

AGRICULTURAL SERVICES REFORM IN SOUTHERN AFRICA

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**ENCOURAGING SUSTAINABLE FAMILY
SECTOR AGRICULTURE IN BOTSWANA**

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ABBREVIATIONS

ALDEP	Arable Lands Development Programme
ARAP	Accelerated Rainfed Agricultural Programme
BAMB	Botswana Agricultural Marketing Board
BCA	Botswana College of Agriculture
BCU	Botswana Cooperative Union
BRIMP	Botswana Range Inventory and Monitoring Project
CBPP	Contagious Bovine Pleural Pneumonia (cattle lung disease)
CDB	Co-operative Development Bank
DAO	District Agricultural Officer
DAR	Department of Agricultural Research
EU	European Union
FAP	Financial Assistance Programme
GIS	Geographical Information System
LAC	Livestock Advisory Centre
LMDP	Livestock Marketing Development Project
LSU	Live Stock Unit
MoA	Ministry of Agriculture
MoFDP	Ministry of Finance and Development Planning
NDB	National Development Bank
NDP	National Development Plan
NGO	Non-Government Organisation
ODA	Overseas Development Administration (of British Government)
PRA	Participatory Rural Appraisal
RAO	Regional Agricultural Officer
RIIC	Rural Industries Innovation Centre
SLOCA	Services to Livestock Owners in Communal Areas
TA	Technical Assistant (front-line agricultural extension worker, previously called an Agricultural Demonstrator - AD)
TGLP	Tribal Grazing Lands Policy
VA	Veterinary Assistant
VDC	Village Development Committee

DEFINITIONS

Batswana	The people of Botswana
Dual Grazing	Large livestock owners making use of both leasehold and communal grazing resources
Grapple	Devils claw, Sengaparile or Harpagophytum procumbens - medicinal tuber found in the Kalahari
Khotla	Village meeting place or court
Mafisa	A traditional system of lending livestock to relatives etc. in which the relative looks after the animal and receives some offspring
Phane	A caterpillar growing on the Mophane Tree which is both eaten and sold to the South African market

FURTHER INFORMATION

This report is one of six country studies, the synthesis of these studies is available as a book: *Living Farms - Encouraging Sustainable Smallholders in Southern Africa*. By Martin Whiteside, published by Earthscan, London 1998.

EXECUTIVE SUMMARY

Mineral revenue has enabled Botswana to enjoy a rapid economic growth over the past two decades, resulting in a transformation from one of the poorest countries in the world to a middle income country. Infrastructure and services have developed markedly, but the other economic benefits of growth have not been shared among the population, leaving as many households below the poverty datum line now as a decade ago. For many, rural life is a poverty trap from which it is difficult to escape. Concern about this, and the possible slowing of the diamond and beef boom, has led the Government to make diversification of the economy a priority.

Although agriculture remains the main means of livelihood of the poorest households, it has failed to provide a route out of severe poverty. Crop production is difficult and risky due to periodic drought, but even taking this into account, average yields are extremely low and have not been improving. Beef production, supported by favourable EU prices and successful Foot and Mouth Disease control, has proved profitable for some. However, few resource poor farmers now own cattle, as enclosure of land and private access to boreholes has favoured richer farmers, especially in recent droughts.

There is concern about environmental degradation such as overgrazing and overuse of wood, although opinions differ both as to the severity of the problem and on the solutions. Environmental concerns are being addressed at the policy level by the National Conservation Strategy. However, in practice there is little progress yet in introducing sound management practices for many of the resources under threat. Dual grazing by leasehold farmers on communal land has not been stopped, despite the policy commitment to do so. Fencing, for livestock disease control and privatised tenure has devastated wildlife populations, while undermining tracking systems of livestock management suitable for a drought prone environment.

In view of the failure of agriculture to provide a means of developing out of poverty, and the limited environmental resources, it is legitimate to question whether encouraging sustainable agriculture is a viable strategy for relieving poverty. Certainly few young people are choosing smallholder farming as their careers and most households are partly dependant on off-farm income. However, given that the majority of poor households are currently dependant on agriculture for a major part of their livelihood, and the limited options for rapidly expanding non-agricultural employment, it is argued that improving both the sustainability and profitability of agriculture is essential, at least in the short and medium term.

Resource Conserving Technologies

Despite a relatively well qualified and well resourced research base, there has been limited success in producing technologies that have really been attractive to farmers in Botswana's drought prone environment. Changes in research orientation, with improved farmer-extension-research linkages and more inter-disciplinary working is considered necessary to improve the relevance of research to farmers. There is a

role for Government and NGOs in encouraging farmers to experiment for themselves by exposing them to different ideas (e.g. through visits and workshops) and by providing resources. Particular emphasis is needed to involve women farmers and those in female headed households.

Developments are underway in the processing and marketing of veldt products, although in some cases this has led to over-exploitation. Work is also being done on domestication, although care is needed to avoid destroying some of the specific advantages of these products to remote area dwellers.

The relative benefits of private leasehold versus communal grazing is a contentious issue that requires further study; the BRIMP programme should provide some needed data. Greater understanding is needed of tracking management systems and of the ways in which communities can manage their natural resources.

Creating an Enabling Environment

Botswana has been successful in creating an enabling environment for larger cattle owners with effective disease control, abattoir facilities, favourable prices negotiated with the EU, cheap leasehold grazing and borehole development. Unfortunately attempts to do the same for resource poor farmers have been less successful, with considerably more money being spent on support programmes than the sum total of crops produced.

The ALDEP programme provides 85% subsidy for a number of inputs for crop production such as draught power, plough, planter, cultivator, water tank etc. The ALDEP recommendation of early ploughing, row planting and vigorous weeding, increases yields per unit area but it is less clear whether yields per unit of labour are sufficiently high to enable labour constrained households to profit.

Programmes like ALDEP probably have the potential for improving sustainable smallholder production but need to be decentralised and complemented by other programmes such as:

- intervention buying of livestock from poor farmers at the onset of a drought
- support to rural crop processing
- off-season labour intensive public works
- consideration of the introduction of an agricultural minimum wage
- development of rural credit
- consideration of intervention to stabilise grain and bean prices
- development of more multi-purpose small dams
- community services for small-scale livestock owners

It is generally acknowledged that Agricultural Extension has been ineffective, despite having higher extension worker:farmer ratios and more resources than most countries in the region. To be more effective the extension workers must be more in tune with the real needs and knowledge of resource poor farmers and have the role

of facilitators, able to access additional resources and expertise as required. There needs to be more involvement of farmers in the selection and management of extension workers, greater decentralisation within the Ministry of Agriculture and improved links at the local level between schools and the extension workers.

Sustaining Institutions

In order to support the implementation of sustainable agriculture programmes in rural areas and, most importantly, the development of community based schemes to manage natural resources, community structures such as VDCs and farmer's committees will need to become much stronger. Greater emphasis must be given to the institution-building side of development in addition to just infrastructural development.

Communities and traditional authorities will need to take greater responsibility for managing resources important for small farmers such as grazing, veldt products, community boreholes, small dams and rural markets. Government services such as agriculture and land boards need to facilitate this community management and NGOs may be well placed to work with and train communities to do this.

Although agriculture is likely to remain only a component of rural livelihoods, transformation to increased smallholder profitability and sustainability is needed for both environmental and social reasons.

1. INTRODUCTION

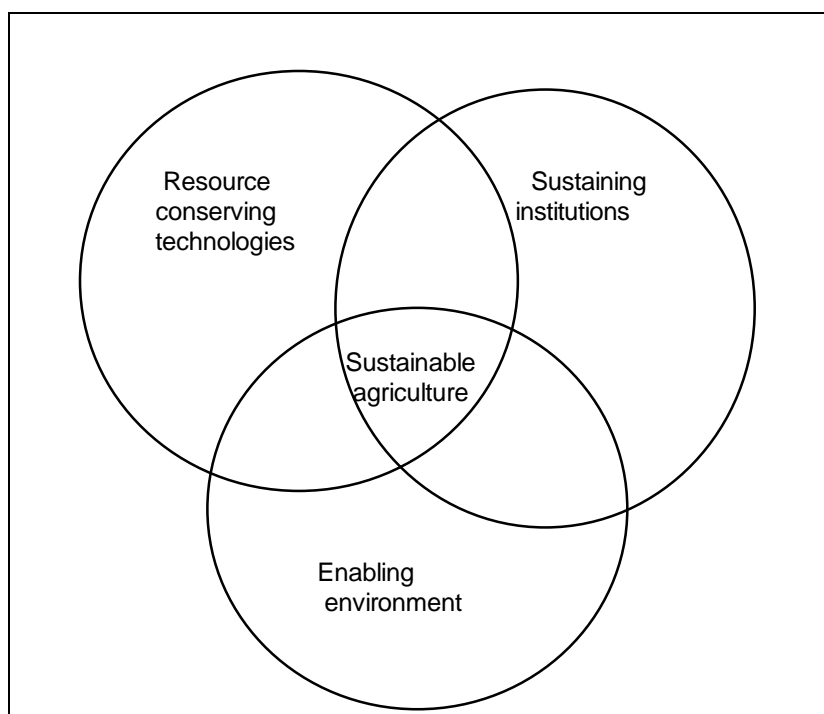
1.1 BACKGROUND

This report is one of the outputs of a programme funded by the British Government's ODA Policy Research Programme which is looking at services and policies needed to support more sustainable smallholder agriculture in Southern Africa. The current case study on Botswana is one of six case studies, the others cover Malawi, Zambia, Namibia, South Africa and Zimbabwe. This paper complements the general literature review on sustainable agriculture in Southern Africa and the overview on Botswana produced in phase 1 of the programme. These reports are available through Environment and Development Consultancy Ltd.

This paper concentrates on services and policies needed to support sustainable family sector agriculture in the east of Botswana where the majority of the population and the largest number of resource poor people are concentrated. It does not attempt to look in detail at the needs of the 'Remote Area Dwellers' although they experience extreme poverty, as this is a specific subject area. Nor does it look at some of the higher potential areas such as Pandamatenga, which, although potentially important in production terms, involve a relatively small number of households.

This report is structured around the three interlocking conditions considered necessary for sustainable agriculture:

Fig 1.1 Conditions for Sustainable Agriculture¹



1.2 NATURAL RESOURCES

The natural resources of Botswana have been described in detail in numerous publications and so only the briefest summary will be given here:

- rainfall is generally low with periodic droughts which have been severe in recent years, particularly in the mid 1980's and early 1990's. Mean rainfalls are generally below 500mm in the east of the country (where the population is concentrated) and below 400mm in the centre and south.
- Soils in the eastern third of the country are moderate textured with low fertility (Hardveldt). Much of the rest is sandy soils with low fertility and very low moisture retaining capacity (Sandveldt)
- Water is very limited with surface water scarce; there is increasing reliance on boreholes
- Vegetation is mainly various combinations of bush and savanna, there is debate about the degree of degradation due to overgrazing (see section 2.6) and wood cutting.
- Although 6% of the country is considered to have crop potential, 1% is cultivated in any year, so deforestation due to agriculture is considered to be only locally significant.
- Wildlife numbers have declined drastically in recent years owing to a combination of

veterinary cordon fences (preventing migration), drought, human encroachment and hunting. The exception is elephant numbers in and around some reserve areas which have increased so as to be causing vegetation change. Reserves and Parks make up 17% of the country.

- Mineral resources include diamonds, copper-nickel and coal; with diamonds responsible for considerable export earnings (see below) and coal used for domestic power generation.
- The human population is 1.4 million (1994) with a growth rate exceeding 3%, there is considerable migration from rural to urban areas, particularly by the young and by men.
- Cattle numbers decreased from 2.9 million in 1980 to 1.6 million in 1993 (due to drought and slaughter in Ngamiland to contain cattle lung disease). Smallstock (mainly goats but also some sheep) numbers increased from 0.7 million in 1980 to 2.1 million in 1993².

Botswana has developed, with considerable community consultation, a National Conservation Strategy to encourage sustainable use of natural resources. A National Conservation Strategy Coordinating Agency has a responsibility to coordinate and prompt different stakeholders to follow the strategy. It is unclear whether this will have sufficient influence to ensure that the necessary steps are indeed taken.

