Agricultural Development in the Okavango Region

MINISTRY OF AGRICULTURE

1. Summary
This paper describes the present state of agricultural development in the Okavango area and the potential for agricultural development over the short and medium-term. The activities of the Ministry of Agriculture and its various departments are described briefly under the headings of animal production, animal health, fisheries, crop production, extension, research and marketing. The chief constraints to agricultural development in the region are identified and efforts to overcome or alleviate these constraints are discussed. Specialised papers are being produced on the subjects of tsetse eradication and fisheries, which are treated only superficially here. Throughout this paper, the close relationship between the Okavango River, the Delta, and the surrounding areas is recognised and comments are not restricted to the Delta proper but can be taken in general to refer to the whole of Ngamiland.

2. Introduction
The Ngamiland district of Botswana covers an area of 109,337 km² and in 1971 had a population of 53,870 persons. Cattle production and subsistence crop production are the major agricultural activities. There are no large-scale commercial farming units. Irrigated agriculture is limited to two small research projects and three relatively small horticultural production units in the Maun area. Arable farming is of two types: dryland (rain-fed) farming in most of the district and molapo farming on land that is seasonally flooded along the main rivers and edges of the Delta. Molapo cultivation is based on planting the crops in the wake of the receding floodwater. Crop production, however, is not favoured relative to cattle management and yields are low, estimated at approximately 300 kg/ha for maize, sorghum and millet. The cattle population of the district was estimated in the 1972 cattle census to be 206,000 head and in the 1975 census, 314,000 head. Estimated off-take in 1975 was 16,000 head worth some R1.20 million to the local economy. In addition, fishing provides an important subsistence element to many families and a small commercial trade in dried fish exists.

3. Present Ministry of Agriculture Activities
(a) Extension. The Ministry maintains a Regional Agricultural Office at Maun that serves the two administrative districts of Ngamiland and Gobe. The regional team includes a regional agricultural officer and specialist staff for animal production, 4B Youth Club activities, land-use planning, and a fisheries unit, discussed below. In addition, there are two District Agricultural Officers in Ngamiland, one based in Maun serving the eastern half of the district and one based in Shaswane serving the western half (this one is due to be transferred to Gomare). Each of these district agricultural officers has an experienced agricultural supervisor working with him. A total of 21 agricultural demonstrators serve the district, based in village communities all around the Delta. In addition, the Ngamiland Rural Training Centre, with a technical staff of five, serves the training needs of the region as far as structured courses are concerned. The programme covers courses in livestock and crop
production, both at the Centre and in certain villages on a touring schedule. In addition to those courses for farmers and their family members, the centre is used for staff courses, both within the Ministry of Agriculture and other Ministries.

The duties of extension agents are to advise farmers on crop husbandry and marketing, animal husbandry and marketing, obtaining of agricultural inputs, reporting on the agricultural situations, organising of small-scale conservation activities, assessing credit and loan applications, inspecting Land Board applications, supervising local 4H club activities, and participating in Village Development Committee activities. These functions are carried out through a monthly programme of individual and group instructions, village courses, recruitment for Rural Training Centre courses, distribution of media materials, and most recently, organisation of radio learning groups. In general, the Agricultural Demonstrator is the farmer’s contact with all outside agricultural services where he requires assistance.

(b) Fisheries. A fisheries officer, a fisheries superintendent, and four fisheries demonstrators under the animal production division conduct a programme of investigations and promotion of improved fishing techniques in the major fishing areas of the Delta. The fisheries investigation and development project has been prepared which will expand this programme over the next two years. The commercial output is estimated at about 400 metric tons of fish per annum from the Delta, mostly for subsistence purposes. The number of active fishermen is unknown. Fishing is seasonal and confined to those areas which can be reached by dug-out canoes. Fishing pressure, although confined to limited areas, is low, and the size and composition of existing fish stocks is little known. The major introduced method of fishing in use is the Gill net, with mesh sizes ranging from 25 mm to 200 mm.

Commercially-produced fish are available at a mesh size of 115 mm, whereas smaller sizes are hand-made from local materials and twine. The sale of fisheries requisites (nets, sinkers, floats, etc.) has recently been handed over from the extension staff to the Botswana Agricultural Marketing Board, which imports the equipment and retails it through traders. This has improved availability while relieving the extension staff of a burdensome chore. Prices are controlled through an agreement between Botswana Agricultural Marketing Board and the traders.

The activities and trade in dried fish are very limited with most activity centred around Lake Ngami. The Botswana Development Corporation started a commercial fishing camp there in 1970 which was promptly ruined by the drying up of the lake. The annual fluctuations in the lake levels, however, are vitally important for the maintenance of a suitable environment for fish growth and fishing activities, since they prevent the build-up of reeds, concentrate the fish when the lake levels are low, and fertilise the lake by absorbing cattle manure when the lake rises. In June, 1970, there were four fishing operations with a score of workers in progress at Lake Ngami with the fish being dried in the open air, bagged, and transported to Francistown for sale at attractive prices (70 cents per kg). The promotion of the trade in dried fish probably offers the most immediate potential for commercial fishing in the area.

