cereals and milled products.

providing a satisfactory level of living for Batswana. However, given the poor natural resource base on which it operates, it has done surprisingly well in some respects. For example, the figures in Table 4 indicate that the agricultural sector is internally self-reliant in the sense that it earns enough to finance the importation of basic foods demanded by the nation [Edwards et al., 1989: p. 26]. However, as we will demonstrate, this self reliance has some fragile elements. What has been recognized in the current development plan is that the national goal of food self-sufficiency (i.e., domestically producing all the necessary basic foods) irrespective of the economic and environmental costs, given the production realities existing in Botswana, was not realistic. Consequently, this has now been replaced by a goal of food security both at the national and household level, in order that all citizens can provide enough food for

their basic needs either through producing it directly or buying it from the incomes they earn [MFDP, 1991: p. 259]. As will be seen later, this improves the potential for fulfilling other agricultural sector objectives such as diversification, conserving natural resources, and creating rural employment opportunities [Sigwele, 1993B].

Table 5: Freehold and Communal Area Farms Compared, 1988

Characteristic	Communal Farms	Freehold Farms
Number of farms	85,900	540
Degree of:		
Commercialisation	Little	Much
Reliance on external inputs	Little	Much
Selling production	Little	Much
Major type of labour	Family	Hired
Type of farm	Most mixed	Only 31% grew crops 90% keep cattle
Percent of total:		
Cattle	82	18
Goats	97	3
Sheep	85	15
Output grain and pulses	73	27
Cattle (percent):		
Annual calving rate	50	70
Annual off-take rate	8	17
Annual mortality	11	5
Average yield grain (kg/ha)	241	748

Source: MFDP, 1991: p. 240.

The agricultural sector can be divided into two groups, those in freehold areas and those in communal areas (Table 5). Five percent of the land is held under freehold arrangements, 70% as tribal/communal land tenure arrangements, with the rest being state and park land. It is those farmers in the communal areas that are considered in this presentation, since they constitute the majority of the population of rural areas. Because of the problems of including estimates of home-consumed production, it is difficult to get estimates of the levels of income of farming households in the communal areas. However, unquestionably, the bulk of the poorest households in Botswana is in this sector. Also, the 35% of the households that are headed by women tend to be concentrated among the poorest households. In 1988, 52% of all farmers were over 54 years of age, indicating that the younger generation was finding other economic opportunities more attractive than the largely traditional agricultural systems practiced in the communal areas.

Most rural (farming) households in the communal areas grow crops, keep some livestock -- although in 1988 38% of the households owned no cattle [MFDP, 1991: p.242] -- and often have off-farm occupations either on a part or full time basis. Studies in the 1980's [Bank of Botswana, 1986; Central Statistics Office, 1986] indicate that remittances from family members engaged in off-farm jobs away from the household amounted to almost 15% of the incomes of such households. If the food aid and

school lunch programmes so prominent during the drought years of the 1980's are included, rural households received 28% of their incomes in the form of remittances and government subsidies. Obviously, such contributions effectively increase incomes of rural households, but in the long run, the focus of agricultural policy should be to create opportunities for increasing the proportion of income that is earned by household members in rural areas in relation to remittances and government subsidies. Table 6 indicates a breakdown of the sources of earned incomes of rural households during the drought period. Even if drought was not present, livestock probably would still be about twice as important as crop production as a source of earned income [Edwards et al., 1989: p. 29]. For poorer households, subsistence income (i.e., domestic consumption of farm produced products) is a very important source of earned income. Also remittances are clearly very important components of their total household income.

Table 6: Sources of Earned Incomes of Rural Households

	Percent
Wage Employment	48.4
Livestock Farming	28.4
Other Activities[a]	18.7
Crop Production	4.5

[a] Largely self-employed income from beer brewing, hunting, building, etc.

Source: Bank of Botswana, 1986

2.6 *Summary of Strengths and Problems/Challenges*

Summaries of the some of the strengths and problems or challenges involved in developing the Botswana economy are given in Boxes 1 and 2. The strengths indicate that Botswana is one of the most fortunate countries in Africa, in combining a very strong economy (i.e., in terms of continuous economic growth) with responsible, stable, and democratic government consistently committed to free market principles. No doubt, much of the success has been due to democratic principles firmly enshrined in Botswana culture, and the relatively homogeneous nature of the people inhabiting the country. However, it is likely that the impressive economic growth fuelled to a large extent by minerals, has been a factor that has permitted the citizens to more closely fulfil their aspirations than is the case in many other countries.

Having said that, problems (perhaps stated more positively as challenges) still remain. The climate provides a particularly difficult challenge, which, along with the poor soils, prevents many citizens from earning a satisfactory level of living from agriculture, both now and in the future. This is further accentuated by the high population growth rate and limited absorptive capacity of the non-agricultural sector. The manufacturing sector, in particular, suffers from having only a small domestic market for its products and having much larger neighbours who have relatively large manufacturing sectors (i.e., Zimbabwe and South Africa).

Unfortunately, many of the problems that currently face Botswana and its people tend to relate to the rural areas. Some of the specific problems relating to rural development in the context of Botswana are:

- Initiatives generally have failed to generate employment and improve income levels -- which are also severely disturbed by periods of long drought (e.g., 1981-87). Much of the responsibility for this is the failure of agriculture to keep its share of national income, resulting in many households having incomes below the minimum living requirement. In the 1980's household study, referred to earlier, it has been estimated that 21% of urban households and 50% of rural

Box 1: Summary: Some Strengths of Botswana

- The economy:
  - Commitment to free market economy – no structural adjustment problems.
  - Impressive economic performance since independence.
  - Substantial foreign exchange reserves, because of markets, and therefore favourable terms of trade, for major exports in form of diamonds (i.e., industrial and gem) and beef (i.e., preferential access to European Common Market).

- Governance:
  - Multi-party democracy.
  - Independent judiciary.
  - Freedom of press and no human rights problem.
  - Accountability in government – Development Plans, Mid-Term Review of Development Plan, and Annual Project Reviews

- Development:
  - Goals: rapid economic growth, economic independence, social justice, and sustained development
  - Change from policy of national food self-sufficiency to one of food security at national and household levels.
  - Social service accessibility comparing favourably with that of most other African countries.
  - Participatory approach involving consultation with the people. Examples in which considerable consultation has occurred include the agriculture part of the current Development Plan (i.e., involving discussions at the local and headquarters level both before and after the plans were finalized) and design of the National Conservation Strategy, the Tribal Grazing land Programme, Management of Tribal Land Act, etc.

households had less income than the minimum requirement [Edwards et al., 1989; p. 10].

- A major reason for the lack of success with respect to rural development has been the unavailability of relevant improved technologies for agriculture.

- Livestock, an attractive alternative to crop production in such a harsh climatic environment, are skewed in terms of ownership and are extensively managed – therefore, not creating much employment.

- Until recently, an inevitable preoccupation with increasing agricultural productivity existed with little conscious effort to address sustainability issues, either directly or indirectly related to agriculture. This is now being rectified with the recent approval of a National Conservation Strategy.

- Complete compatibility has not always existed between technologies and policies designed to improve agricultural productivity, and implementation of policies that facilitate increases in

Box 2: Summary: Problems/Challenges Facing Botswana

- Difficult climate:
  - Most of development concentrated in eastern part of country with higher rainfall.
  - Chronic water shortage problem -- competition for domestic, industry, wildlife, and agricultural uses. A National Water Master Plan has been developed.
  - Drought-prone, making rural development dependent on agriculture, from which most people derive their living, particularly challenging.

- High population growth rate (i.e., 3.4% per annum):
  - Age structure pyramid heavily skewed towards young, creating pressure on social services -- particularly education and health.
  - High levels of under- and open unemployment.

- Economic problems:
  - Provision of infrastructure and social services expensive per head of the population because of low population density.
  - GOB not recovering big enough share of costs of providing services -- need to aim for situation where recurrent expenditures equal non-mineral revenues.
  - Southern Africa Customs Union provided short-run benefits through excise taxes but may have slowed down attempts at diversification, because new manufacturing initiatives protected for only eight years (not long enough) because of lack of experience, small domestic market, and lack of skilled labour force.
  - In labour terms, limited absorptive capacity of non-agricultural sector and decreased employment opportunities in neighboring countries (i.e., 20,000 in 1992 down from 45,000 in 1970's).
  - Agriculture residual employer of people -- but fails to provide satisfactory levels of living, because improvements in productivity -- and, for that matter, sustainability -- have been elusive.

agricultural productivity in ways that ensure ecological sustainability in the long run.