1.3 MACRO-ECONOMY

Botswana is classified as a middle income country with a GNP per capita of US\$2,790 (1993). There has been rapid per capita growth of GNP (estimated at 6.1% per year between 1980 and 1992) mainly due to diamond exports and, to a lesser extent, beef exports to the EU. However, the diamond and beef boom is slowing down as is the overall growth rate. This has led to a recognition of the need to curb Government expenditure and diversify the economy - these are recurrent themes of National Development Plan 8 (NDP 8 1997-2003) currently being drawn up.

A major theme is the further opening up of the economy (Botswana's economy has generally been more open than many in the region) with the abolition of exchange controls and moves towards the privatisation of some Government services and parastatals such as the Botswana Agricultural Marketing Board (BAMB). Increasing cost sharing in areas such as veterinary services is also expected.

Despite the rapid economic growth, there is continuing concern that a fairly narrow section of the population has benefited and that a large proportion of the population continues to live in poverty. There is also concern at increasing unemployment, under-employment and rising crime.

1.4 POVERTY IN BOTSWANA

A recent study (mainly analysing 1993/4 survey data) on income poverty in Botswana found³:

- roughly 38% of households (47% of population) were living in poverty in 1993/4.
- The number and proportion of people living in poverty was substantially higher in rural areas, although poverty in urban areas was also on a significant scale.
- A higher proportion of female-headed households were living in poverty although the overall number of poor people in female headed households and male headed households was similar.
- In comparison with 1985/6, the proportion of people living in poverty fell sharply, although the absolute number remained similar. People living in female headed households experienced significantly less reduction in poverty rates than those living in male headed households.
- The average household size and dependency ratios increase as the severity of poverty increases and the average dependency ratios for female headed households are significantly higher than for male headed households.
- Household sizes and dependency ratios increase sharply from urban, through urban-village to rural areas.
- Up to a third of female headed households are widows, especially among the poor and very poor.
- The proportion of household members in paid employment is a significant predictor of household poverty levels

The results from surveys such as this need to be treated with some caution as it is difficult to reflect adequately (among other things):

- inter-household transfers
- the consumption of home produce
- intra-household poverty

However, the broad thrust of the findings sets a benchmark for action and points to a crisis in rural areas. Social and demographic trends have created a "poverty trap" for many households, especially in rural areas and among female headed households with high dependency ratios and low labour potential.

1.5 EXISTING AGRICULTURE

Both crop and livestock agriculture in communal areas (often referred to as the traditional or family sector) are generally considered to have stagnated. Both crop yields and livestock offtake rates have hardly changed since Independence; this is particularly stark alongside the rapid development of both infrastructure, such as roads, and services such as education. The proportion of food being imported continues to increase, the number of poor in the rural areas remains unchanged, the proportion of

rural people without cattle continues to rise and, increasingly, young people are saying they are not interested in growing crops.

The basic agricultural system (with a number of variations) is for people to live in villages and to grow crops in fields (lands or masimo) which may be near the village or further away (in the latter case necessitating people temporarily living at their fields during the growing season). Fields are ploughed by animal traction or tractor and most crops are broadcast, although row planting has been encouraged in recent years and is reported to give higher yields and to be on the increase. Few people use fertilizer, although some use animal manure, and weeding is important to obtain a good crop. Sorghum is the main crop, with maize, beans, groundnuts and water melons also grown, often mixed in the same field. Yields vary enormously with rainfall but on average are extremely low at about 300kg/ha. Most families do not grow enough to last them throughout the year.

Livestock, particularly cattle, were traditionally kept further from the village in cattle posts using communal grazing. However, there has been a change over recent years, with the large cattle owners either gaining access to exclusive leasehold ranches, through the Tribal Grazing Lands Policy (TGLP) or sinking their own borehole and thereby getting de facto control over the grazing around that borehole. This has left the small cattle-owner disadvantaged and many have lost their cattle during droughts. Many of the large cattle owners in the leasehold areas practice dual grazing, using both their exclusive leasehold area and communal areas. This undermines one of the stated objectives of the TGLP, which was to reduce grazing pressure in communal areas by removing the largest herds.

A remarkable feature of recent years, particularly following recent droughts, has been the increase in goat numbers relative to cattle. Many of the poorer farmers now have goats instead of cattle:

Table 1.5(a): The change in livestock numbers (millions)⁴

	1980	1993
Cattle	2.9	1.6
Goats	0.6	1.8
Sheep	0.15	0.3

There has been a steady rise in the proportion of rural households which do not own any cattle:

Table 1.5(b): Changes in distribution of cattle between households²

Number of cattle	1981	1990	1993	1996
Farming households with no cattle	32%	38%	47%	49%
Farming households with 1-40 cattle	41%	38%	36%	25%

Farming households with 41-100 cattle	18%	18%	11%	16%
Farming households with >100 cattle	9%	6%	6%	10%

The fall in the number of cattle among the poorer households indicates a considerable intensification of poverty in rural areas, with loss of savings, security, cattle products and income. The loss of cattle has also left the poorer farmers at a disadvantage when it comes to ploughing - forcing them to hire ploughing, often at a less favourable time. This has been compounded by reduction in traditional livestock sharing schemes such as mafisa:

Table 1.5(c): Access to Draught Power⁵

	1980	1990
Use of own draught power	48%	35%
Use of Mafisa or borrowed draught power	20%	13%
Hired draught power	25%	45%

Gathering of wild fruits, tubers, caterpillars (especially Phane), firewood, poles, thatching grass and hunting wild animals have differing importance in different areas. In the remoter areas hunting and gathering make up a very important part of overall livelihoods (see 2.4). Phane is now an export industry, albeit erratic.

The Government runs relatively comprehensive agricultural services (see box 1.5). However the impact of these on sustainability and profitability for poorer households remains doubtful (see 3.7).

Box 1.5 - GOVERNMENT AGRICULTURAL SERVICES

MINISTRY OF AGRICULTURE

- **Department of Crop Production and Forestry** - includes crop extension service (TAs)
- **Department of Animal Health and Production** - includes veterinary extension and the National Veterinary Laboratory
- **Department of Agricultural Research** - includes both crop and livestock research
- **Department of Co-operative Development** - encourages and supports the nominally independent co-operative movement
- **Division of Agricultural Planning and Statistics** - provides statistical monitoring and evaluation and provides a link between the Departments and other Ministries.
- **Division of Agricultural Information**
- **Agricultural Resources Board** - supported by 10 District Conservation Committees, nominally responsible for the Agricultural Resources Conservation,

Herbage Preservation and Prevention of Fires Act.

- **Rural Training Centres (RTCs)** - five centres providing training for farmers as requested by TAs. Also used for training agricultural staff and staff of other ministries and organisations.

BOTSWANA MEAT COMMISSION (BMC)

Has three abattoirs, cannery and tanning facilities. Has statutory monopoly over exports of meat, owns marketing organisation in Europe. BMC aims to maximise returns to its suppliers.

BOTSWANA LIVESTOCK DEVELOPMENT CORPORATION (BLDC)

Acts as a public sector buyer in more remote areas where buying competition is weak.

BOTSWANA VACCINE INSTITUTE (BVI)

Produces vaccines for both home and export market.

BOTSWANA AGRICULTURAL MARKETING BOARD (BAMB)

(See box 3.2a) Buyer of crops and supplier of some inputs, supposed to hold strategic reserve. 26 depots and storage capacity 140,000 tonnes.

BOTSWANA COLLEGE OF AGRICULTURE (BCA)

Associate Institution of the University of Botswana providing agricultural training at certificate, diploma and degree levels as well as short course in-service training for extension staff. Mainly trains staff for the Ministry of Agriculture; has expanded facilities and intake markedly in recent years.

1.6 GENDER AND SUSTAINABLE AGRICULTURE

Gender roles vary from household to household, from rural to semi-urban to urban areas and are changing over time. The increasing numbers of female headed households have been noted, as well as the high degree of poverty found in some of these households. However, female headed households are very diverse and so generalisations need to be treated with caution. It is not only the gender of the household head that is important; the different roles of men and women in all households is important in relation to agricultural tasks, natural resource management and community power structures. Also of importance for the future are the differing aspirations of boys and girls in relation to farming.

Women and men are treated differently at three different levels:

- in national law
- in traditional law

- in existing social practice

National law has been restrictive towards women in agriculture because of its effect on land rights and credit. A process is underway to end this by changing the Deeds Registry Act and the Marriage Act. Women are also disadvantaged under customary law over land and property rights which affect inheritance and rights on divorce. The majority of the population follows patrilineal inheritance patterns and women often need support from a male relative in order to get access to land.

Customary law and social practice change over time. For instance traditionally the eldest son would inherit most of the cattle and other belongings from his father with the widow and daughters getting little or none (the son would however also inherit some obligations to care for them). Recent trends have been towards the widow inheriting most of the cattle and belongings (even if the son(s) look after the cattle) and for there to be a more equal division between all children⁶.

Within agriculture, women generally have particular responsibility for crop production, although men have responsibility for clearing land and ploughing with cattle. Women generally have responsibility for smallstock and men for cattle. Gathering of firewood, veldt products for home consumption and the collection of water are generally a woman's responsibility.

There is a very high proportion of female headed households in rural areas, some estimates put it as high as 43%. These households tend to have high dependency ratios, low labour availability and low access to draught power and cattle. Some programmes like ALDEP (see box 3.4) have tried to improve the participation of women. Few national agricultural programmes have, however, been based on a thorough gender analysis or really taken into account the different needs and constraints of female and male headed rural households.

A number of NGOs have specific interest and expertise in gender issues and the Women's Forum brings together concerned women at a national level to put pressure on the policy and legislative process in relation to gender issues. There is also a small but growing pool of trainers able to work with projects or community groups on gender issues.

2. RESOURCE CONSERVING TECHNOLOGIES

2.1 INTRODUCTION

There has been very limited technological improvement in recent years to Botswana's smallholder agriculture sector. Crop yields remain extremely low (around 300 kg/ha), even given the poor rainfall. Cattle productivity in communal areas (table 2.6) remains low and has hardly changed since independence. The reason for this lack of technological improvement is not necessarily a lack of yield enhancing technologies, but rather that the right combination of technology, enabling environment and community support has not been achieved.

The ALDEP package (see 3.4) of early ploughing, row planting and regular weeding has been shown to produce improved yields per unit area under smallholder conditions. However it is less clear whether the yields per unit of labour are consistently higher, and whether they are sufficiently high to enable a labour poor household to develop out of farming through crop agriculture.

Therefore any technology needs to be developed within a small farmer context and meet the priorities and the constraints of those farmers.

2.2 RESEARCH

Lack of appropriate technology is recognised as a constraint to the development of the agricultural sector⁷. The Department of Agricultural Research is relatively well resourced with over 60 professional staff, four regional research stations and eighteen ranch research sites. In addition some research is carried out by the Botswana College of Agriculture, the Department of Environmental Science (University of Botswana), the National Institute of Development Research and Documentation (NIR), the Department of Wildlife and National Parks, the Rural Industries Innovation Centre (RIIC) and some NGOs like Veldt Products Research and Thusano Lefatsheng.

The draft NDP 8 includes a plan to produce a research master plan in order to systematically prioritise research efforts. Strategies include:

1. Institutional development including infrastructure, research equipment, intersectoral co-ordination and collaboration.
2. Development of technologies within farming systems and practices that are economically and environmentally risk efficient.
3. Development of technologies for household, on farm and industrial processing of agricultural products to add value and enhance shelf life
4. Conservation and protection of diversity in plant and animal genetic resources.
5. Promotion of bio-technological research with potential for higher production.
6. Establishment of an Agricultural Development and Research Council to co-

ordinate research and technology development in the agricultural sector.

These strategies imply a cross sectoral farming systems approach. The focus on risk efficiency is important for smallholder sustainability but labour efficiency should probably also be included.

Scientists worldwide have started to work more closely with farmers and to pay more attention to the social and economic context in which farming is practiced. There is a progression of levels of involvement by farmers in research, and Botswana has:

- involved farmers in some prioritisation of research
- undertaken researcher managed research on farmers' fields
- undertaken farmer managed and researcher interpreted research in farmers fields
- undertaken social and economic research on different farming systems.

Despite this, agricultural research has been criticised for its top-down orientation, focusing on issues identified at headquarters rather than on the problems experienced by farmers in their daily work⁸. However, the Department of Agricultural Research remains very discipline divided within its eleven programmes of cereals, oilseeds, horticulture etc. as well as having a modernisation ethos. In addition, the linkages between research, extension and farmer are weak. Therefore fundamental changes will probably be needed in order for this research agenda to succeed in producing real benefits for the poorer farmers.