- Poor monitoring and evaluation of rural development initiatives has often occurred, thereby reducing opportunities for rational mid-course adjustments and for information that could be useful in deciding what should or should not be done in the future.

- Recognition of the actual and potential importance of off-farm employment in contributing to the livelihoods of rural households has been insufficient. We have already stressed the importance of remittances to the incomes of such households, but initiatives to encourage greater informal part-time employment in the rural areas themselves have been generally lacking. This is unfortunate, given the potential significance of such types of employment [Liedholm and Mead, 1993] and their potential to relieve pressure on the fragile natural resource base.

- To date, no systematic study has been done of the positive and negative effects of the increasingly liberalised macro-policy framework adopted by GOB on the poorer segments of society in the

rural areas.

3 RURAL DEVELOPMENT – CONTINUING COMMITMENT

3.1 Justification

In Botswana, there has been an obvious lack of success in stimulating rural development. However, as was seen earlier, this cannot be attributed to a lack of financial resources. Rather there has been, and continues to be, a commitment to designing and implementing initiatives that will stimulate rural development. Listed below are some very obvious reasons why that commitment is bound to continue for the foreseeable future:

- Not only do two out of three Botswana continue to live in rural areas, but the absolute numbers living there are likely to continue in the near- to mid-term future.

- As we have already stressed, not only does the average level of incomes of households tend to be lower in rural areas than in the urban areas, but rural areas also contain the poorest households in the society.

- Because of the lack of absorptive capacity in the urban areas, an urgent need exists to slow, to the extent possible, the drift of people to urban areas, through making life as attractive as possible in rural areas.

- There is an interdependency between rural and urban areas, and thus, rural development cannot be treated in isolation from the rest of the economy. Success in rural development creates backward and forward linkages to the urban areas, through providing food for those outside agriculture and through constituting a major market for the products produced by the non-agricultural sector.

- Most of the elected Members of Parliament (MPs) represent rural constituencies, thereby creating a continuing pressure for problems of rural areas being kept in the forefront of GOB's concerns.

Consequently, the objectives of rural development, summarised in Box 3, have remained consistently the same during the last 20 years, although, naturally, the strategies used in attempts to fulfil these objectives have, in the light of experience, undergone adjustment.

3.2 The Major Elements

The major elements of the current strategy for stimulating rural development are:

- The acceptance of a goal of food security at the national and household level in place of one of food self-sufficiency means a fundamental change on the part of GOB, which has implications for many facets of rural development. Given the environmental constraints in Botswana, the costs of domestically producing sufficient essential foodstuffs to feed all residents would be very high. Food security, on the other hand, allows for production and income generation that follows the principle of comparative advantage through trade.

Box 3: Rural Development Objectives

- Increase sustained production from land and wildlife through research, coordinated extension service, and conservation planning to promote better land use management.
- Improve marketing and credit facilities in rural areas.
- Create productive employment and income-earning opportunities in rural areas to reduce the numbers with no visible means of support.
- Improve accessibility to social services – such as water, education, and health care -- to foster healthier, smaller, better educated, and better-fed families.

Source: MFDP, 1991: p. 87 from Government Paper No. 1 of 1972 and No. 2 of 1973.

- Emphasis continues on improving the effectiveness of the public sector in addressing the needs of rural development and the agricultural sector through training, strengthening analytical capacity in agricultural planning and policy formulation, and improving the effectiveness of the research and extension systems.

- The role of GOB is increasingly being confined to facilitating the process of rural and agricultural development through provision of social services; infrastructure and essential services, such as roads; cattle trek routes; disease control; and access to credit for agricultural and non-agricultural purposes. The GOB is also taking increasing responsibility for sustainability issues. As far as possible, production and marketing functions are being undertaken by the farmer and the private sector, while prices are being left to the market.

- Increasing emphasis is placed on encouraging diversification in terms of the variety of agricultural products produced, uses of natural resources, off-farm employment opportunities, markets, and technologies of agricultural production.

- Adjustments are being made in prices, subsidies, user fees and credit to ensure that procurement of basic foods is achieved at the lowest possible cost, that efficient use of limited public funds is maximised in terms of the interests of society as a whole, and that sustained and satisfactory levels of development in the future are not sacrificed in favour of current consumption.

- The free market orientation is continuing, although it is recognised that some deviations are necessary in order to provide reasonable levels of living for the more disadvantaged, whose special needs must be addressed through specific targeted programmes.

- In order to make current and future rural households more self-reliant, there is increasing recognition of the need to use a multi-pronged approach to ensure that the three critical strategies of providing drought relief, improving productivity, and ensuring environmental sustainability, at least, are not in conflict with each other and, at best, are synergistic or complementary to each other.

- Efforts are increasing to encourage a greater participatory role by the rural population not only with respect to consultation on future national initiatives but also now giving greater regional/local/community responsibility for control and monitoring of natural resources, particularly with respect to communal grazing areas and wildlife. For example, as a result of local consultation, it took five years to develop the National Conservation Strategy and two years to develop the agricultural sector policy in the current National development Plan.

With this background, we now turn to a more detailed description and evaluation of four specific initiatives that relate to rural development and the focus of this Conference. These specifically deal with the macro/institutional framework, drought relief, production, and sustainability.

4 MACRO/INSTITUTIONAL FRAMEWORK

4.1 Food Self-Sufficiency to Food Security

A major factor inhibiting rural development in many African countries relates to poorly developed or rapidly deteriorating infrastructure. The problem of poorly developed infrastructure, particularly with reference to the western part of Botswana, has been recognized by the GOB. As a result in the current Development Plan, explicit efforts are being made to move away from the "beltway of development" in eastern Botswana to develop "gateway routes" into the western part (Kalahari) through building roads such as the Trans Kalahari road (Jwaneng - Ghanzi), Kang to Hukuntsi, and Maun to Shakawe. Perhaps this will encourage development of the western part of the country (e.g., through stimulating employment via eco-tourism activities in game parks) and also may improve the livestock off-take rate, thereby reducing pressure of livestock on the natural resource base. As the "gateway towns" develop, a need will arise for more distant "service centres", which will bring social services (e.g., health, education, etc.) even closer to remote areas.

As already mentioned, a fundamental change has occurred recently in macro policy, in the agricultural sector, and is well articulated in the current Development Plan. This change from a policy of national food self-sufficiency to one of national and household food security permits areas of comparative advantage to be exploited, and providing the supply of essential food supplies from a variety of sources reduces pressure on the environment. Sigwele [1993B] has examined the impossibly high cost of pursuing a strategy of food self-sufficiency instead of food security. The dual objectives of national and household food security allows policies to increase the supply of food and the effective demand for food to operate in tandem. Thus, an emphasis on household food security means focusing not only on policies designed to increase the supply of essential foods at the lowest possible prices, but also on policies creating income-earning opportunities -- inside or outside agriculture -- and, when necessary, the provision of subsidies or transfers when earned incomes are insufficient. After all, for individual households, food prices and income levels (i.e., "not how full the silos are") determine whether they can acquire the food they require. Under such conditions, domestic production should not be pushed, at least in the medium to long term, beyond the point at which the cost of domestic production exceeds the cost of imports. At this point, the optimal balance between domestic production and imports is achieved, while at the same time, the total cost of food supplies, plus the cost to the consumer, is minimized. The ever changing nature of the relationship between supply of basic foods and the demand for them means the required "matching exercise" is usually managed best through open markets in which enterprises can respond to changing prices.

This fundamental change in policy means that adjustments are being made with respect to the macro framework. These are necessary, if the policy of national and household food security is to be successful in practice. Some of the important ones are discussed in the following sub-sections.

4.2 Crop Marketing and Pricing Policy

Less than 30% of grain marketing is through the Botswana Agricultural Marketing Board (BAMB). In essence, BAMB acts as a buyer of last resort, through setting a floor price. In order to pursue the quest for national and household food security, a change has had to be made in the pricing policy of BAMB. This has meant the implementation of a policy of gradually, over time, reducing the BAMB price of sorghum to bring it into line with its import parity price plus internal transport costs in Botswana.[3] In general, all cereal crops (i.e., mainly maize, sorghum, and millet) plus cowpeas are now to be based on import parity prices. However, alternative crops such as sunflower and groundnuts are still being based on export parity prices. The reason for this is that no domestic processing capacity exists for these crops. For example, an estimated production of 10,000 tons is the economic threshold for a local factory to process sunflower.[4] Implications of such adjustments in prices are that sorghum prices will drop about 30%, maize will remain about the same, and sunflower and groundnuts will increase 30-50% [MFDP, 1991: p. 260].