There is formal farmer participation on the Livestock Advisory Committee for Research; these tend to be prominent rather than average farmers, and they tend to listen rather than make a substantial input into recommendations.

Some leading NGOs working in this field consider that technologies are not really developed **with farmers** despite the increased farmer involvement. Part of the problem is that although scientists have co-opted farmers to help them with their research, little help has been given by scientists to farmers' research. Agriculture developed long before research departments through the experimentation of farmers. The role of research departments is to complement and support farmer research rather than replace it. The difference between farmer input into scientists' research and scientists' support of farmers research is illustrated in table 2.3. Both are needed for a truly dynamic research process.

Table: 2.2 The two sides of farmer/scientist complementary research

Scientists' research with help from farmers	Farmers' research with help from scientists/others
<p>Information provided by farmers on:</p> <ul style="list-style-type: none"> • farming systems, • farmer social, cultural and economic conditions • farmer priorities • on-farm research <p>guides the work of the agricultural scientists.</p> <p>Farmers manage trials on behalf of scientists and give their opinions to scientists on the results.</p>	<p>Farmers exposed to a variety of ideas through:</p> <ul style="list-style-type: none"> • discussions with scientists • visits to other farmers • visits to neighbouring countries • visits to research stations • offers of relatively untested planting material and techniques <p>Farmers then "try" what makes sense to them on a small scale, adopt and expand what works and discard what does not.</p> <p>Scientists/TAs can monitor this experimentation (although this is not essential); what is important is to catalyse it with ideas and opportunities and let the farmers decide what to adopt or not.</p>

Botswana has a relatively good record over the years of 'scientists research with help from farmers' through its farming system approach to research and by including on-farm trials within the research programme. However, the record on encouraging farmer experimentation is very poor, in fact there is opposition to allowing farmers to try what is not yet officially recommended. Scientists do not like this approach as "they are not in control". The Ministry of Agriculture wants to promote what is '**recommended**'; this is understandable but should not in the right circumstances prevent farmers being treated as equals with the invitation "*we don't know how good this is, but if you like, try it on a small-scale and see*". For instance Veldt products Research are currently undertaking experiments on agroforestry systems using indigenous fruit trees which will take several years. There seems little reason why farmers should not visit these, and if it makes sense to them, try planting some themselves in whichever way they think might work best for them.

The development of complementary scientists' and farmers' research would benefit from much improved Farmer/Extension/Research linkages. This requires decentralisation so that people are encouraged to work together and can make the relevant decisions at field level (see 3.9).

Changes will probably be needed within the structures and ethos of DAR to achieve the strategies outlined in NDP 8. This will require more inter-disciplinary working and a greater emphasis on returns to labour and on reducing risk. Farmer experimentation should be encouraged both by the Ministry of Agriculture

and NGO staff through exposure to ideas (e.g. through visits and workshops) and, where relevant, by providing resources and/or planting material.

2.3 TECHNOLOGICAL OPPORTUNITIES

This report is primarily concerned with the policy framework within which technologies are developed, rather than providing detailed evaluation of individual technologies. However the interaction between the enabling environment, services needed and existing constraints inevitably highlights some technological opportunities. The table below is not exhaustive, but does give a pointer to some of the technologies either being worked on, or worthy of further study.

Table: 2.3 Some technologies which may be relevant to encouraging more sustainable agriculture in Botswana

Technology	Comment
Early ploughing, row planting and regular weeding	A part of the ALDEP 'package'. Increases yields per unit area and is popular among some households. Little data available on returns per unit of labour. Some indications that labour short households find the labour needs a constraint.
Intermediate level chickens	<p>There is a possible opportunity for improving chicken production at the level between the traditional free-range tswana hen receiving virtually no inputs, and the small scale high to medium input broiler/egg units currently encouraged by the Ministry of Agriculture.</p> <p>Improved chicken production at the household level with minimum investment and recurrent costs could improve household nutrition and supplement incomes. An added advantage is that such chickens are often under the control of women.</p> <p>Productivity has been limited by periodic epidemics of Newcastle Disease and high mortality among young free-ranging chicks (mainly through predators). The Australian developed V4 vaccine is claimed to have better heat tolerance and easier administration, possibly making family sector control of Newcastle Disease a reality for the first time. Appropriate penning for newly hatched chicks might be effective in reducing mortality.</p>

Improved goat management	<p>Goat numbers have increased three fold over the last decade and they now outnumber cattle. In contrast to cattle, goats are often under the control of women and resource poor farmers. Increased numbers of goats does not yet seem to have been matched by the emphasis given to goats at Ministry and local government level.</p> <p>The effect of increasing goats on range needs to be both studied and managed, they may be beneficial in reducing bush encroachment.</p> <p>Opportunities for increasing the productivity of goats need to be investigated. The Agricultural Department of the Tonota College of Education is for instance finding farmer interest in crosses between dairy and tswana goats which appear both adapted to the harsh Botswana conditions and able to produce milk for local consumption or sale.</p>
Improved processing of indigenous products	<p>Various indigenous species such as the devils claw (Grapple) and fruit trees like morula have good potential markets and may also be important for home consumption. An important feature of these species is that they are adapted to Botswana's harsh conditions, are often used by otherwise extremely resource poor communities and are often the only thing that produces a crop in a drought year.</p> <p>Markets are being developed and need further developing (see section 2.4). There is also potential for local processing and therefore adding value before sale. Further research into this is needed.</p>
The cultivation of indigenous species	<p>Attempts are being made by the NGOs Thusano Lefatsheng and Veldt Products Research to select and grow domestically some of the indigenous wild plants in order to increase production and/or decrease over-exploitation in the wild. Success could provide an additional valuable component to rural livelihoods.</p> <p>Two points of caution (see table 2.4):</p> <ul style="list-style-type: none"> ● there is often a link between productivity and hardiness. Breeding for increased productivity can lead to reduced resistance to drought ● linked to the above, domestication may lead to cultivation by better off farmers in more productive areas (perhaps even outside Botswana), thereby undermining the gathering market now being enjoyed by some of Botswana's poorest communities.

Local processing of agricultural products	<p>Current agricultural policy encourages crop diversification. Processing of these recommended crops such as sunflower, groundnut and cotton at a household or community level can:</p> <ul style="list-style-type: none"> • maximise value added • encourage economic activity and employment in rural areas. <p>Technologies for dehulling, oil extraction and cotton cleaning have potential and some are being developed by organisations like RIIC.</p> <p>Mechanised threshing of existing crops has the potential for reducing workloads, particularly for women, and making increased production more attractive.</p>
Fodder Crops (such as Dolycus lablab)	<p>Traditional livestock enterprises are typically low input - low output. Growing fodder would increase input, particularly of labour, and will only be cost effective if a corresponding increase in output is achieved. This is more likely in more intensified schemes such as dairy cows or goats. Strategic supplementary feeding of draught animals or at breeding time might also be effective.</p>
Agroforestry	<p>There are various programmes, mostly involving fruit trees (exotic and/or indigenous) grown in or around crop fields. Some farmers are reluctant to include trees within crop fields for fear of encouraging birds (eg Quelea) which attack the crops. Where farmers are prepared to interplant trees, species such as Faidherbia albida may prove beneficial.</p> <p>There is potential for trees to be planted in sequence with crops rather than in conjunction (this would avoid the bird problem). In this case leguminous trees might be planted as an improved fallow - not only regenerating the field but also possibly providing some fodder and or firewood and poles. More research is needed.</p>
Backyard gardening	<p>There is certainly potential for more production in people's backyards - in villages or towns. A combination of fruit trees, vegetables and small livestock (intermediate level chickens, zero grazed dairy goats, rabbits etc.) has been shown to supplement household diet and income. Various techniques such as trench gardening, water harvesting and re-use of grey water can be used.</p>
Small dams	<p>Multipurpose dams providing water for human consumption, smallstock and small scale fruit and vegetable production have potential.</p> <p>Techniques for labour intensive construction and community planning, development and maintenance need to be developed.</p>

Improved crop storage	A new component of ALDEP Phase 2. Has potential for reducing losses and enabling delayed sale until prices are high.
Kraal Manure/Green Manure	<p>Kraal manure has been recommended to farmers for many years with little uptake, the labour required being a major deterrent. However discussions with farmers in North-East District reveal a growing acceptance of the practice. This could spread if concern for building soil fertility increases.</p> <p>Although green manures such as Sun Hemp can be shown to increase subsequent crops, in most cases it seems unlikely that farmers will consider the labour required justifies the potential benefits.</p>

2.4 VELDT PRODUCTS

There is increasing recognition of the potential for veldt products to contribute to rural livelihoods. The importance of these products is due to a number of factors:

- Veldt products are important to the poorest and most remote households - those it has proved most difficult to assist through conventional programmes
- Veldt products are seen as key components of CBMNR schemes (see section 4.3) and the creation of value for these products is seen as a way to promote their conservation.
- Recognition in some quarters that veldt products have the potential for greater profitability in some circumstances than crop and livestock agriculture which are high risk.
- The development of markets for veldt products such as Morula, Phane, herbal teas, Grapple (Sengaparile or Harpagophytum procumbens) and truffles in South Africa, Europe and Far East.
- Veldt products are already an important and unrecognised part of the informal economy and household livelihoods - thus in addition to the specific products with cash earning potential, households have always used wild vegetables, fruits, firewood, thatch, poles etc.

Mainstream economists are at last showing that Veldt products should be taken seriously and larger scale production programmes are being planned. For instance an ambitious programme to collect and process Morula (*Sclerocarya birrea*) in the north of the country has a plan to market 12,000 tonnes per year, to create 600 jobs and inject P1.1 million into local economy. Two NGOs - Thusano Lefatsheng and Veldt Products Research (see Box 2.4), have an existing track record on the development of veldt products.

Box 2.4 - Developing Veldt Products

Thusano Lefatsheng (TL)

TL was formed in 1984 by a group of citizens and expatriates concerned about poverty aggravated by continuous crop failure due to drought. TL was set up to develop alternative cash crops through the selection of indigenous plant species and other drought tolerant plants from arid areas. The focus of TL has been on the Western Sandveldt and has expanded to cover Kgalagadi, Ghanzi, Ngwaketse-Kghalahadi, Kweneng West and other areas.

TL's programme has a number of departments:

- **Extension** - awareness raising and training with local communities on sustainable use of various veldt products. User groups are being formed and support being given to CBMNR projects. There is concern at the over-exploitation of some veldt products and their possible local extinction.
- **Research** - in the short term this is looking at sustainable harvesting techniques, in the long term better cultivars are being selected for cultivation.
- **Commercial** - seeks market opportunities for TL's products, development of new product lines and contributes towards the overall expenses of TL. In 1994/95 it generated revenues of P407,060, producing a gross profit of P262,964 (Gross Margin 64%)⁹. This amounted to 41% of total expenditure, with the balance of 59% being made up by donors. The plan is to expand locally generated income to 67% of the total, leaving 33% to be made up from donations. The main products are (1994/5):

Sengaparile granules (medicine)	P271,900
Sengaparile tablets (medicine)	P96,200
Mosukujane (herbal tea)	P15,300
Mosukudu (herbal tea)	P5,000
Lengana (herbal tea)	P4,100
Phane (catterpillar - delicacy)	P14,800

TL has a factory where Sengaparile is made into granules, the tableting is contracted out. The tea is made into tea bags.

One issue within TL is finding the balance between the commercial activities and extension activities. On the commercial side TL has been trying to maximise profits, by competing with other operators and has considered patenting its inventions, thereby excluding others from using them. On the extension side, however, there is a commitment to work in collaboration with other organisations in the interests of local communities. These communities might be best served if a range of buyers were available for their products - not just TL.

Veldt Products Research (VPR)

VPR was established as an informal organisation in 1981 to research and develop a wide range of non-timber forest products and to investigate suitable management systems for natural resources in order to ensure sustainable utilization. In 1988 VPR began a long term research programme on the domestication of indigenous fruit trees with economic potential. In 1994 VPR became a registered non-profit

making organisation.

The components of VPRs programme include:

- Assisting rural communities to develop their own strategies for utilising their natural resources in a sustainable way.
- Domestication of indigenous fruit trees and identification of the most suitable production system for resource poor farmers
- Mycorrhizae research to identify and multiply those mycorrhizae (fungi) which improve indigenous fruit tree growth.
- Processing of indigenous fruit.
- A buying and marketing network for veldt products.
- Consultancy and training.
- Commercial nurseries - for exotic and indigenous fruit trees and ornamental plants.

While the desire to domesticate veldt products is understandable there are also some very real dangers.

Table 2.4: Advantages and risks of domesticating veldt products

Advantages	Risks
Reduced pressure on fragile and scarce natural resources	Improved cultivars (with narrower genetic base) may increase yield in an average year but destroy those attributes that make veldt products particularly important for food security - production even in drought year, pest resistance etc.
Increased production per plant and per unit area with improved cultivars and improved cultivation	
Increased production per household because of reduced time spent harvesting from dispersed plants	Cultivation may destroy the socio-economic characteristics that make veldt products so important for the poorest remote area dwellers. Where there is a limited market, successful cultivation may be concentrated in less remote, more favourable situations (even outside Botswana) and destroy the market for those in remote areas.
Care taken over plants as private rather than common pool resource	

The sustainable use, processing and marketing of veldt products needs to be encouraged. Where possible producers need to have a choice of channels through which to market. Domestication must be undertaken with care, and efforts made to maintain the comparative advantage of the poorer remote area dwellers.

Wildlife utilization

Research results show that commercial use of wildlife for meat, trophy hunting and game viewing can result in attractive rates of return¹⁰. It is probable that the subsidies and overall returns for beef will decline, which are likely to make wildlife management more attractive. There is currently no abattoir in Botswana capable of processing ostrich meat for export, leaving ostrich producers at a disadvantage. Over large parts of the country wildlife utilization has a comparative advantage over livestock and it is considered that the potential is at least four times the present level. However the main beneficiaries of wildlife utilization are likely to be larger farmers and businessmen unless communities are enabled to participate in schemes like the Chobe Enclave Project (see 4.3).

Botswana currently promotes 'high cost, low volume' tourism. Data from South Africa suggests that, although profits from this type of tourism can be very high and environmental impact low, the employment generation is also low and therefore the distribution of benefits, compared with 'low cost, high volume' tourism, is poor.

The issue of how poor rural households can benefit from wildlife and tourism needs to be further researched and debated.

2.5 WATER DEVELOPMENT

Water is an overriding constraint throughout Botswana. Considerable investments are being made in large schemes to try and achieve water security for major settlements. 65-70% of water currently comes from groundwater, however reliance on surface water is likely to increase when some of the water main projects come on stream. Industrial use is expanding rapidly, but agriculture still accounts for a total of 48% of all water supplies. The NDP 8 stresses the need to consider water use efficiency and not just expansion of supplies to meet demand. Some large scale schemes, such as the Okavango Integrated Water Development Project, have been shelved because of environmental concerns (although in a different scheme Namibia may remove water from the Okavango River). The recent National Water Master Plan envisages that by 2020 all Botswana's internal surface water resources will be being used and attention will need to be focused on international resources such as the Zambezi. There is considerable scope for regional conflict over water in coming years.

There has been an expansion in the numbers of small dams, although this has not been as fast as planned because of personnel and equipment constraints. There is some concern that excessive building of small dams may harm existing downstream water off-takes. The recent Agricultural Development Water Policy is supposed to facilitate the optimal use of multi-purpose dams. There has been some development of small-scale filtration units to enable human consumption of water from small dams.

There seems to be scope for increased development of small dams and increased community involvement in the planning, construction and management of small dams. The potential for very small scale (plots of 1/10-1 Ha) vegetable growing beside small dams needs to be further developed.

2.6 GRAZING

Grazing is a particularly important and controversial natural resource that merits specific discussion. Communal areas make up most of the total land area and support 85% of the national cattle herd.

There is an ongoing debate on the degree of range degradation in communal areas, whether the deterioration is permanent and the extent to which this is due to overgrazing. Many rural Batswana, with some justification, attribute lack of grazing to lack of rainfall rather than overgrazing. Among the scientific community the debate has become somewhat polarised with some loose use of scientific data to back different

viewpoints.

Firstly it is important to distinguish between vegetation change and degradation. Any change in land use will cause vegetation changes; these changes only become degradation when the productive capacity of the land is significantly reduced e.g. when palatable grass species are replaced by unpalatable species or the fertile topsoil is either washed or blown away. Even when degradation is shown to have taken place there is debate whether this degradation is permanent i.e. if the pressure is removed whether the land will return to its previous productive state (the ability to do this is called resilience).

It is generally agreed that degradation has taken place around some boreholes and some settlements. There is less agreement on whether more widespread degradation has occurred. Most boreholes have a sacrifice zone (0-400m) with little biological productivity, this is surrounded by a nutritious grass zone (200-800m) followed by a bush encroachment zone (200-2000m). Beyond this there is a relatively unaffected grazing reserve area. With boreholes at 8 km spacing it can be seen that most of the area is not significantly affected¹¹. Even when soil loss is observed there is debate as to whether this is significant and whether in fact soil is being redistributed rather than permanently lost. Vegetation changes are also not necessarily due to overgrazing - variations in rainfall also have been shown to have a marked impact. Some of these questions will hopefully be answered over the next three years as the Botswana Range Inventory and Monitoring Project (see box 2.6a) begins to produce results.

Box 2.6a - Botswana Range Inventory and Monitoring Project (BRIMP)

The aim is to strengthen land use planning and land management policy by providing reliable technical and sociological information on the use and condition of the rangelands.

The project has a number of interlocking components:

Range Inventory System (RIS) - to develop a comprehensive database on all inventory data ranging from bio-physical to socio-economic. The data will be stored on a GIS database and have supporting software and be able to generate predictive models.

Monitoring seasonal vegetation change (Early Warning System) - working with the meteorological services, it will integrate rainfall with vegetation data so as to be able to produce carrying capacity maps.

Sociological Input :

- to develop an understanding of rangeland uses,
- to highlight indigenous knowledge of rangelands
- to identify socio-economic questions for the RIS
- to collect socio-economic data for the RIS
- to evaluate the prospects for community-based rangeland monitoring

- to train rangeland economists in PRA techniques

Training/Human Development - both interdisciplinary and disciplinary, the aim will be to build up collective capacity to make the project sustainable.

Literature/information Review - to produce easy to read executive summaries of the state of current opinion on each of the various related topics.

Research - rather than conduct original research BRIMP will improve capacity and facilitate appropriate research by others.

Best estimates at the current time of the state of Botswana's rangeland are:

- Changes in range vegetation have occurred in response to grazing, including changes from perennial to annual grass species and increases in bush density, the evidence linking these changes to irreversible loss in soil and useful vegetation productivity except in limited areas is not conclusive^{12,13}.
- There is degradation around settlements and boreholes and some of this degradation is likely to be permanent.
- Vegetative change in areas of high grazing pressure is leading to some degradation, but this is less significant than annual variations in productivity due to rainfall patterns. Most of this degradation is unlikely to be permanent.

To compound the debate on the seriousness of land degradation there is also disagreements over the solutions.

In recent years land in communal areas has been virtually "Open Access" with few restrictions on Botswana citizens wanting to build up livestock herds. However two processes have been taking place:

- exclusive access has been allocated to individuals or syndicates (on a long lease basis) in the form of 6,400 Ha TGLP ranches. These have naturally gone to the larger cattle owners (but many still use communal grazing as well - see box 2.6b).
- De facto control over grazing in many areas has gone to those with access to water, which has increasingly meant those who can afford individual or syndicate boreholes. More recent agricultural policy is allowing fencing of grazing around these boreholes and therefore de jure control of the grazing. This may also mean control of other natural resources such as Phane, thatching grass, wild fruits and other veldt products.

Box 2.6b - Dual Grazing

One of the original justifications for giving large cattle owners leasehold ranches was to reduce pressure on communal areas. However in practice many of the large owners have continued to graze cattle on both communal areas and in their ranch. Many therefore contribute towards grazing pressure in the communal areas and then retreat to their ranch once the grass in communal areas is finished.

Although the Government has committed itself to abolishing dual grazing in NDP 7 and again in the draft NDP 8, in practice nothing has been done and there do not seem to be any concrete plans to achieve this. Enforcement is difficult:

- Many large owners believe that the ownership of a leasehold ranch does should not cancel their constitutional right to the use of communal areas
- Owners could avoid enforcement by claiming their cattle in communal areas actually belonged to other family members.

It might be possible partially to tackle the dual grazing problem by removing dual grazing rights from individual cattle rather than their owners, i.e., individual cattle might be registered and branded as belonging either in a ranch or a communal area and simple transfer between the two would be an offence.

Many within the Ministry of Agriculture see communal areas as "the problem". In this they are opposed by many resource poor farmers, some NGOs and some land boards who see communal areas as part of "the solution" - e.g. a resource for poorer communities.

The Ministry of Agriculture back up their viewpoint with statistics on the higher productivity of the fenced areas¹⁴.

Table 2.6 Productivity in communal and leasehold areas

	Communal Area	Fenced Area
Calving rate	50%	60%
Annual mortality	12%	5%
Annual offtake rate	8%	17%

While pertinent, these sort of figures only show part of the picture. The offtake rates, defined as sales, do not include many of the other valid contributions livestock make to the rural (and therefore national) economy such as draught power, milk, savings and insurance. Nor is consideration given to the overall productivity i.e. including not only livestock but other veldt products. In addition there is no consideration of costs (financial and economic) of the different systems nor their employment or self-employment potential. These are all needed in order to make a realistic comparison of communal grazing with fenced grazing.

It is also important to note that many of the recently fenced leasehold areas are not much different from "fenced cattle-posts" with similar low offtake rates and lack of modern grazing management. Thus just giving exclusive land rights does not automatically lead to a change in the production system.

In the past livestock "experts" considered they could assign maximum carrying capacity to different types of rangeland, i.e. a certain fixed number of hectares was considered necessary per livestock unit. More recent research and experience¹⁵ have raised important questions about the applicability of this approach with increasing recognition that:

- optimum stocking rates vary according to the management system and outputs needed (optimum rates for ranches beef being lower than for communal area beef/draught/milk/savings systems)
- in areas of highly variable rainfall, higher stocking rates can be achieved by allowing livestock to move relatively large distances to areas with better grazing at a particular time.
- in areas with highly variable and cyclical rains optimum stocking rates change according to the amount of rains and therefore livestock numbers should rise and fall according to the quantity of rain.

Systems in which livestock move over relatively large areas to exploit changing grazing resources and in which stocking densities vary according to rainfall/grazing availability are called tracking systems. The relative merits of the more static "maximum livestock unit" approach to sustainable grazing and the more flexible "tracking" approach are disputed, with advocates of the former tending to favour continued enclosure of land and advocates of the latter arguing for the retention and community management of communal grazing.

In practice there has been a progressive increase in livestock stocking densities, human

population density, cropped areas and total outputs from communal areas.

Both leasehold and communal grazing is a current reality in Botswana. There should be a greater emphasis, however, on developing services and management capacity to make the communal areas profitable and sustainable (see 4.3). This will require more appreciation of tracking management systems and a review of fencing policy. Increased efforts are needed to end dual grazing.

3. CREATING AN ENABLING ENVIRONMENT

3.1 INTRODUCTION

It is generally accepted that the Governments efforts to promote increased crop production have not been successful. The Governments Chief Agricultural Economist points out¹⁶ that in the 1985-91 period:

P190 million was spent on ARAP
P 22 million was spent on ALDEP
P 41 million was spent on FAP (agricultural sector)

making a total of P253 million in all. In the same period total crop production was worth P144 million. Although this period was severely affected by drought, and some of these programmes are perhaps better characterised as drought relief interventions, it does indicate a considerable amount of money being spent with little return.

The broad policy of Government with regard to creating an enabling environment for sustainable agriculture was spelt out in NDP7 (11.66):

“Government’s activities be confined to facilitating the process of agricultural development through research, training, extension, and the provision of infrastructure and essential services, such as roads, trek routes and disease control and access to credit. Government also has an important role to play as custodian to the environment.....As far as possible, however, production and marketing functions are undertaken by the farmer and the private sector, while prices are left to the market”

NDP 7 articulated a policy change towards economic liberalisation. This was complemented by a change in policy from national food self sufficiency to food security (see box 3.1). The policy of economic liberalisation continues in drafts of NDP 8, although targeted subsidies are supported in certain circumstances (see 3.4)

In discussions with farmers some of the disincentives to sustainable agriculture were noted as:

- Lack of markets - particularly for diversified products such as vegetables, eggs, veldt products.
- Low prices, particularly for Sorghum and expensive transport to the nearest BAMB depot.
- Difficulty for poor households to raise their contribution (typically 15-25%) to some of

the assistance packages, such as ALDEP; credit was considered to be needed for this.