At first glance, reductions in the price of sorghum would appear to favour consumers and hurt farmers. Indeed, it is certainly likely to hurt the more commercially oriented farmers who sell all their production. However, it is likely to help those who are poorer, whether they are consumers or farmers. Reduction of the price of sorghum relative to maize should be beneficial to poorer consumers who will be encouraged to eat more sorghum and also is likely to help smaller and hence poorer farming households who do not produce enough grain to be self-sufficient as far as consumption requirements are concerned. Thus, reduction of the price of sorghum would appear to have a favourable impact in terms of equitability. The price reduction for sorghum also should help the sorghum milling industry through helping sorghum meal prices to remain competitive with those for maize. This is important, because the proportions of maize and sorghum consumed in milled form are 90 and 50 percent, respectively [Rohrbach, 1988].

4.3 Livestock Marketing and Pricing Policy

Although pricing of crop products appears to be becoming more rational, an area of some concern in the long run is the export price of beef. This concern arises because Botswana meat currently has preferential access to the EEC at prices higher than prevailing on the world market. Three important points to note with respect to this are:

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[3]. This will also prevent the smuggling of sorghum from neighboring countries where prices have often been lower. In Botswana, internal transport costs can be up to 30% of the cost of the basic grain [MFDP, 1991: p. 260].

[4]. The major issue with respect to sunflower and groundnuts appears to be a lack of suitable germplasm. Normally, export parity prices become relevant only when domestic demands for individual commodities have been met and the export market is being explored.

- The adjustment to lower export prices, if and when preferential access to the EEC is reduced, could be difficult.

- Because the national cattle herd is inequitably distributed in terms of ownership, the major benefits of preferential access to EEC accrue to few people.

- The higher price may have encouraged over-exploitation of some of the grazing land, raising questions of ecological sustainability in the long run.

As with crops, private marketing of livestock is dominant within the country, with the Botswana Livestock Development Corporation (BLDC) acting as a buyer of last resort.

In order to let market forces play their roles most efficiently, it is important that the exchange rate reflects the true value of the pula in relation to other currencies. Fortunately, unlike many other countries in Africa, the pula appears to be neither under- nor over-valued.

4.4 Subsidies – Output or Input

The situation discussed above means that output subsidies in the form of supporting product prices -- apart from the special case of beef to the EEC -- are no longer possible. Given the harsh environmental realities of Botswana, and the need for ensuring food security for all of Botswana's households, it is inevitable for the near to mid-term future that agriculture will need some degree of subsidisation on the input side. This will be particularly important for the poorer farming households in encouraging them to keep farming and in helping them to produce or earn enough to fulfil consumption needs. In the long run, it may be possible to dispose of this safety net through phasing out input subsidies, as a result of such farmers adopting improved practices that enable their production levels to be increased, resulting in marketable surpluses. Also, hopefully, with increased diversification of the economy, alternative sources of incomes will be created. The advantages input subsidies have over output subsidies in the Botswana setting are given in Box 4.

Given the realities of Botswana, a compelling case can be made for the use of input subsidies instead of output subsidies, in social welfare and equitability terms. However, a number of other reasons also exist for the use of input subsidies **per se**. Four of these are as follows [MFDP, 1991: p. 261]:

- To support activities that have positive externalities (e.g., livestock vaccination and crop protection programmes, where non-participation by one farmer could be detrimental to the whole farming community).

- To encourage the adoption of improved technologies (e.g., double ploughing, row planting, use of improved inputs) through reducing risk to the farmer.

- To encourage conservation.

- To promote diversification and employment.

Thus, input subsidies, in the Botswana context, do have an important role to play in furthering the objectives of national and food security. However, use of such public funds must be carefully targeted

Box 4: Advantages of Input Compared with Output Subsidies in the Context of Botswana

- They can be targeted to specific farming households (e.g., poorer households in Botswana).
- They can help protect productive assets during drought years (e.g., giving ploughing subsidy to plough even when using own means of traction).
- Unlike output subsidies, they benefit those who don't sell any of their production (i.e., once again the poorer farming households).
- They are less likely to be product (i.e., output) specific, therefore reducing the potential for non-market price distortions between products.
- They can help reduce the risk of production (e.g., through subsidising the ploughing operation, the risk of producing crops in relation to investing resources in livestock or off-farm occupations, is reduced).

and monitored to avoid their inefficient use. Also, because non-mineral revenues probably will not cover recurrent expenditures during the current development plan, two areas that are receiving greater scrutiny are [MFDP, 1991: p. 261]:

- Plans for the progressive introduction of user fees for some of the services currently provided at minimal cost or free.
- Trying to encourage the supply and efficient use of credit. These two factors are related. During the last development plan (NDP 6), the National Development Bank (NDB) failed to foreclose on defaulted loans. Although foreclosing is particularly hard on those at the receiving end, the fact is that most of these were larger commercial farmers, and the failure to take action, combined with the perceived low rates of return from such loans, have acted as disincentives for the commercial banking sector to make loans to rural areas. Thus, the GOB has recognised that the practice of giving subsidised credit is inefficient in the long run. However, the GOB also recognises that, until credit markets function sufficiently well to ensure all farmers have reasonable access to credit, it may have to intervene to support specific target groups, such as poorer farmers with no collateral.

4.5 Diversification

The change from food self-sufficiency to food security allows another major strategy to be fully exploited. This is diversification in terms of enterprises that can be pursued. This permits the exploitation of complementarities between enterprises within the farming systems (e.g., allocating labour to a number of different enterprises that collectively yield the greatest return from that labour). This can, in turn, have important positive implications for attaining sustainability through:

- Encouraging the growing of both grains and legumes, using manure from livestock on crops, etc.

- Encouraging not only on-farm but also off-farm employment opportunities in the rural sector, which can help relieve the pressure on the natural resource base.

The Financial Assistance Programme (FAP) (Box 5) is designed to contribute positively to diversification through creating employment opportunities both inside and outside agriculture.

Box 5: The Financial Assistance Programme (FAP)

FAP was designed to encourage development of "infant industries" and labour-intensive production systems. Although preference has been given to rural areas, in the sense that grants tend to be higher, they are still guided by economic imperative. Thus, the perceived small size of the market in rural areas has sometimes inhibited the awarding of such grants. Nevertheless, the FAP has been designed specifically to address the needs of the more disadvantaged. These include helping both women and poor people. For example, if women own and manage a business funded under FAP, they are entitled to an extra 15% in terms of grant size..

The FAP has been reviewed recently and it is not yet known what adjustments may be made. Three areas that we believe need serious consideration with a view to possible modification are as follows:

- Until now, FAP grants have not been available for service sector initiatives (e.g., repairs of boreholes, blacksmiths, machinery repair, etc.). Grants in these areas would help improve backward and forward linkages between agriculture and other sectors of the economy.

- The labour subsidy given under the programme diminishes over time and does not last long enough to encourage labour intensive methods. This would only occur if the labour subsidy did not decrease over time and was as long as the life of capital equipment it is designed to replace [Edwards et al., 1989: p. 21].

- No FAP support has been given to activities in the informal sector, which provide substantial levels of employment. Although such activities often result in very low levels of return to labour, they can be particularly useful on a part-time basis in helping to provide some source of income during periods (e.g., during the dry season) when the opportunity cost of labour is low.

4.6 Linking Drought Relief, Productivity and Sustainability

The GOB has now recognised the endemic nature of drought in Botswana and, consequently in recent years, has been reappraising the approach it needs to take with dealing with it, especially in conjunction with strategies designed to improve productivity while at the same time ensuring sustainability. A more explicit concern with issues relating to drought is particularly important, given that many drought periods last for several years and make farming households particularly vulnerable, especially because many operate very close to the survival line even during normal years. Increasingly, the GOB is designing and

implementing strategies that stress the interdependencies between drought relief, production, and sustainability. The fact that the different components are not considered as being mutually exclusive is illustrated by drought relief being viewed not only as food aid, but also as food for work to preserve productive assets and build "conservation" components and as a subsidy to try and encourage some production during drought periods. However, in spite of this, some degree of priority occurs in terms of: drought relief, productivity, and sustainability. As a result, projects in the Development Plan now are accelerated in drought periods (e.g., soil conservation to prevent sand dunes, bunds, fire breaks to facilitate bush fire control, increased office and staff housing construction, etc.). The objectives of such actions are to provide income supplementation for those adversely affected by the drought and to help GOB reduce recurrent expenditure during such periods in favour of emphasising developmental expenditures.