Box 3.1- Self-sufficiency versus Food Security

(from NDP 7)

National food self-sufficiency implies producing within Botswana sufficient livestock, sorghum, millet, maize and milled products of these products to satisfy the needs of everyone in Botswana, regardless of cost. Given the environmental constraints in Botswana, this cost would be very high. Furthermore, national food self-sufficiency is only indicative of the physical supply of food: it does not guarantee universal access to food, nor the end of hunger and malnutrition.

Food security, on the other hand, allows for production and income generation which follow the principle of comparative advantage through trade. The policy of national food security to be implemented during NDP 7 has the following three components:

1. At the *national level*, Botswana has a comparative advantage in producing livestock (particularly beef) and sorghum, as well as the production of minerals and an increasing range of manufactures and services. Foreign exchange earnings from activities in which Botswana is competitive can be used for importing essential food items which cannot be produced so advantageously in Botswana, such as maize.
2. At the *household level*, it is the purchasing power of individual households which determines the quantity and quality of the food consumed. Purchasing power depends on both the household income and on the prices of basic foodstuffs. The goal of household food security demands that each household has sufficient income generating opportunities and access to food to meet its nutritional requirements.
3. To lessen the risks and dependence, it is wise to buy the imports from a number of countries and to maintain a *Strategic Grain Reserve* in Botswana. Currently it is planned to store up to six months' supply of food grains in such a reserve. This will also help to cushion Botswana against severe shortfalls of production resulting from drought, allowing time to arrange supplies from other sources.

3.2 MARKETING

Crop Marketing

There is widespread dissatisfaction among farmers at the price they receive from BAMB for sorghum. Farmers also noted that the price offered by commercial grinding mills for appropriate quality sorghum can be considerably higher than the BAMB price.

BAMB has set its producer prices in recent years at [border parity + transport] for food grains. Sale price is determined by producer price plus “an appropriate mark up”.

Table 3.2: BAMB prices 1987/88 to 1993/94 (Pula per metric tonne bagged)¹⁷

	1993/4	1992/3	1991/2	1990/1	1989/90	1988/9	1987/88
Producer price sorghum	330	376	271	302	302	302	302
Producer price maize	344	310	291	275	275	275	275
Differential price sorghum over maize	-4%	-21%	-7%	+10%	+10%	+10%	+10%
Mark up on Sorghum release price	62%	45%	67%	18%	18%	18%	13%
mark up on maize release price	33%	44%	20%	36%	26%	26%	23%

Analysis of the figures show some interesting trends:

- The price offered for sorghum (which is environmentally more suitable to smallholder production in low rainfall conditions and is the traditional crop) has declined relative to maize.
- The mark-up on sorghum release prices has increased dramatically and in recent years has been higher for sorghum than maize.

Box 3.2(a) - Botswana Agricultural Marketing Board (BAMB)

BAMB was formed in 1974 with responsibility for improving the marketing infrastructure within the country. It has built up a network of 15 depots and 9 agencies and both buys and sells basic grains, beans and oilseeds. In addition it sells fertilizer, seed and empty bags.

BAMB has generally relied on farmers bringing produce to their depots, it has never had a particular emphasis on outreach buying or mobile buying points. ALDEP however promoted a number of community lock up depots, some of which proved successful.

Before 1992 only BAMB was allowed to import sorghum (maize imports were always allowed). This kept the price of sorghum artificially high, which tended to benefit mainly the larger farmers as most poor farmers do not have excess sorghum to sell. Since 1992 restrictions on imports have been lifted.

BAMB has built up considerable cumulative losses over the years. It is supposed to hold the countries strategic grain reserve of 45,000mt (scaled down from 80,000mt), however in November 1996 the reserve stood at 5,000mt. The Government appears to be planning to phase out its intervention in crop marketing and BAMB is likely to be privatised and possibly dismembered.

Since the majority of resource poor households are net purchasers of grain they are

likely to be harmed by attempts to keep the price of grain artificially high. There are aspects of recent BAMB policy which perhaps need to be questioned such as the high mark ups and the preferential price given to maize. However, since Government intervention in general marketing through BAMB seems set to end, it is perhaps more useful to look at what future interventions, if any, should be maintained.

Perhaps the most useful intervention would be on a price stabilisation basis - stepping in to make purchases in a good year when there is surplus production to prevent prices falling to unacceptably low levels. This could be sold (or distributed as drought relief) during a bad year to prevent grain prices becoming unacceptably high. A scheme like this:

- could be linked to the management of a strategic grain reserve
- would be likely to be particularly beneficial to marginal producers - raising prices at times when they were trying to sell and lowering them when they were trying to buy
- would not necessarily involve ongoing inputs of Government money and could, if necessary, be largely implemented through the private sector.

A Government price stabilisation programme for grain and beans, linked to the strategic grain reserve programme, should be studied.

Livestock Marketing

Cattle from small farmers are sold either for the local market or are transported to one of the BMC abattoirs. Until recently the transport and marketing to BMC was handled by both local producer cooperatives and by private traders. Recent financial difficulties within the Cooperative Union means that private traders are now playing the dominant role. It is not clear how this has affected resource poor farmers and whether cattle marketing is a constraint.

Smallstock marketing has however been identified as a constraint. A much larger proportion of smallstock compared with cattle are either used for home consumption or sold locally. Only a small proportion are sold to the BMC and the abattoirs are generally not using their smallstock capacity to the full. One problem has been the transport costs for smallstock - if these are fully paid by the farmer it makes selling to the abattoirs uneconomic. Smallstock marketing has in the past received cross-subsidisation from cattle when joint loads have been transported as well as subsidisation from the Small Stock Unit of the Ministry of Agriculture.

The Livestock Marketing Development Project (Box 3.2b) has tried to improve the marketing of smallstock but failed.

Box 3.2(b) - Livestock Marketing Development Project (LMDP)¹⁸

The objective of the project was to increase rural incomes by increasing smallstock offtake, with increased marketing through the Botswana Cooperative Union/Livestock Marketing Division (BCU/LMD) to BMC abattoirs. This was to be achieved by improving

smallstock infrastructure at rail sidings and quarantine camps, the provision of vehicles and railway rolling stock and the provision of working capital to the BCU. Marketing and transport were to be transferred from the Ministry of Agriculture to the cooperative movement. There was an assumption that smallstock transport to the abattoir would be cross-subsidised by cattle.

The project was funded by the EU. There was a considerable delay between formulation and implementation and some of the proposals were, in hindsight, ill-conceived:

- Improvements in roads mean that road rather than rail is the most appropriate means of rapid transport to abattoirs.
- Implementation may have coincided with a cyclical downturn in smallstock marketing to the BMC
- The implications of the transfer of responsibility from Government to the BCU/LMD and its successor BAMCU were not realised and these organisations did not have the organisational capacity or financial resources for the scheme as proposed.
- The cross-subsidisation plan was not sustainable.

An evaluation of the project in 1996 concluded “*the LMDP has been of virtually no benefit to smallstock producers and has had a negative overall impact on the smallstock marketing structure*”¹⁸. After considering various options, including canceling the project, the evaluators concluded that marketing of smallstock was still a constraint to certain groups of smallstock producers and recommended:

- a consultative exercise be undertaken with farmers to establish the current smallstock marketing situation.
- Studies conducted as to why some primary co-operatives are more go-ahead than others.
- Other constraints within the smallstock sector should be examined including husbandry, nutrition and health.

Based on the results of this exercise a redesigned project could be considered, possibly involving:

1. Provision of transport and training directly to some multi-purpose cooperatives (efforts to reduce transport costs through backloading etc.)
2. The Ministry of Agriculture resuming the provision of smallstock marketing extension.
3. The Government of Botswana liaising with BMC concerning increased prices for smallstock.

De-stocking Programme At Drought Onset

Small-scale livestock owners have been disproportionately affected by the drought, losing a greater percentage of their animals than the larger borehole and ranch owners, and many have been forced out of cattle ownership altogether. The proportion of rural households owning no cattle has increased from 32% in 1981 to 49% in 1995 (see table 1.5b).

It has been argued that one of the most effective supports Government can give to

communal livestock systems is to enable emergency de-stocking at the onset of a drought at a price that is sufficiently attractive to farmers and which will enable restocking following the drought¹⁹. Traditional farmers are often criticised for being reluctant to de-stock until it is too late. While this is often true, it is also the case that prices offered to farmers at the onset of a drought are poor and they rapidly get caught in a downward spiral of declining livestock conditions and declining prices. Government can break this spiral by:

- intervention buying at the onset of a drought
- investing in emergency cold storage facilities
- buying otherwise un-saleable animals, perhaps for relief feeding programmes.

Over time a culture of early de-stocking needs to be developed. Although the costs of programmes like this are considerable, they are less expensive than the cost of not doing anything.

The Government should develop pilot schemes for the early destocking of livestock at the onset of drought. Ways of targeting intervention buying at the small livestock owner need to be identified.

3.3 LOCAL PROCESSING

In tandem with the development of local marketing there is an opportunity to develop some local processing. This can have four mutually supporting effects:

- Increased value added giving higher producer prices leading to increased incentives for local agricultural production.
- Increased local employment leading to increased local purchasing and thus stimulus of the local economy.
- Increased or cheaper produce available on the local market
- Decreased women's workloads (e.g. in hand processing of grain)

Rural food processing has been developing with the installation of the RIIC developed grinding mill for sorghum in larger villages. The Financial Assistance Policy (FAP) is a means by which entrepreneurs and community groups can obtain finance for purchasing a mill. Unfortunately FAP rules, aimed at encouraging production rather than services, will only finance mills which have a commercial component (e.g. they purchase grain, mill, bag and then resell it rather than just mill sorghum at a fee). This is a mistake because:

- Commercial milling is a more risky undertaking and requires greater working capital than service milling. Therefore it would be sensible for community groups and new rural entrepreneurs to start with service milling and later include a commercial milling component.
- The service versus production argument does not hold. Service milling can stimulate increased production - by the farmers as a result of the milling opportunities.

FAP should fund service milling in rural areas because of its potential beneficial effects on local production.

Other potential areas for rural processing may complement the current agricultural policy in favour of diversification. These include:

- oil extraction from sunflower and groundnuts
- groundnut dehulling
- peanut butter
- veldt product processing

Some of these are being looked at by both parastatal and NGO bodies working in these sectors.

3.4 INPUT SUBSIDIES

The Agricultural section of the NDP 8 (draft) states that subsidies have a role if they are targeted to those areas and beneficiaries who need them most. Since the majority of smallholder farmers only market a very small percentage of their produce NDP 8 considers they will not be helped by subsidies to output prices. *“Input subsidies will therefore be provided to the resource-poor farmers but will be phased out as their productivity and income levels rise”* (NDP 8 - draft).

Targeted input subsidies for agriculture are most likely to be implemented through the new ALDEP - Phase 2 (box 3.4) for arable farming and SLOCA (see 3.8) for livestock.

Input subsidies are most easily justified and sustainable if:

- there is a public good element (e.g. livestock disease control), or
- they create permanent improvements in the production system (e.g. capital improvements such as draught power, livestock watering points or implements).

Subsidies on private good inputs such as fertilizers or hybrid seed are less likely to be sustainable.

The ALDEP package (particularly the components of draught power, implements for row planting and weeding) is thought by its proponents to result in sustainable increased yields and increased cultivated areas per household. Unfortunately the way it has been monitored²⁰ makes it difficult to know if this is the case. This is because although it has been shown that ‘ALDEP farmers’ do have higher yields and cultivate larger areas, it is not clear whether this is due to the selection of farmers who participated in phase 1, these have generally been those households keener on crop production and who would probably be getting above average yields even without the package.

Box 3.4 - Arable Lands Development Programme (ALDEP)

ALDEP has been Botswana’s most important programme in support of smallholder dryland agriculture. The main emphasis has been on the promotion of a technology package by providing highly subsidised inputs to selected farmers. ALDEP started in

1982, financed by IFAD and ADB, running through to 1996. It is currently entering a 2nd phase entirely funded by the Botswana Government to run from 1997 to 2003.