4.7 Continuing Emphasis on Small-Scale Rainfed Agriculture

Given the national development goals and the macro policy framework that have just been described, the GOB is continuing to emphasise small-scale rainfed crop production because:

- Most rural households are still dependent to some extent on this activity for deriving their means of livelihood.
- Large-scale commercial farming involving crop production often has not been very attractive (Table 5) or profitable (Box 6).
- The potential for irrigated or flood recession (i.e., **melapo**) farming is very limited.

The continuing emphasis on the arable sector is illustrated in the recently completed Development Plan. Fifty-six percent of the development expenditure in the Ministry of Agriculture was devoted to this area. If drought relief-related expenditures are included, this percentage rises to 65%.

Box 6: Pandamatenga: A Mixed Record

During the 1980's, support was given to the development of large-scale commercial farms near Pandamatenga, a large area of vertisols previously undeveloped. These farms specialising in sorghum production often have proved, for a number of reasons, not to be economically or financially viable. A number of reasons account for this poor record, including poor selection of farmers (i.e., only 25% have been successful), poor appraisal for loans by the lending agency, and lack of relevant research backup. As a result, foreclosure on loans has been enforced recently. This does not necessarily mean there is no future for the area and the large-scale commercial sector for growing crops, but such soils apparently need careful management and a more diversified cropping system needs to be introduced. In any case, commercial farms in the Pandamatenga area and other parts of Botswana are unlikely, by themselves, to solve the food production problem (i.e., they produce 15% of the food grains in the country) and certainly will not contribute much to solving the food security problem in which access to employment is such a central feature.

Given the climatic conditions prevailing in Botswana, livestock will continue to receive some emphasis. This applies not only to cattle, but also to small stock (i.e., goats and sheep), which are much more equitably distributed and also are often owned by women. Some attention to the small stock area is a recent initiative on the part of the Botswana Meat Commission (BMC), which is responsible for operating the official abattoirs in the country. The BMC is currently considering expanding the domestic market for small livestock through having loading facilities for them in strategic places and providing transport to other domestic locations where a market exists. The seller would be responsible for payment of

transport costs. Currently, the domestic marketing system for small stock is poorly developed.

A breakdown of the proposed developmental expenditures within the Ministry of Agriculture (MOA) for the current Development Plan is given in Table 7. Because of changes in the way sectors are broken down compared with previous development plans, it is not possible to directly compare plans of the current Development Plan and previous ones. One major difference -- a positive one -- is the appearance of a sector specifically addressing environmental conservation issues.

Table 7: Development Expenditures in the Ministry of Agriculture

	NDP 6		NDP 7
	Actual	**Planned**	**Planned**
Breakdown by Department (%):			
Headquarters[a]	38	54	19
Animal Health and Production	11	8	18
Crop production and Forestry[b]	49	35	39
Agricultural Research[c]	1	2	12
Botswana College of Agriculture[d]	0	1	12
Breakdown by Sector (%):[e]			
Environment/Resource Conservation			22
Research/Technology Development			11
Manpower Development			14
Extension and Diversification			22
Infrastructure and Services			31
Total Funds (Pula '000)[e]	328,405	59,866	126,300

Source: MFDP, 1991: P. 257, 271.

[a]. In NDP 6 includes construction of new headquarters for planning and extension.
[b]. In NDP 7 includes Cooperatives -- not broken out in NDP 6.
[c]. In NDP 7 includes construction of regional research stations (e.g., in the north east and western areas of the country.
[d]. Includes expansion because of degree, diploma, and certificate courses, plus a Centre for Continuing Education.
[e]. Big increase in actual over planned expenditures in NDP was largely due to the extended drought prevailing during most of the period.

4.8 Institutional Framework

Supporting these initiatives requires a number of institutions and programmes. Three fundamental "institutional functions" that are more generic in nature, and yet dictate to some extent the direction and success (i.e., both potential and actual) of more specific initiatives and programmes, are as follows:

- Unlike many countries, agricultural planning, extension (i.e., both crops and livestock), and research are located within the same ministry (i.e., MOA). This does help, to some extent, avoid some of the problems of communication and coordination that can result when, for example, crops and livestock are located in different ministries – something that occurs quite frequently in other African countries. Nevertheless, given the current vision for the country and the goal of food security, three other sets of linkages are important, if the MOA is going to play an optimal role in facilitating the development process. These are as follows:

    - Those between the MOA and other ministries (e.g., Ministry of Finance and Development Policy (MFDP) for macro policy, Ministry of Local Government and Lands (MLGL) for the National Conservation Strategy, Land Boards, Land Use Master Plan, etc.). In addition many initiatives relating to those of great interest to the MOA are the primary responsibility of other ministries (e.g., Drought Relief Programmes, creation of off-farm employment opportunities, etc.)

    - Those between MOA and parastatals (e.g., BAMB, BMC, BLDC, etc.).

    - Those between MOA and non-governmental organisations (NGO's) that can contribute towards diversification and sustained development of the rural sector.

  Although efforts exist to provide coordination of developmental activities in rural areas through a Rural Development Council headed by the Vice President of the country, there is general recognition that coordination needs to be further strengthened. The Rural Development Council advises Cabinet in matters relating to rural development programmes and polices.

- In Botswana, a great deal of use is made of projects to support specific initiatives. In the current Development Plan, for example, 30 different projects are planned. Of the 30 staff in the Division of Agricultural Planning and Statistics (DPS), 15 (i.e., agricultural economists, statisticians, rural sociologists, and demographers) are located in the Monitoring and Evaluation Unit. The Division produces quarterly reports that are forwarded to the MFDP. Site visits and fiscal and performance audits are also carried out to improve monitoring. Additional work may be required for donor-funded projects. This depends on the donor and can be quite time consuming. Although, in recent years, considerable progress has been made in strengthening DPS, we recognise that more needs to be done in strengthening the analytical capacity particularly with reference to policy issues.

- As mentioned earlier, emphasis on consulting rural communities concerning possible developmental initiatives is increasing. However, this participatory role is currently in the process of being developed further, now extending into day-day-day actions that go beyond the traditional **kgotla**. Two specific areas that will be discussed in more detail in later sections are:

    - In an effort to improve the efficiency with which relevant improved technologies and associated support systems are developed, the farming systems research (FSR) approach -- which places considerable emphasis on farmer participation – has been institutionalised in the Department of Agricultural Research (DAR).

    - A trend exists to facilitate the planning, management and coordination of development through some decentralisation of power, as exemplified by giving greater responsibility

at the local level for managing drought relief and natural resource initiatives.

5 DROUGHT-RELIEF STRATEGIES

As indicated earlier, the GOB now views drought in the country as a normal part of life and, therefore, is increasingly planning, designing, and implementing initiatives that fall under its normal developmental and recurrent expenditure patterns. Given the climatic realities of Botswana, this is highly desirable, especially considering that such droughts usually run in periods of several years at a time, making low income families dependent on agriculture particularly vulnerable. As a result, six specific initiatives are in place to deal with such situations:

Box 7: Success with Drought Relief Initiatives in Botswana

In a recent World Bank report [IBRD, 1990: pp. 97, 100] two Drought Relief initiatives in Botswana were lauded as being very successful. The programmes referred to were as follows:

- **Feeding Interventions**. During the 1982-87 food aid was transported through official GOB channels, and by private traders and retailers, to all households that contained children under 10, pregnant and lactating women, and destitutes. The food was distributed mainly through clinics and schools. Between one-third and two-thirds of the population received free rations during the drought and there was virtually no evidence of misuse of rations. Although domestic food production declined substantially during the drought, by 1986 the percentage of children who were undernourished had fallen to less than predrought levels. There were no deaths from starvation.

- **Public Employment Interventions**. The Labour Based Drought Relief Programme (LBDR) provided employment for between 60,000 and 90,000 persons each year during the drought period. More than 80% of the participants were women. It was estimated that the Programme replaced almost one-third of the losses in rural incomes caused by crop failures between 1983 and 1985. The Programme stabilized incomes, generated purchasing power, and protected rural assets. The percentage of traditional household farms with arable land fell by less than 17% and the total number of farming households declined by less than 5%. At the same time the productive value of the works created was considerable.