Originally ALDEP was conceived as a loan/subsidy scheme. However, the transaction costs of servicing large numbers of small loans were not viable (NDB estimated a cost of P110 per year to service a P300 loan over 5 years) and the scheme switched to 85% grant and 15% down-payment. In phase 2 female headed households will be eligible for a 90% grant.

The main elements of the package are:

- draught power (oxen or donkeys)
- implements (ploughs, row planters, cultivators, harrows)
- fencing (for arable land)
- water catchment tanks
- scotch carts (introduced 1991)
- threshing machine (being tested)
- grain silos (new component for phase 2)

Since 1988 there has been a policy of developing ALDEP demonstration farms with a farmer using a full compliment of the package. These are planned to increase during phase 2 to at least two in each of the 275 extension areas.

The terminal report of the first phase²⁰ records that farmers who received an ALDEP package were cultivating larger areas and producing more crops than those who did not receive a package. However it is difficult to ascertain whether those receiving packages were already the keener farmers, which seems likely, and therefore it is difficult to know what was the actual impact of the package.

Although the initial involvement of women in ALDEP was low this did increase during the programme and 21,721 out a total of 48,313 packages went to women.

ALDEP implementation suffered after 1988 from the sudden creation of the much larger and more generous ARAP Programme which caused confusion on the ground because of its free distribution and diverted considerable TA time away from ALDEP implementation.

Reviews of ALDEP have noted the restrictive nature of some of the eligibility criteria, ie, those without livestock were not eligible for fencing; this restriction was relaxed in 1989. However, in order to promote weeding it has been obligatory since 1989 to take both a planter and a cultivator.

A strength of ALDEP was a deliberate strategy to combine research with practice. However a study⁸ indicated that the attitudes of researchers and demonstrators to farmers inhibited the implementation of ALDEP - farmers were not regarded as resource people who could inform researchers and extension workers on the nature and extent of their problems. Farmers' problems were approached mechanically, with "book

solutions”, even when these solutions were least relevant.

The original basis of ALDEP was that families would be able to graduate out of poverty on the basis of arable farming. Surveys of ALDEP farmers show that this is unlikely on the basis of farming alone - for the poorest farmers only 7% survive exclusively from income derived from arable farming, it is only the richer farmers (with 20-40 cattle) and with some livestock income who have some prospect of supporting themselves more or less exclusively from farming.

A major problem with the ALDEP package is that for many of the poorest households labour is the overriding constraint. Some key parts of the package like row planting increase labour requirement. A community interviewed in the North-East had been taught row planting but most continued broadcasting to save labour²¹. The appropriateness of ALDEP technology in a drought year is also widely questioned.

ALDEP decision making was considered too centralised by those implementing it in the field. The insistence that both a row planter and cultivator must be included in the same package is technically logical but does indicate a ‘top down’ mentality, rather than one of providing the best information and then encouraging farmers’ own decision making.

In contrast to ALDEP the paid de-stumping and free ploughing provided under the ARAP Programme is widely considered to have been a failure:

- many people received money for de-stumping and ploughing but then never seeded or weeded
- many of the benefits went to the tractor owners
- environmental damage was caused by unnecessary de-stumping
- a culture of dependency was encouraged
- agricultural extension resources were diverted from more beneficial activities.

Overall the programme is considered to have been very expensive and the impact unsustainable.

The continuation of ALDEP into phase 2 is welcome as one component of support to smallholder crop production. ALDEP implementation needs to be decentralised and there should be greater flexibility to allow the package to be adapted to farmers’ needs. Better monitoring and research to evaluate the effect of the ALDEP packages is required. Continued action research, with participation from farmers, is needed to ensure the technologies are appropriate to labour poor households and to drought years.

3.5 CREDIT

Credit services for resource poor smallholder farmers are relatively under-developed in

Botswana. In recent years problems within the National Development Bank (NDB) and Cooperative Development Bank (CDB) have compounded the lack of opportunities for credit.

While some credit schemes are being developed (e.g. by Women's' Finance House and CORDE), there is very little opportunity for credit for resource poor rural households. Originally the ALDEP packages were supposed to be part subsidy part credit - however this failed because of the high administrative costs to the banks of servicing small rural loans and the lack of collateral of farmers. The ALDEP scheme was therefore changed to a grant and down-payment, and this is similar for schemes like FAP. Households have had problems in raising the down-payments, although this is sometimes ameliorated by being able to pay with labour. However the need for credit, either to meet down-payment obligations, or for other productive investments remains.

High transaction costs make small loans to individuals in rural areas without collateral unsustainable. Loans to groups sometimes run into difficulties because of the lack of individual responsibility for repayment. The best solution might be credit groups in which loans are made to individuals within the group, often on a rotating basis, dependent on the repayment of loans by others. In this way much of the transaction costs are handled efficiently by the group and there is local peer selection of borrowers and peer group pressure on repayment. Schemes like this could build on the existing widespread grassroots experience of Burial Societies/Stockvels.

The number of households without cattle has increased in recent years due to drought (table 3.2b). Systems of revolving loan can be used for livestock re-stocking, this has similarities to the traditional "Mafisa" system of lending livestock. A household can be lent a female animal and in return repays the first female offspring, which in turn is given to another household and the cycle continues.

Further development of appropriate credit schemes and livestock restocking schemes are needed for rural areas.

3.6 IMPROVING INCOME TO RURAL HOUSEHOLDS

Most rural households rely only partly on agriculture. The relationship between off-farm income and agricultural production is complex. However, appropriate interventions on off-farm income may have beneficial effects on relieving rural poverty and agricultural sustainability. Rural processing has been considered above. Here consideration is given to labour intensive public works and the agricultural minimum wage.

Labour Intensive Public Works

Labour intensive public works linked to drought relief have been extensively used in Botswana. Some problems have been noted:

- Drought relief wages are very low - allowing survival but not saving, therefore they do not progress out of poverty
- Productivity has been very low - people are paid to do very little
- Programmes have conflicted with the need for agricultural labour

A recent study on poverty and poverty alleviation in Botswana²² has recommended that labour intensive public works be expanded and paid at a minimum wage to enable people to develop out of poverty. The report also noted that the implementation of labour intensive public works programmes can be contracted out to the private sector or to NGOs to improve productivity. While these recommendations go some way to overcoming the difficulties experienced, it is important to design schemes that complement the agricultural cycle and that support sustainable development in the local area - for example with small scale water development schemes.

Labour intensive public works should be continued in a modified form:

- **paid at minimum wage rates**
- **with the implementation contracted out to private companies or NGOs**
- **schemes to run for 3-4 months before ploughing (to avoid interference with farming and enable participants to save money for ploughing)**
- **schemes to be prioritised by VDCs and Farmers Committees**

Minimum Agricultural Wage

Practically all wages in Botswana are covered by minimum wage and employment protection legislation, with the exception of agriculture. Many "herdboys"^a at the cattlepost have a serf like relationship with the cattleowner - being paid mainly with food and second hand clothes. Often whole families provide labour, and sons follow on from their fathers and often ethnic minorities are the herders. Productivity and levels of responsibility of the herders is also often very low.

The issue of extending labour protection and minimum wages to agricultural employment is a highly sensitive and complex one. Doubtless many will predict disaster if such employment protection is enforced. It is worth remembering that when the proposals for a minimum industrial wage were discussed many people predicted flight of industry and mass unemployment - of course no such thing happened; it is therefore worth looking critically at the pros and cons:

Table 3.6: Provisional advantages and disadvantages of extending minimum wage legislation to agricultural employment

^a This is the term used despite it referring to fully grown men - it is an indication of their status.

Advantages	Disadvantages
<p>Extra income and protection for poorest and most vulnerable members of society</p> <p>Increased flow of money from urban to rural areas</p> <p>Increased circulation of money and demand for services in rural areas</p> <p>Increased professionalisation (with expectations of increased productivity and responsibility) of rural employment</p> <p>Improved management of livestock at cattle posts</p>	<p>Some reduction in agricultural employment</p> <p>Enforcement difficult</p> <p>Increased wages wasted on alcohol by some employees</p>

Overall it is considered that the benefits for the rural economy and employees are likely to be positive.

The Government should urgently investigate in detail the advantages and disadvantages of introducing minimum wage and employment protection to agriculture.

3.7 AGRICULTURAL EXTENSION

The basic components of the Ministry of Agriculture's services were given in Box 1.5. There are approximately 300 farm families per front-line extension worker or "Technical Assistant - TA^b" (compared to an average of 1800 in sub-Saharan Africa²³); training is via a three year course at the Botswana College of Agriculture entered following a Cambridge Certificate pass. In 1989 responsibility for animal health and production was taken away from TAs and given to veterinary assistants. This move effectively divided livestock and crop production in the Ministry of Agriculture and has implications for crop livestock interactions such as animal draught and manure.

It is acknowledged at all levels, within the Ministry of Agriculture, outside the Ministry of Agriculture and among farmers that the extension system has failed - basic yields and

^b Originally the front-line extension workers were known as 'Agricultural Demonstrators', they are currently called 'Technical Assistants' (TAs)

livestock productivity have not improved over the last 20 years. There is less consensus, however, on why the system has failed and how to improve it²⁴.

Table 3.7: Reasons given for failure of Agricultural Extension to have an effect

Reason for failure	Comment
Not enough front-line extension workers	Not really a viable reason given that Botswana has one extension worker to 300 families compared to an average for Sub-Saharan Africa of one to 1800 families. The lack of suitable transport for some extension workers has, however, reduced their effectiveness
Insufficient or inappropriate training for technical assistants	Training facilities at the BCA have improved markedly in recent years, qualifications on entry (Cambridge) and length of course have also increased and compare favourably with other countries in Africa. However, the course has a "modernisation/technical" focus with insufficient emphasis on farmer participatory techniques, indigenous knowledge and the extension worker as facilitator. It was noted that both high external input and low external input agriculture were taught at BCA, but there was interest and emphasis on high input 'modern' farming.
Inadequate selection and supervision of technical assistants	Many farmers complain that the TAs exist but never see them. Both selection and supervision of TAs is very centralised with virtually no farmer or farmers committee participation. TAs are transferred from area to area by central dictat - there is little sense of successful work on the ground being rewarded by more choice of work area and promotion.
Inadequate improved agricultural techniques to promote	The Division of Agricultural Research and the ALDEP programme have consistently claimed that they have developed varieties and techniques that will significantly improve yields. However, many of these have not been enthusiastically taken up by farmers. It is probable that many of these techniques are not actually as advantageous under family sector conditions over a range of rainfalls as the researchers believe.

Drought	From one point of view it is legitimate to blame drought for the failure of crop agriculture and of programmes to improve it. On the other hand, given the drought prone nature of Botswana, the challenge is to develop agricultural systems and services that work in this drought prone environment.
Technical Assistants spending time on drought relief rather than agricultural extension	This is true as many TAs have spent 80% of their time in some recent years supervising drought relief programmes (eg measuring fields for ARAP de-stumping and ploughing grants)
Farmers not serious about crop agriculture	Although this may be true for some farmers and many of the youth, other farmers are extremely dedicated and rely heavily on their crop production
Wrong overall approach by the Ministry of Agriculture	Farmers are seen as “the problem” rather than the “solution”. A top-down technical teacher-pupil system is promoted with little more than peripheral mention of farmer participation.

A change of approach from ‘top-down’ to ‘bottom-up’ and from technocratic to participatory is easy to recommend but more difficult to implement. Some changes are taking place:

- Participatory techniques are being taught at BCA
- PRA is being used by various parts of the Ministry of Agriculture
- On-farm trials are being used in Agricultural Research
- There is a unit within the Ministry of Agriculture which looks at the social side of agriculture

However, welcome as these changes are, they do not yet constitute the needed fundamental change in approach towards a farmer centered extension service.

Some of the issues are:

- The TA needs to be considered as a servant of the local farmers, responding as much to their priorities and needs as to centrally set agendas.
- The District Agricultural Officers have difficulty supervising the practical work and effectiveness of widely dispersed TAs. Farmers, being on the spot, are usually more aware of what their TA is or is not doing
- TAs tend to be sent to areas with little reference to their own personal choice - therefore commitment to an area is not necessarily encouraged.
- There is little emphasis on how a TA’s particular skills meet the needs of the area. TAs are not usually posted to their home areas so that best use is not made of their own local knowledge.