- Three groups now exist at the national level that try to predict potential problems through monitoring the situation, thus enabling action to be taken in a timely manner. These groups are the National Early Warning Technical Committee, the Strategic Grain Reserve Monitoring Group, and the National Food Strategy Working Group. The rainy season usually lasts from October/December to April. In-depth checking of the situation occurs through field visits in February/March. These are repeated in May. Information is provided to the Inter-Ministerial Drought Committee, which then submits recommendations for action to the Rural Development Council in June/July, which, in turn, submits them to Cabinet for consideration and approval.

- The immediate problems of hunger resulting from drought are addressed by distributing food to the needy through schools and clinics -- a programme that is generally viewed as being very successful (Box 7). The food required for this is from three sources: the Strategic Grain Reserve (i.e., currently planned to amount to three to five months food supply), direct commercial purchases, and contributions by donors.

- As indicated earlier, GOB is now maintaining some flexibility when certain development projects, particularly those designed to improve infrastructure, conservation, or sustainability, are implemented. Implementation of these are accelerated quickly during drought periods, thereby providing work for people. This Labour Based Drought Relief (LBDR) Programme pays about 50% of the minimum daily wage (i.e., this currently amounts to about P4.50), which discourages all but the most needy from seeking benefit from it. Nevertheless, such a Programme can help prevent rural households selling off their productive assets, thereby enabling them to return to productive agriculture as soon as the drought is over. Much of the responsibility for LBDR projects lies with the Village Development Committees (VDCs). They select the workers and the projects from a portfolio of development projects drawn up earlier. However, these projects have to be approved and monitored by a technically competent supervisor from the GOB. Once again, these public employment programmes have generally been viewed as very successful although the GOB is continuing efforts to improve the efficiency and quality of the work.

Box 8: The Traditional Agricultural System in Botswana

The traditional agricultural system dominates on communally held land (i.e., about 70% of the land area of the country), to which, for cropping purposes, individual households obtain usufructuary rights allocated by the District Land Boards. The system is well adapted to the harsh production environment in which farming households operate. Households often have three residences: the main one being in a village, supplemented by one at the cattle post where the livestock are kept much of the year, and the other at the lands area where crops are cultivated during the rainy season. The cropping systems practiced are characterised by low labour inputs allocated to large areas of cultivated land. For example, in 1988 the traditional farm size was 5.5 hectares with 18% being less than 2 hectares and 11% being more than 10 hectares [MFDP, 1991: p. 242]. Yields in normal years tend to be very low reflecting this land extensive system of cultivation. Mixed cropping is usually practiced in which seeds are broadcast on the ground and then; ploughed in using oxen, donkeys or sometimes tractors. Seed is planted for two or three days after a planting rain -- in a good year there are about five planting rains (i.e., 15 planting days) per year. Thus, a risk averse strategy results from this staggered planting of mixtures of sorghum, millet, cowpeas, water melon, etc. One and depending on the need, occasionally two weedings, are carried out using hand tools. The result in terms of crop production means that very few small-scale farming households are self-sufficient in food production.

- In an additional attempt to preserve productive assets, the GOB, in recent years, has heavily subsidised attempts to continue agricultural production during drought periods. Elements in the

Drought Relief projects and particularly the Accelerated Rainfall Arable Production (ARAP) Programme have included for limited areas a ploughing subsidy (e.g., up to 10 hectares), free seed and support for purchasing fertiliser, implementing row planting, undertaking weeding, erecting fences around individual household arable fields, undertaking destumping, encouraging water storage in tanks, and purchase of fodder for livestock. Apart from the fact that many farmers do continue to try and produce during drought years, such initiatives appear to have had little success in changing the agricultural systems of small-scale farming households, which are still largely traditional in nature (Box 8). Some specific problems associated with ARAP are summarised in Box 9.

Box 9: Shortcomings of the Accelerated Rainfall Arable Production Programme (ARAP)

- The cost per kilogram of sorghum produced under the ARAP programme amounted to P1.08 compared with the BAMB price of P0.35.

- One of the intentions of ARAP was to encourage the adoption of improved technologies which are more land intensive than the traditional system (Box 8). In fact, there is little evidence that this occurred (e.g., adoption of fertiliser and row planting did not occur) as exemplified that during the year in which the study was undertaken, average yield of sorghum was 74 kg/ha compared with 200 kg/ha in non-drought years. In fact, as we discuss later, we contend that the type of technologies and the ways in which they were packaged were inappropriate for drought years.

- Where tractors were available, much of the traction was hired rather than undertaken by the farmers themselves. In such cases the benefits of the ploughing subsidy were skewed towards those doing contract ploughing. The benefit to the needy farming households was therefore very limited, because the resulting crop yields were often very low not only because of the drought year but because timeliness in ploughing/planting was often sacrificed often resulting in poor initial seed germination.

- Free seed issues were confined to sorghum, maize and millet, and did not include cowpeas that were very important to the farmers, while there was little evidence that weeding intensity increased.

Two other more general criticisms that have been levelled at the ARAP programme are:

- There is in general, considerable concern that the effectiveness of extension agents is reduced because of the monitoring and regulatory functions associated with implementation of such programmes. Successfully combining these functions with the convincing and cajoling ones associated with their primary extension activities is likely to be impossible to achieve.

- That ARAP was not sustainable on either economic or environmental grounds.

Source: Some of information taken from [ATIP, ADNP and FSSR, 1988].

6 PRODUCTION INITIATIVES

6.1 Linking Technology and Policy

One of the primary objectives of agricultural development is improving the welfare of farm households through increasing the overall productivity and sustainability of the farming system in the context of both private and societal goals. This is done given the constraints and potentials imposed by the factors that determine the existing farming system. In this effort, two complementary strategies must be used:

- The development of **relevant improved technologies** by research – with inputs and feedback from extension and farmers – and their dissemination via extension.

- The development of **relevant policies and support systems** by planning and their implementation by extension and governmental and non-governmental developmental organisations.

As we have consistently argued throughout the presentation, there are many "actors" in the agricultural development process. As far as rural development, or specifically agricultural production, is concerned, it is critically important that two-way interaction exists between all the "actors" depicted in Table 8. Interactive linkages have developed over the years, but of course, there is, still room for improvement. The current situation is as follows:

Table 8: Roles and Functions of the "Actors" in Agricultural Development

Role	Functions	Actors
Implementing		Farmers
Supporting	Transmitters, Input Provision, and Market for Products	Extension Staff, Development Agencies, Non-Profit, Non-Government Agencies, and Commercial Firms
Providing Potential Means	Technology Policy/Support Systems	Research Planning

- The Agricultural Policy Committee links planning, research, and extension. It consists of the Directors of the departments in the MOA plus the Chief Agricultural Economist and is chaired by the Permanent Secretary (i.e., the most senior civil servant in the MOA). The committee meets quarterly and considers reports and recommendations produced by concerned departments, divisions, and, sometimes, consultants. This provides a forum at which decisions can be made ensuring compatibility between:

    - Recommended technologies and policy/support systems designed to encourage their adoption.
    - Policies designed to improve productivity and those designed to ensure sustainability.

- In recent years, the GOB has made efforts to improve linkages with NGOs[5] – which generally have a strong commitment to a farmer participatory approach. For example, GOB officials often sit on the governing boards of NGOs (e.g., Forestry Association of Botswana, Thusano Lefatsheng).

- In some regions of the country, the Regional Agricultural Officers (RAOs) have set up regionally based "committees" consisting of representatives of all the "actors" involved in agriculturally related activities in their regions, both in and outside the public sector (e.g., NGOs). The objectives of these "committees" are to disseminate information; improve communication between the "actors"; provide a means for coordinating activities; and, where desirable, plan and implement joint activities.

- Traditionally, links to the farmer have been stronger than links from the farmer. The recent institutionalisation of FSR in the Department of Agricultural Research [MFDP, 1991: p. 262] is an attempt to change that paradigm through creating truly interactive links between the farmer and the other "actors" in the agricultural development process. The FSR approach, which has been institutionalised in many countries throughout the world, evolved in the mid 1970s as a result of increasing realisation that small-scale farmers are rational in their farming methods, are natural experimenters, and can actively contribute not only in identifying their agricultural problems but also in helping to identify and evaluate solutions to those problems. Thus, the FSR process has four stages, namely descriptive/diagnostic, design, testing, and dissemination [Worman et al., 1992]. The farmer is on centre stage and actively participates during all four stages of the FSR process. Thus, the heterogeneity in the farming population is explicitly recognised. Efficient execution of the FSR process requires an interdisciplinary team consisting of representatives of both technical and social science disciplines. Because FSR facilitates a process and does not by itself produce a product, its effectiveness is determined by the degree to which farmers are actively incorporated in the research and development process and by the effectiveness of the linkages with the other "actors" in the agricultural development process. For example, FSR is complementary to, and not a substitute for, commodity-based research (i.e., largely undertaken on experiment stations) that provides possible solutions to problems identified by farmers. It also has another potential role, often under-exploited, in helping to identify adjustments necessary in policy/support/delivery systems that might be necessary to improve the adoption of improved technologies that are being disseminated. Because the FSR teams are located regionally, they play an active role in regionally based "committees" mentioned earlier. Experiment station-based research, which is organised into interdisciplinary commodity and subject matter areas, can be responsive to the needs of farmers though close working relationships with the FSR teams and regular consultation with extension staff at the Annual Research Meetings and in more frequent meetings of the commodity and subject area teams.

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[5]. In Botswana, NGO's are self-initiated and cover social, economic and religious activities. In terms of agriculture, there are NGO's engaged in agro-forestry, veld product research and utilisation, and natural resource conservation. They are privately financed and have no formalised links with GOB.

6.2 The Technology Challenge

Although, in the last 15 years, much progress has occurred in terms of sensitivity to, and involvement of, farmers in the research process, results in terms of widespread adoption of improved technologies still have to materialise. The Green Revolution, which has largely bypassed Africa, has been successful in much more favourable production environments than exist in Botswana. However, much has been learnt over the last few years about what is going to be needed if relevant improved technologies are going to be developed successfully for small-scale farmers. The uncertain nature of the rainfall and poor and variable soils give rise to five important implications concerning development of relevant improved technologies for small-scale farmers in Botswana [Heinrich et al., 1990; Norman, 1993]:

- Farmers are likely to adjust the implementation of their farming plans according to how the cropping season unfolds. This means that, by using a decision-tree strategy, the resulting area planted, the crops grown, and the practices used could be very different from what was originally planned. The implication of this is obvious: researchers need to "mimic" this sequential decision-making by developing a number of options among which the farmer can choose, depending on the circumstances relating to the season. Thus, the conventional "blanket recommendations" are unlikely to be very useful as far as farmers are concerned.

- The heterogeneity of the soils and, for that matter, of the resource base possessed by farmers, implies the need of targeting technologies to different situations in order to make them more relevant. This "location specificity" demands a greater emphasis on farmer-based work or FSR than would perhaps be necessary in more homogeneous and favourable environments.

- Because of the characteristics of the production environment of Botswana, both in terms of uncertainty and heterogeneity, researchers need to develop considerable amounts of conditional information, indicating "what should be done if this or that happens".

- Given the nature of the environment in Botswana and the precarious level of living achieved by most farmers, a high premium probably will be placed on stability of return (e.g., a certain level of grain production each year to meet household food needs).[6] Thus, researchers need to place considerable emphasis on developing technologies that ensure reliable returns per hectare, even if they may not result in maximum yields in some years.

- Because of the harsh and heterogeneous nature of the production environment, most technologies are likely to result in incremental changes rather than quantum jumps in productivity. Unlike more favourable environments (e.g., Green Revolution areas), in Botswana much more attention needs to paid to the lower rungs on the technology ladder. This is because these often relate to ensuring better timeliness in operations to maximise the return from limited soil moisture, which can be achieved only with ready access to traction. As a result, they require relatively large changes in the farming systems for their implementation. These "lumpy" types of changes are obviously much less likely to be spontaneously adopted, without substantial cajoling and support,

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[6]. For most households, this is likely to be interpreted in terms of self-sufficiency (i.e., producing the food themselves) rather than what would perhaps be preferable, food self-security (i.e., earning enough income, either on or off-farm, to ensure that adequate food supplies are available for the household).

than the "divisible" types of technology (e.g., improved seed, fertiliser) associated with the Green Revolution. The "divisible" technologies (i.e., land-intensive types) start becoming relevant only when these "lumpy" changes have been adopted. This lack of spontaneous adoption means that a close congruency must exist between the required policy/support system and the improved technology to induce its adoption.

One technology in Botswana that has consumed a lot of research time and illustrates many of the points just discussed is double ploughing, which is briefly discussed in Box 10.

In the quest for the development and adoption of relevant technologies by small-scale farmers in Botswana, a number of challenges still remain. Two important ones are as follows:

- Although the research process has improved institutionally in recent years through its organisational changes (i.e., into commodity and subject matter teams) and incorporation of a greater farmer focus (i.e., thanks to interaction with FSR teams and extension), promising results are still to emerge and these need to be obtained in as cheap a way as possible. The research organisation is obviously small, given the relatively small size of the national economy, and, therefore, research priorities must be carefully chosen. This becomes a particularly important issue given growing concerns in Botswana about increasing diversification and the need to address ecological sustainability issues. Undoubtedly, there is need to continue working on ways to increase collaboration between the research systems in the SADC countries [Sigwele, 1991, 1993A; Okello and Eyzaguirre, 1992]. Also, challenges still exist in improving the efficiency of FSR work in terms of incorporating farmer inputs in ways that are acceptable to experiment station-based scientists. One format that has evolved in Botswana and shows considerable promise is the use of farmer groups (Box 11).[7]

- Incorporation of the farmer in the research process and the locational specificity of many technological recommendations poses some challenges in terms of what is acceptable information on which to base technological recommendations and who should be responsible for approving the recommendation. We believe that it would be desirable to move towards the following approach:

    - In considering approval of technological recommendations, "hard" technical and economic data (i.e., usually collected under closely supervised experimental conditions) should be complemented/supplemented to an increasing extent with "softer" types of data collected from farmers as a result of on-farm testing.

    - Whenever possible, some devolution should occur in responsibility to the regionally based "committees", in terms of approving locational specific technological recommendations.

    - However, this approval system, however, should be modified and submitted for consideration by the Agricultural Policy Committee in MOA in cases where

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7. Box 11 illustrates the use of farmer groups for research purposes. However, the group concept is also used frequently in Botswana for other purposes, particularly in extension, to facilitate collective responsibility and a sharing of the resulting benefits. Such groups are usually self-initiated, are given advice on their operation by MOA, but receive no financial assistance.

Box 10: The Double Ploughing Technology

In recent years, much research effort in Botswana, both on the experiment station and on farm, has concentrated on tillage systems to improve water availability and to encourage more efficient use of water. One strategy that has been examined a great deal, with the active participation of farmers, is that of a pre-planting ploughing operation – implemented at least one rain before planting – to open up the soil profile to trap more water. Results from this work have now resulted in an official recommendation.

Briefly, application of the FSR approach helped in highlighting the following:

- Early ploughing should be encouraged when farmers have control over draught power, when they are faced with a land constraint or lack labour for weeding, and in situations where soils are relatively deep and have a good water holding capacity.

- Sensitivity to providing farmers with a series of options rather than the conventional universal or "blanket" recommendations, together with realisation that the options they are able to select will be dependent on the resources they have at their disposal, led to guidelines indicating, for example, that:

    - The traditional plough/planting operation option may be the best under certain circumstances.

    - The early ploughing operation should be done only when planting can't be done, thereby not sacrificing planting opportunities using the traditional system. This could be done, for example, by continuing to plough but not plant more than three days after a planting rain.

    - Depending on resources available to the farmer, a number of possible variations are available in the second tillage (i.e., second ploughing, harrowing, or cultivating) and planting (i.e., broadcast or row) operations for the early ploughing system.

The use of the FSR approach helped sensitise the whole research process by including the farmer perspective, taking account of the socioeconomic dimension, and helping make the guidelines appropriate for more farmers through inclusion of targeting and conditional information to widen intervention possibilities. Also, it helped identify one snag to the widespread adoption of the early ploughing operation. During drought periods, the GOB has heavily subsidised the ploughing operation. Unless it also subsidises the secondary tillage operation, farmers are likely to continue their extensive farming systems in order to benefit from the subsidy.

adjustment/modification in the policy/support system is required to "induce" farmers to adopt the proposed technological recommendation.