There are distinct advantages in the farmers committee being involved, along with the DAO/RAO, in the selection and supervision of TAs. There are also advantages in the TAs actively applying for postings and competing against each other to get a desired post. This might need to be balanced by the need for a TA to have spent a period in a remote area before receiving promotion or further training.

A more decentralised, participatory system of extension needs to be developed with farmers' committees participating, along with the DAO/RAO, in the selection and supervision of the TA in their area. TAs should be given a greater choice over the area in which they work and be rewarded with promotion for effective performance.

As some of the other sections of this report highlight, the constraints to sustainable farming faced by farmers are not purely technical. The effective front-line extension worker needs to be a facilitator who can:

- work with farmers committees and other groups to establish priorities
- give generalised agricultural advice
- access specialised agricultural advice
- access non-agricultural advice (eg on small dam construction or community mobilisation)
- help committees, groups and individuals access funds for projects
- motivate communities and groups undertaking community agricultural projects
- encourage and support farmers to experiment and innovate
- work complementarily with others involved such as NGOs, school agricultural science teachers etc.

This sort of agenda requires a wide range of social skills and the ability to “network” as well as give agricultural advice. It is rather different from the training currently given to TAs.

TAs need to develop the role of ‘facilitators’ who, in addition to providing technical advice, can motivate community activities and access specialist advice and resources as required by community projects.

3.8 LIVESTOCK SERVICES

The basic Government institutions responsible for livestock services were given in box 1.5. The delivery of animal health services is currently being looked into by another ODA funded project²⁵ and so is not dealt with in detail here.

A major emphasis of Government has been on the maintenance of Foot and Mouth Disease free status which is a prerequisite of beef exports to the EU; this has been achieved through a series of cordon fences and barrier vaccination. This

programme, while successful in controlling disease, has had a disastrous impact on wildlife.

Livestock extension advice has, since the early 1990s, been separated from crop extension, and has been provided by a team of veterinary Assistants (VAs) reporting to the Department of Animal Health and Production. Veterinary services are provided through the Government by the District Veterinary Officer or Veterinary Assistants, or in some cases by private vets. Vaccination for a range of other cattle diseases is provided free and veterinary services at highly subsidised prices. A network of 33 Livestock Advisory Centres (LACs) provide inputs for smallholders, this is complemented by co-operative stores and private traders.

There are plans for both privatisation and increasing cost recovery within livestock services. The LACs are being considered for sell off, and more widespread charging for animal health services together with, perhaps, the development of private sector paravets are also under consideration.

The main programme for providing other services like water, spray races, crushes etc to communal areas livestock owners is SLOCA - Services to Livestock Owners in Communal Areas. In this programme farmers can group themselves together in order to receive government assistance to:

- dig wells or boreholes
- construct crushes, spray races and holding grounds
- erect drift fences

It is argued by some²⁶ that SLOCA benefits the larger communal area livestock farmers, who find it easier to form the necessary group. Certainly it would be difficult for a household with only one or two cattle or goats to benefit. Sometimes poorer farmers have been incorporated by larger farmers into a group in order to satisfy SLOCA criteria, but they do not necessarily get a fair share of the benefits.

Smallscale cattle owners have been disadvantaged by recent conditions for keeping cattle in Botswana as is shown by the increasing number of rural households without cattle - up from 32% in 1981 to 49% in 1996 (see table 1.5b).

There is debate about whether the decline in cattle ownership by poor households is an inevitable progression and to what extent it is worthwhile designing policies and programmes to encourage resource poor households to keep small numbers of cattle and other livestock. Some argue that keeping small herds (less than 20) is unlikely to be viable and therefore should not be encouraged. Others argue that

- livestock ownership is still an aspiration of many rural families,
 - livestock play a number of important economic and social roles,
 - alternatives to livestock as a means of livelihood security are as yet insufficiently developed,
- and therefore that livestock owning by poor households should be actively supported.

It is interesting to note that the widespread subsidies and drought related support to poor households have concentrated on crop farming, while livestock subsidies have tended to benefit richer households. There have not been any significant Government programmes enabling poor households to re-stock, with the exception of ALDEP, operating in the context of crop draught power. This seems to suggest that the Government does not consider the ownership of livestock by poor households to be particularly desirable.

For many resource poor households in rural areas livestock ownership is still one of the best ways of providing some income, a source of savings and draught power for crop production. Therefore it is important to develop cost effective services for these smallscale livestock farmers. Given the small herd size, community involvement is likely to be a key way of keeping transaction costs low. The main services needed are:

Grazing - community management schemes are discussed in section 4.4

Veterinary - provision via farmers' groups may keep costs per farmer low

Marketing - most marketing is likely to be informal and local. See also box 3.2

Water - there is probably increased scope for community managed boreholes (see below).

Community Boreholes

Currently individuals and syndicates benefit from their own boreholes. Smallscale producers have three options:

- use the domestic village supply (not officially allowed)
- use surface or shallow water accessed through rivers, ponds or shallow wells (can dry up and limits access to grazing, particularly during droughts)
- pay to water at someone else's borehole (expensive - near Serowe syndicates charge their members 10t/cow/day but smallscale producers have to pay 40t/cow/day to private borehole owners)

Community boreholes might be one answer to this problem. These could be developed and managed by a VDC or farmers committee and be open to all members of a particular community. Controls would be necessary to prevent overall stock numbers rising above the capacity of the range around the borehole. Such boreholes could be part of a community managed natural resources scheme and perhaps only be used for watering at certain times of the year in line with an agreed rotational grazing scheme.

There is a need to complement services being developed for larger scale livestock owners with community facilities for smallscale livestock owners. Experience to date should be documented and further experience built up in the community management of services such as community managed boreholes for livestock.

3.9 DECENTRALISATION

Decentralisation is a major theme of NDP 8.

During consultations for this report a whole range of different organisations working with different Government rural development programmes identified excessive centralisation as a major constraint, with those working on the ground having little power over decision making or the setting of priorities. Within the Ministry of Agriculture those working at Regional and District level criticised excessive centralisation and their lack of power to take decisions.

Decentralisation within the Ministry of Agriculture would bring a number of advantages enabling:

- local agricultural programmes to be tailored to local conditions and local priorities
- effective farmer participation at the local level
- effective collaboration between the Ministry of Agriculture, other Government Departments, local government and NGOs at the local level
- more effective planning and monitoring of performance from the bottom up.

To be effective, real decision making power, including over budgets, would have to be instituted. This would entail a shift of power and resources from the centre.

The proposals for decentralisation proposed for NDP 8 should be energetically implemented, especially within the Ministry of Agriculture.

3.10 SCHOOL: AGRICULTURE LINKS

There is potential for improved links between schools and the local agricultural service, particularly at Community Junior Secondary School Level:

- The Agricultural Science Teacher and the extension worker could form a team with the former concentrating on the children and the latter on the parents
- School agricultural work could be linked through visits etc. with what is actually going on in the farming community around the school
- The school, with its agricultural science teacher, classrooms and other equipment could be a resource for the extension worker to use with farmers at evenings and weekends.
- The transition from schoolchild to adult farmer could be facilitated with keen school leavers being helped to set-up in farming by the extensionist and teacher working together

The current school agricultural curricula are not particularly relevant to sustainable smallholder agriculture in Botswana. The Junior Community Secondary School curriculum has a heavy emphasis on the modernisation of agriculture. The Senior Secondary School curriculum (Cambridge) is not country specific.

The secondary school system is really orientated towards the production of white collar workers - until recently the Government and other employers were able to absorb these. However expansion in secondary schooling, and the reduction of formal sector employment opportunities, means that there is now a greater need to equip these school leavers for self-employment, including agriculture.

Some schools have out of school agricultural clubs (called 4B clubs) but it is not clear what impact these are having.

Ways in which the extension service and the school agriculture programme can work more effectively together need to be developed. Both the curricula, and how lessons are used in practice by schoolteachers, should be looked at in relation to current thinking on sustainable smallholder agriculture.

4. SUSTAINING INSTITUTIONS

4.1 INTRODUCTION

Botswana has been undergoing a very rapid transformation from a predominantly rural society with traditional social organisation to a society with rapid urbanisation and modernisation. The growing prosperity has been concentrated in a relatively small sector of the population, largely living in urban areas or the large 'urban villages'. There are some particular features of Botswana's modernisation which are important to note:

- traditional authority systems (chiefs, headmen and Khotlas) have been retained and have been integrated into the official system at a number of levels.
- Some of the chiefs traditional functions, like allocation of land, are being taken over by professional/democratic institutions such as land boards.
- Most urban Botswana retain some rural links, with families split between urban and rural bases, but with the economically active concentrated in urban areas.
- The urban rich tend to invest in cattle enterprises in rural areas, often using fairly traditional production systems and managing them by periodic visits.
- Many professionals working in rural areas (teachers, police, agricultural extension workers, health staff) do not come from the area where they are working and have not chosen that particular area to work; they therefore do not necessarily have a long term commitment to the area.
- Those living in their home rural areas are often the economically marginalised - women, the old, the young, the poor and minority groups.

In rural areas traditional authorities are considered to be the most respected political

institutions, some consider that they have regained authority in recent years in relation to a more general dissatisfaction with politicians. Village Development Committees exist in many communities but are generally quite weak. Crop and grazing areas sometimes have their own farmers committees but again, these structures are generally weak.

4.2 COMMUNITY DEVELOPMENT

Infrastructure development in Botswana has progressed remarkably in recent years with many villages now served by tarred road, phone booths and a range of substantial government buildings such as schools and clinics (**hard development**). What has not developed to anything like the same extent is either the agricultural base at household level or the community management capacity such as VDC's and farmers committees (**soft development**). VDC's and Farmers Committees exist but in many cases are not particularly effective.

The Community Hall Syndrome

Development is often seen by rural communities in terms of **infrastructure**. The first project of nearly every VDC is a community hall. Community halls are generally rather large structures and their building usually absorbs all community capacity for several years, although once built they do not seem to get much use; however, they are a symbol of achievement. This concentration on infrastructure infects other groups such as farmers committees and youth clubs which often concentrate on hard development, leaving little energy for the crucial soft side of development such as building up understanding and capacity for community management of natural resources

Comment

An example of this concentration on infrastructure was a village in the North-East where a keen teacher had started a much needed youth group. The first project of the group was to build a youth club..... After two years the teacher was moved on, leaving foundations dug, a pile of bricks and a disenchanting group. One wonders if it would not have been better to have used the energy to develop sustainable, educational and enjoyable activities (drama, dance etc.) in an existing classroom or the Khotla?

Communities should be encouraged to see development not only in terms of infrastructure but also in terms of organisational capacity. Organisation and community management can then create the enabling environment for wider individual and group developments. For instance the sustainable management of natural resources by the community opens up many other possibilities for development.

4.3 COMMUNITY BASED MANAGEMENT OF NATURAL RESOURCES

Although the population density in rural areas is still low there is considerable pressure on natural resources both around the main population centers and in some cases more widely, as low and variable rainfall tends to mean low biological productivity and therefore low and variable sustainable offtake. The main resources under pressure varies from area to area but include:

- water
- grazing
- firewood and poles
- thatching grass
- wild animals
- gathered veldt products such as Phane and Grapple

Unmanaged use can lead to rapid destruction of these resources. For example when thatching grass starts to become in short supply people gather it early in order to 'get in

first'. The unripe grass has not had a chance to set seed which affects next years supply and the unripe grass does not last as long, resulting in more frequent re-thatching and further exploitation of the resource.

It seems that in the past some natural resources were managed to a degree by the community, under the control of chiefs and headmen, often backed by the traditional belief system. Others resources were probably unmanaged, but perhaps low population density resulting in low exploitation rates made management unnecessary.

Currently there is little community management but some Government regulation, such as on hunting wildlife and Grapple collection. Although headmen and land boards have de jure control over who can graze in any communal area, in practice the main control over grazing is through access to water, with the owners of boreholes having de facto control over the grazing within about a 4 km radius.

Communal land is currently being allocated on a long lease basis to exclusive private or syndicate users, typically to be fenced as either grazing or fields. Up to 1993 this allocation was on the basis of tribal affiliation (e.g. those with local roots had priority), since then allocation is supposed to be on equal basis to all Botswana Citizens.

Community Management

Experience from various countries suggests that natural resources are best managed when the planning is done with the local community, the management is with the consent and participation of the local community and the benefits flow as directly as possible to that community. Community management does not necessarily mean however that access to resources will be more egalitarian.

There are a few examples of community based wildlife management projects and considerable donor interest is being shown in this approach. The most well known of these is the Chobe Enclave Project where the communities entered into a joint venture partnership with a local safari operator.

Table 4.3: Cash realised by local communities in Chobe Enclave Project²⁷

YEAR	Pula	£ equivalent
1993	24,000	5,000
1994	65,000	3,000
1995	200,000	41,000
1996(expected)	330,000	68,000

These figures indicate the rapid return and significant cash income that can be generated by wildlife utilization projects in the most favourable areas . Returns to

sustainable management of other types of natural resources are often not so rapid and can, if the resource is already over-exploited, actually be negative in the early years.

There has been little progress so far in developing community managed natural resource programmes involving a wider variety of resources in traditional agricultural areas. The Permaculture Trust is in discussions with some communities about developing management schemes and there are also some programmes looking at the utilization of veldt products - see section 2.4)

Existing agricultural policy and land board regulations apparently give the right for communities to draw up a land use plan for the area they traditionally use. They can then apply to the land board for rights to manage the use of this area and fence it if necessary. This would enable the community, in the form of the Village Development Committee or Farmers Committee, to prevent uncontrolled exploitation of say grazing, trees or thatch and be backed up by legal authority.

Discussions with communities indicate that at least some are interested in such an approach. In order to implement such a scheme a community might need support from an NGO and local government officers. The Central District Land Board have also indicated support for such schemes in principle.

Communities should be facilitated where appropriate to develop schemes to manage and exploit sustainably resources to which they have traditionally had access and to get these approved by the Land Board and other authorities. This facilitation needs to include:

- **Community awareness raising and organisational development using techniques like PRA**
- **Technical advice on the management of natural resources**
- **Possible funding support**

4.4 COMMUNITY MARKETS

There is little tradition of local markets in Botswana, however in recent years there has been a growth of informal markets and hawking, particularly in the urban and peri-urban areas. In most rural villages there is no market resulting in:

- difficulties in selling
- a tendency for local produce to be sold in the nearest town and local purchases to be sourced through the nearest towns, leading to high transaction costs and therefore poor terms of trade between rural production and rural consumption.

Interest is being shown in developing village level markets and Botswana seem to be overcoming their traditional reluctance to engage in this type of commerce. There are some advantages in developing a system of periodic markets with villages in an area each having a different market day (as is common in parts of West and East Africa):

- it enables more specialist traders to visit each village in turn on a weekly cycle both to sell and to purchase.
- a market day provides an opportunity for other activities which require a concentration of people such as agricultural or health education presentations or entertainment.

What is important is not primarily the physical infrastructure of “a market” but the development of the social and commercial behaviour that can make such markets flourish.

Some pilot studies should be undertaken on the development of village level markets, with consideration given to developing a system of periodic markets; priority should be given to the development of the social and commercial aspects rather than just the physical market infrastructure.

5 ACHIEVING SUSTAINABLE AGRICULTURE

5.1 PROMOTING BEST PRACTICE

In order for more sustainable agriculture to spread, systems are needed to:

- evaluate, monitor and reach a consensus about what is best practice and what policy environment is required.
- Promote best practice and empower different stakeholders to adopt best practices.
- Encourage the Government (and others) to create the appropriate policy environment.

As in any country, in Botswana there are a range of views on the best approach, Botswana is, however, fortunate in having a civil service and Government fairly open to debate. There are key decision makers at different levels who are open to reasoned persuasion on issues like sustainability, the environment, gender, equity etc. Various organisations in Botswana are already promoting the debate and encouraging a deeper understanding of these issues such as the Women's Forum, the Botswana Society, FONSAG (see box 5.1), CORDE, the National Conservation Strategy Agency and the Kalahari Conservation Society.

Box 5.1 - Forum On Sustainable Agriculture (FONSAG)

FONSAG was established in 1990 to facilitate the development of sustainable agriculture in Botswana through information, experiences and expertise exchange. FONSAG is registered as an NGO and membership is open to organisations, groups, relevant Government departments and individuals involved in agriculture, environment conservation, and natural resource management.

The objectives are:

- to promote the development of agricultural practices which are environment friendly, economically viable and affordable even to the resource poor farmer.
- to facilitate collaboration and a spirit of partnership between all key players in agricultural development.

FONSAG offers its members:

- Information collection and dissemination
- Provision of technical advice
- Resource Centre Services
- A Newsletter
- Linkage to funding sources
- Exposure to regional and international experiences.

What is interesting is the constructive way in which FONSAG manages to bridge the

Government:NGO divide, enabling learning and sharing of expertise in both directions. Prominent people in both communities are involved in the various specialised committees of FONSAG, and in the occasional conferences which they host.

5.2 RECOMMENDATIONS

Resource Conserving Technologies

1. Changes will probably be needed within the structures and ethos of the Department of Agricultural Research to achieve the strategies outlined in NDP 8. This will require more inter-disciplinary working and greater emphasis on returns to labour and on reducing risk. Encouragement should be given to farmer experimentation both by Ministry of Agriculture and NGO staff through exposure to ideas (e.g. through visits and workshops) and, where relevant, by providing resources and/or planting material.
2. The sustainable use, processing and marketing of veldt products needs to be encouraged. Where possible producers need to have a choice of channels through which to market. Domestication must be undertaken with care, and efforts made to maintain the comparative advantage of the poorer remote area dwellers.
3. The issue of how poor households rural households can benefit from wildlife and tourism needs to be further researched and debated.
4. There seems to be scope for increased development of small dams and increased community involvement in the planning, construction and management of small dams. The potential for very small scale (plots of 1/10-1 Ha) vegetable growing beside small dams needs to be further developed.
5. Both leasehold and communal grazing is a current reality in Botswana. More emphasis will however be needed on developing services and management capacity to make the communal area grazing profitable and sustainable. This will require a greater appreciation of tracking management systems and a re-evaluation of fencing policy. Increased efforts are needed to end dual grazing.

Creating an Enabling Environment

1. A Government price stabilisation programme for grain and beans, linked to the strategic grain reserve programme, should be studied.
2. The Government should develop pilot schemes for the early de-stocking of livestock at the onset of drought. Ways of targeting intervention buying at the small livestock owner need to be identified.

3. FAP should fund service milling in rural areas because of its potential beneficial effects on local production.
4. The continuation of ALDEP into phase 2 is welcome as one component of support to smallholder crop production. ALDEP implementation needs to be decentralised and there should be greater flexibility to allow the package to be adapted to farmers' needs. Better monitoring and research to evaluate the effect of the ALDEP packages is required. Continued action research, with participation from farmers, is needed to ensure the technologies are appropriate to labour poor households and to drought years.
5. Further development of appropriate credit schemes and livestock restocking schemes are needed for rural areas.
6. Labour intensive public works should be continued in a modified form:
 - paid at minimum wage rates
 - with the implementation contracted out to private companies or NGOs
 - schemes to run for 3-4 months before ploughing (to avoid interference with farming and enable participants to save money for ploughing)
 - schemes to be prioritised by VDCs and Farmers Committees
7. The Government should urgently investigate in detail the advantages and disadvantages of introducing an agricultural minimum wage and employment protection.
8. A more decentralised, participatory system of extension needs to be developed with farmers' committee to participate, along with the DAO/RAO, in the selection and supervision of the TA in their area. TAs should be given greater choice over the area in which they work and be rewarded with promotion for effective performance.
9. TAs need to develop the role of 'facilitators' who, in addition to providing technical advice, can motivate community activities and access specialist advice and resources as required by community projects.
10. There is a need to complement services being developed for larger scale livestock owners with community facilities for smallscale livestock owners. Experience to date should be documented and further experience built up in the community management of services such as community managed boreholes for livestock.
11. The proposals for decentralisation proposed for NDP 8 need to be energetically implemented, especially within the Ministry of Agriculture.
12. Ways in which the extension service and the school agriculture programme can work more effectively together need to be developed. Both the curricula, and how lessons are used in practice by schoolteachers, should be looked at in relation to

current thinking on sustainable smallholder agriculture.

Sustaining Institutions

1. Communities should be encouraged to see development not only in terms of infrastructure but also in terms of organisational capacity. Organisation and community management can then create the enabling environment for wider individual and group developments. For instance the sustainable management of natural resources by the community opens up many other possibilities for development.
2. Communities should be facilitated where appropriate to develop schemes to manage and exploit sustainably resources to which they have traditionally had access and to get these approved by the Land Board and other authorities. This facilitation needs to include:
 - Community awareness raising and organisational development using techniques like PRA
 - Technical advice on the management of natural resources
 - Possible funding support
3. Some pilot studies should be undertaken on the development of village level markets, with consideration given to developing a system of periodic markets; priority should be given to the development of the social and commercial aspects rather than just the physical market infrastructure.

ANNEX 1 - PEOPLE CONSULTED

Ms Elsie Alexandra	- Chairperson, Women's coalition
Mr Appiah	- Economist, Crop Production, MoA
Mr Batshwana	- Project Officer, CORDE
Mr Stephen Cartwright	- British High Commission
Mr Chilume	- MoA
Mr Russel Clark	- Permaculture Trust
Ms Alicia Escuin	- EU
Mr B. Garegope	- Baralong Farms OSCCA
Dr Gakale	- Director of Research, MoA
Mr Edward Karkari	- Senior Agricultural/Forest Economist, MoA
Mr R. Kashweka	- Director, FONSAG
Mr Ketolgetswe	- vice-chair, CORDE
Kwayedza farmers Group	- North East District
Mr G. Lesonya	- Co-ordinator, Palapye Development Trust
Dr I Lupanga	- Botswana College of Agriculture
Ms Ntjidzi Manyothwane	- MoA - DAPS
Mr Masakwana	- Chief Animal Production Officer, MoA
Mr Esau Mbanga	- District Officer of Development, Central District
Mogobe Wa Mosu	- Borehole Syndicate, Central District
Mr O. Mokone	- Editor, The Gazette
Mr Mogome	- Secretary, Central District Land Board
Ms Vivien Moiteelasilo	- Director, Pioneer Rural Industries Centre, Palapye
Mr K. Moletsane	- Research and Policy Inf. Officer, FONSAG
Ms Ketsile Molokomme	- Acting co-ordinator, CORDE
Mr Motlhabane	- Industries Officer, Central District
Mr D. Mmofswa	- ALDEP Project Manager, MoA
Mr Babathi Moji	- Regional Agricultural Officer, Central Region.
Mr M. Mooka	- Coordinator of Rural Development, MoFDP
Ms Grace Mosinyi	- Communications Officer, FONSAG
Mr Masego Mphathi	- Chief Land Utilization Officer, MoA
Mr N Mwandila	- Chair, FONSAG Research Group. Also Tonota College of Education.
Nlaphwane Farmers Group	- North-East District
Mr Phili	- Principle, Mahalapye Rural Training Centre
Mr G. Phorano	- General Manager, Thusano Lefatsheng
Mr Maotoanong Sebina	- Senior Natural Resource Officer, National Conservation Strategy Agency
Mr Greg Stuart-Hill	- Range Ecologist, BRIMP, MoA/ODA
Mr S. Taukobong	- General Manager, BAMB
Mr Frank Taylor	- Managing Director, Veldt Products Research

Totobela Farmers Group
Dr Lyndsay Tyler

- North-East District
- Team Leader VEEU Project, ODA/MoA

ANNEX 2 - USEFUL ADDRESSES

Co-operation for Research, Development & Education (CORDE)

P.O. Box 1895, Gaborone, Botswana.

Tel: (267) 323865

Forum on Sustainable Agriculture (FONSAG)

P. Bag BO 136, Bontleng, Gaborone.

Tel/Fax: (267) 301971

Ministry of Agriculture

P. Bag 003, Gaborone

Fax (267) 356027

National Conservation Strategy (Co-ordinating) Agency

P. Bag 0068, Gaborone, Botswana

Tel: (267) 302050/302056. Fax: (267)302051.

Rural Industries Promotions Company (RIP)

P.O. Box 2088, Gaborone, Botswana.

Tel: 314431/2. Fax: 300316

Thusano Lefatsheng

P. Bag 00251, Gaborone, Botswana

Tel: (267) 3722273

Veldt Products Research

P.O. Box 2020, Gaborone, Botswana

Tel: (267) 347047. Fax: (267) 347047

Women's NGO Coalition

P. Bag 342, Gaborone, Botswana.

Tel/Fax: (267) 30955

ANNEX 3 - REFERENCES

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