6.3 ALDEP – A Targeted Development Programme

In addition to ARAP, implemented as a Drought Relief initiative, the GOB in recent years has implemented a major development initiative specifically geared to arable production undertaken by small-scale farmers. This initiative, called the Arable Lands Development Programme (ALDEP) [Kerapeletswe, 1992], financed in part by the African Development Bank and the International Fund for Agricultural Development, is being implemented under the auspices of the Department of Crop Production and Forestry (DCPF) and is aimed at improving agricultural productivity through providing such farmers with the means of production, while at the same time promoting relevant improve technology development and adoption. Initiatives have included provision of draught animals plus related equipment, help with fencing and water tanks at the lands areas, and promotion of technological packages. Initially, some of these components were given to farmers on low-interest loans, but because of heavy administrative costs relating to collecting repayments, they have increasingly moved to cash down payments, combined with substantial levels of subsidisation (e.g., 80%). Collaborative research with specific reference to tillage work also has been undertaken in collaboration with FSR teams. In general, the 1980's drought is thought to be one of the major reasons for ALDEP not having the favourable impact that was intended. Fortunately, this has not discouraged GOB from pushing ahead with this initiative, designed to help the more disadvantaged farming households, in the current Development Plan. However, in doing so, some adjustments are being made that may improve its impact in the future. The next phase, which will emphasise extension and technology transfer, will include the following adjustments [MFDP, 1991: p. 265]:

Box 11: Use of Farmer Groups

In FSR work in Botswana, the farmer group approach allows farmers to decide their own research agenda, through selecting those technologies they wish to test. Anyone can join these groups. They are groups simply in terms of the participants attending meetings on a regular basis during the growing season to discuss progress on the technologies that they are implementing individually. Such groups have proved to be efficient in reducing time and logistical costs; in providing a good forum for station-based researchers and extension personnel to interact with farmers; in ascertaining farmers' interest in interventions that do not necessarily address the most critical constraint or enterprise but can improve overall farming system productivity (non-leverage interventions); in permitting farmers to choose the technologies they wish to test; in improving farmer to farmer dialogue on the merits of the technologies they are testing in a forum where researchers are present, etc. They have even been used in getting farmers' opinions on possible treatments to use in design type trials (i.e., trials both managed and implemented by researchers). In Botswana, an average of 80% of the members of these "volunteer" groups have been women.

Source: Worman et al. [1992].

- The extension agents (i.e., Agricultural Demonstrators (AD's)) are being relieved of their heavy administrative duties with respect to implementing ALDEP in order that they can concentrate on extension and technology transfer duties, with reference to which they will receive in-service training.

- Other organisations will have primary responsibility for distributing ALDEP inputs and equipment (e.g., Botswana Cooperative Union, etc.).

- Cooperative activities are continuing to be encouraged both with research (e.g., tillage trials, demonstration fields), and NGO participation is also being sought.

7 INITIATIVES RELATING TO SUSTAINABILITY

7.1 Sustainability – The Bottom Line

With reference to issues relating to sustainability, there has been increasing recognition in recent years that:

- In countries like Botswana, issues relating to productivity and sustainability cannot be separated. For conservation initiatives to succeed, strategies need to be implemented that will bring about a convergence of the short-run production interests of farmers and the long-run interests of society in maintaining the productivity of the land for use by future generations. Of key importance is the need to overcome poverty, which forces farmers to place short-term survivability before long-run sustainability and is a major cause of environmental degradation. This is in spite of the fact that many traditional practices were sustainable but farmers have been forced to make compromises in their practices in order to ensure short-term survival.

- Improving the living standards of the majority of the population on a sustainable basis will not be possible without resource conservation. At the same time in order to avoid structural adjustment problems in the long run, increases in agricultural productivity required for these improved levels of living will need to be achieved in ways that are not just financially but are also economically viable in the long run. This will require long term planning and an imaginative approach to the use of grazing and arable lands, and also of timber, water, and wildlife [Perrings et al., 1988].

  Governmental intervention is necessary to encourage conservation because [MFDP, 1991: p. 262]:

  - The processes and effects of degradation are not easily noticed in the short run.
  - The land tenure system, particularly in communal areas, does not encourage individual responsibility.

  Thus, the pricing system is unlikely to be able to send effective or timely messages as to when and what should be done. For example, communal lands are freely accessible to those who use them. Therefore, costs of using such land in terms of degradation do not enter into their decision-making processes. Also the livestock who graze on them, for traditional or cultural reasons, may be overvalued.

- Efforts must be increased to re-establish community responsibility for controlling and monitoring local natural resources (e.g., communal grazing areas and wildlife). This arises out of increased realization that sustainability is not just an economic concern but is also a social concern.

7.2 *Initiatives in Quest for Sustainability*

Because of the above factors, the GOB has embarked on a number of initiatives designed to encourage conservation and sustainability. Six of these are as follows:

- A National Conservation Strategy (NCS) has been implemented recently, possibly one of the first in Africa. Even prior to this enactment, Botswana was already recognised internationally as being a leader in protecting its biotic community, with more than 18% of the land being gazetted as national parks and game reserves.[8] in addition, Botswana has one of the best environmental baselines in Africa [Christophersen et al., 1989]. The goals of the NCS are summarised in Box 12. Fulfillment of the goals will require implementing development initiatives that minimise environmental costs, enhance the quality of the environments, and – if there is a conflict – make the appropriate trade-offs between short-run production and long-run sustainability. Strategies for achieving this will include [MFDP, 1991: p. 95]:

Box 12: The National Conservation Strategy (NCS) Goals

- Conservation of all main ecosystems including wildlife, vegetation, and soils.
- Maintenance and improved production of renewable resources including veld products.
- Control and optimise reduction of non-renewable mineral resources.
- Ensure more equitable distribution of incomes and rewards in the interest of conserving natural resources.
- Cost-effective restoration of degraded natural resources, including improved capacity for regeneration of the veld.
- Prevention and control of pollution.

Source: MFDP, 1991: p. 95.

  - Provision of economic incentives and use of disincentives.
  - Use of regulations -- existing and new.
  - Improving planning and administrative procedures to make them more sensitive to ecological needs.
  - Expanding facilities and programmes to improve environmental education, training, awareness, and research.

- Because the responsibility for implementing natural resource management activities is divided among several ministries, there is a central NCS Advisory Board chaired by the Minister of Local Government and Lands, consisting of representation from a number of other ministries including MOA, Commerce and Industry, Mineral Resources and Water Affairs, etc.

- However, considerable responsibility also exists at the local level. The GOB, through the MOA

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[8]. This will rise to 36% with the establishment of the proposed Wildlife Management Areas [Edwards et al., 1989: p. 119].

has developed a map delineating land suitable for rainfed crop production. A similar map for livestock will also soon be produced relating livestock numbers to carrying capacity of the land. These maps will help policy makers and land administrators in making decisions on the allocation and use of land in ways that ensure ecological sustainability in the long run. Land Use Planners now are located in each region, and each district has to come up with a Land Use Plan that will need to be approved prior to implementation by the District Land Boards, which are responsible for enforcing land use regulations [Edwards et al., 1989: p. 137].

- The potential for giving local communities greater control over, and responsibility for, the natural resources in their areas is receiving a great deal of attention at the present time. The traditional **kgotla** system plus the fact that any return from responsible management of the natural resources accrues to the community itself, makes it an attractive proposition for many communities. Currently, two initiatives are being investigated:

  - Community-managed communal grazing areas are being set up on a pilot basis in communities requesting them. Support from GOB is available for fencing the communal grazing area, and the community will have responsibility for controlling livestock access in a manner that is equitable for all the local residents. Fencing and controlling access indirectly places a value on that grazing land -- as far as the community is concerned -- and also improves the chances of rangeland improvement programmes being successful.

  - Another initiative currently under consideration but not yet implemented is setting up Wildlife Management Areas under the control of local communities. This approach, which is currently being implemented in some of the communal areas of Zimbabwe, gives local communities responsibility for managing the wildlife in their areas in such a way that any rewards in terms of off-take -- whether in terms of cash or meat -- equitably accrue to the community.

In recent years local communities have become increasingly vocal over the use of land and its allocation to livestock, wildlife, etc. For example, during the Chobe Forestry Inventory Study (1991-92), local communities were involved in decisions concerning the optimal harvesting of timber, while ensuring continued benefits to local communities through accessibility to firewood. Similarly, local communities are currently actively involved in deciding on the future management of designated Wildlife Management Areas (WMAs) in the Chobe and Ngamiland Districts.

- We have repeatedly stressed the significance that the GOB is placing on diversification as a strategy for stimulating development in a manner that is sustainable not only in ecological but also in livelihood terms. A basic requirement, given that natural resources are so central to the development of Botswana, is that satisfactory levels of living that are also sustainable in the long run will not be attainable unless ecological sustainability is achieved. Diversification, especially when viewed in livelihood terms, has several facets, including not only diversification in terms of agricultural products and use of natural resources, but also in terms of production technologies, markets, and hence sources of income -- both on and off the farm. Thus, the likelihood is better that ecological sustainability will be achieved through the natural resources being used in the most beneficial way; through enabling the complementarities between enterprises to be exploited (e.g., grain and legumes, livestock and crops); and through helping to relieve some of the pressure on the natural resource base by creating part- or full-time employment off the farm. In terms of natural resources relating to agriculture, wildlife and fishing have received, and

continue to receive, some emphasis.[9] To date, however, apart from some moral and advisory support to NGOs, tangible GOB support to agro-forestry and production of veld products has been minimal. However, agro-forestry is now receiving some support from the European Economic Community (EEC).

- Finally, in addition to the soil conservation-related projects implemented under the Drought Relief Programme, which contribute directly to ecological sustainability, a number of rules or regulations are on the statute books that contribute to this goal. Two examples are not allowing boreholes to be drilled closer than 8 km radius from each (i.e., to prevent overuse of water and overgrazing near the boreholes) and not allowing burning of rangelands at the beginning of the rainy season (i.e., to prevent the loss of annual grass species).

7.3 Challenges in Attaining Sustainability

Nevertheless, in spite of the apparent commitment of the GOB in addressing issues of sustainability, considerable uncertainty exists as to how successful the initiatives that are being planned and/or implemented will be. A number of challenges still need to be addressed. Three of these are as follows:

- Some possible adjustments are needed in terms of research, extension, policies, and soil conservation programmes, if issues of sustainability are going to be addressed successfully [Norman, 1991, 1993]. It is not possible to discuss these in detail in this presentation, but the main points can be summarised as follows:

    - **Research**. With reference to research, at the very least, it is critically important that any proposed improved technologies are evaluated **ex ante** to try and ensure that they do not have a negative impact as far as sustainability is concerned. Even better, however, would be a research approach that emphasises the production of improved technologies that not only lead to productivity increases in the short run but also contribute positively to long-run ecological sustainability. However, in order for this to occur, the conventional reductionist approach to developing improved technologies needs to be complemented to a much greater extent with the more complex systems approach. This will be necessary because of the required change in direction from a commodity- to a production-systems approach (i.e., implied in the need in investigating sustainability options to reintroduce biodiversity into farming systems and to encourage -- if possible -- nutrient recycling, use of manure, introduction of agro-forestry, etc.). If relevant technologies exploiting biological interactions are to be developed, such a change also implies the need for some research resources to be devoted to what might sometimes be perceived as more up-stream research, such as establishing cause-effect relationships (e.g., modelling) and perhaps even eventually biotechnology. Some shortcuts will undoubtedly be possible, for example, using farmers in assessing the causes of unsustainability and in designing and evaluating relevant solutions. Farmer participatory methodologies suitable for addressing sustainability issues have evolved rapidly in recent years, but to date have been little used by FSR teams in Botswana.

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[9]. For example, in the Okavango Swamp area in the northern part of the country, 200 fish-related projects have been approved for funding under the FAP.

- **Extension**. In terms of extension, the foregoing discussion implies greater emphasis on what Hudgens [1992] calls information-based technologies rather than on material-input technologies. This change from a commodity to a production system emphasis implies the need for a sophisticated extension service that operates in a truly interactive mode with farmers. Although, given the cultural situation in Botswana, some constructive interaction exists, the locational and farmer specificity of some of the problems and the potential need to select the appropriate solution from a number of options imply the need to improve the quality of this dialogue.

- **Policies**. Policies can be important not only in preventing losses in soil productivity or erosion arising in the first place but also in helping to stop them, once they have developed. Thus, policies are required that:

  -- Eliminate possible conflicts between strategies designed to promote short-run production and those designed to encourage long-run sustainability (conservation).

  -- Positively encourage, via incentives, adoption of strategies that conserve the environment for use by future generations.

  The first approach, which is obviously preferable, is likely to be more important in maintaining soil fertility and in promoting good land-use management through the use of appropriate technology. In Botswana, as we have already intimated, care needs to be taken that policies designed to increase short-run production are not implemented if they encourage land degradation in the long run. For example, the destumping component of ALDEP and ARAP would have been better if it had been complemented by a policy that required the planting of windbreaks or living hedges as a result of benefiting from the destumping subsidy. In an attempt to address this issue, GOB is now requiring each newly proposed project to have an environmental impact assessment (EIA).

  The second approach, on the other hand, is likely to be more necessary in correcting erosion that has already developed. Unlike many African countries, Botswana is in the fortunate position of having resources that can be used when necessary for this purpose. However, as we argue in the next paragraph, that does not mean we believe this is a desirable approach.

- **Soil Conservation**. In many African countries, a fundamental change is needed in the way soil conservation units operate. For too long, soil conservation units have been preoccupied with the construction of physical structures to prevent further soil erosion once it has occurred. Increasingly, there is a feeling that the appropriate approach is for units responsible for soil conservation to work much more closely with those responsible for research and stimulating production (i.e., extension and planners) in developing initiatives that will prevent soil erosion occurring in the first place. Those advocating this approach argue that many of the tools used in FSR, particularly those involving farmer participatory techniques, can be very useful in designing strategies that are accepted by farmers. In Botswana, the soil conservation group is located in the Department of Crop Production and Forestry, and thus appears to have a close relationship with extension. However, the link with research in general and particularly

the FSR teams would benefit from being strengthened and perhaps result in strategies that would prevent over-cultivation developing in the first place.

- Livestock, particularly cattle, pose a particular challenge as far as Botswana is concerned. Once again, time and space do not permit a detailed discussion on all the issues. However, the problems, which are not mutually exclusive, can be summarised very briefly as follows:

  - As mentioned earlier, considerable inequity exists in the ownership of cattle, the distribution being heavily skewed in favour of larger farmers.

  - Cattle numbers tend to be high and adjustments in stocking rates during drought periods are made only reluctantly in response to starvation and, in the past, sometimes were limited by abattoir capacity. Cattle are important culturally, and this tends to inhibit the operation of market forces in terms of acquiring and selling. Nevertheless, substantial economic incentives do exist for keeping cattle in the form of high output prices (i.e., because of preferential access to the EEC) and heavily subsidised inputs.

  - As indicated earlier, overgrazing tends to result in communal areas. This is further exacerbated by larger farmers (i.e., who in 1975 were allocated rangeland under lease hold arrangements -- the Tribal Grazing Land Programme (TGLP) [Tsimako, 1991; MOA, 1991]) -- having their cattle graze in the communal areas when the grass stocks are low on their own farms.

  - Although the off-take rate from the commercial farms is about twice as high as from herds owned by communal farms (Table 5), one study showed that the output per head was about the same on both types of farms, and the financial margin per head was lower on the TGLP ranches because of higher operating costs [Carl Bro International, 1982]. There is no reason to believe the situation has changed significantly since the study was undertaken.

  In looking at possible solutions that will help control the overgrazing problem while at the same time ensuring greater equitability from the societal point of view, a number of initiatives will be required. Three that appear to be necessary, and, in fact, are being seriously considered by GOB are:

  - Getting a higher proportion of the costs of services provided for cattle (e.g., vaccines, etc.) being paid by the owners themselves.

  - Elimination of dual grazing rights for TLGP ranchers in the sense that they will no longer be allowed access to communal grazing areas.

  - Decreasing intergrade and seasonal price differentials to stimulate greater off-take rates from communal areas.

- Botswana has a particular problem with respect to wildlife. In order to be able to export beef to the EEC, the GOB was forced to construct cordon fences. These were required in an effort to control foot and mouth disease in a country with 2,000,000 cattle, 85% of which are kept in unfenced communal areas. Inevitably, because of the cordon fences, wildlife migration has been

inhibited to some extent. However, given the need to stimulate development and provide employment, Botswana apparently has had little option but to pursue this strategy. Also, we should perhaps reiterate a point made earlier that a substantial amount of the land already has been devoted to game reserves – we suspect probably one of the highest percentages in Africa.

8 CONCLUDING COMMENT

We hope that, in presenting this case study of rural development in Botswana, we have shown it to be the outcome of a complex interaction between development and dissemination of relevant improved technologies; complemented and supported by both local and governmental initiatives; and involving a large number of activities encompassing issues relating to equitability, welfare, productivity, and sustainability.

Botswana can be proud of its success to date. Admittedly, it has been fortunate in having substantial resources. However, the use of these revenues has been handled responsibly by a democratically elected government in a way that is trying to ensure that everyone shares in the fruits of the developmental process. The stage is set, but the task is not finished. Unquestionably, as the next century dawns, two of the major issues facing Botswana will continue to be creating employment for its citizens and maintaining ecological sustainability so that land is available for use by future generations.

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