(c) Animal production and marketing. As stated above, the cattle population in 1975 was estimated to be as high as 314,000 with a sale outside the district of about 16,000 or roughly 5%. This population is a substantial increase from the 216,000 reported four years earlier, but is due in large part to the three good years of rains when calving rates have been high. Most cattle winter at Lake Ngami, along the Lake and Boteti Rivers, or on the western edges of the Delta itself, with much smaller numbers on boreholes in the Haina Veld in the south-east corner of the district.

Using the Botswana Livestock Development Corporation (BLDC) average price of K30 per animal sold in the district, this trade represents a substantial income to local residents of about K1,200 million per year and an export value to Botswana of about double that amount. In addition, an unknown number of animals are sold locally to butchers or slaughtered for personal consumption. Animal husbandry methods are predominantly those that are on a fenced ranching in the area. Cattle populations are concentrated around the swamp edges and rivers due to the lack of water away from these permanent sources and to the presence of tsetse across the northern half of the district. At many as 50,000 head of cattle may be watered at Lake Ngami at any one time. Under the Tribal Grazing Land Programme, it is hoped to introduce fenced ranching in the Haina Veld and possibly south of Lake Ngami. Improved range management in the communal areas will be more difficult to introduce since the permanent sources of water mean that each individual can water his stock individually and collective sharing of facilities is not as widely practiced as it is elsewhere in the country. A major issue for the future will be whether a form of fenced management should be introduced in any areas which may be cleared of tsetse before they are occupied on a communal basis. The preservation of good grazing in the communal areas would argue for this step, but a durable form of management would be difficult to establish and maintain.

Cattle marketing in Ngamiland goes back as far as 1864 when H. S. Chapman purchased 200 head at Lake Ngami. It has traditionally been conducted by traders and speculators, who provided a ready market with either cash payment on the spot or credit facilities. In 1975 a marketing co-operative was established to market finished cattle direct to the Botswana Meat Commission. In its first year, this co-operative sold some 1,250 head of cattle out of the district. In order to improve prices to the producer for younger and unfinshed stock, and to introduce a greater degree of competition in livestock buying into the district, the BLDC in 1974 established the Makalawane Ranch east of Maun to serve as a buying and fattening ranch for Ngamiland cattle. In its first year of operation, the ranch purchased some 6,000 head of cattle and substantially raised the price in Ngamiland for all cattle sold. Buying days are normally held twice a month at the ranch and mature animals are sold direct to Botswana Meat Commission while unfinished stock are held for fattening. The potential of this service has been such that the ranch has become overstocked and cattle have recently been moved to portions of the Okavango Quarantine Camp and BLDC ranches in eastern Botswana to accommodate the overflow. In spite of these significant improvements in the cattle market in Ngamiland in recent years, the total output is not as high as it should be and many mature animals die on the range, particularly in times of drought. The biggest constraint to achieving a higher output is poor roads and resulting high costs of trucking cattle out of the district. Cattle keeping is the preferred occupation of virtually all inhabitants of the district, however, and compliance with veterinary measures is excellent, and there is no lack of interest or willingness on the part of cattle owners to take steps to improve the welfare of their herds. Given the precarious nature of arable farming in Botswana, it is unlikely that any other economic activity will displace cattle-keeping as a form of saving and investment.

In addition to the beef-related activities mentioned above, the Ministry is encouraging poultry and dairy production for home consumption and the Maun market. A poultry distribution and demonstration unit has been established at the Rural Training Centre (RTC) which will operate on a large scale. It will provide inoculated chicks and training for small-scale poultry operators to operate their own production units. A milk collection centre and filtration operation is operated in Maun by a dairy demonstrator under the supervision of the regional Animal
Production Officer to encourage the marketing of clean, fresh milk. Smallstock policy in the area is to produce for local consumption only, although a demonstration flock of goats will soon be stationed at the RTC.

(d) Animal health. Botswana's success as a beef exporting country is based largely on its excellent record in animal health, virtually unmatched by any other African country including South Africa or Rhodesia. This is a function both of the dryness of the country as a whole and of the disease control measures and quarantine system maintained by the Department of Animal Health. It is fair to say that the front lines of this successful battle have been in Ngamiland, for it is only in the extreme north of the country that ecological conditions would favour the major disease found elsewhere on the continent. The Department, therefore, maintains a major programme in the district both for the benefit of the local cattle owners and for the protection of the country as a whole.

An annual prophylactic vaccination campaign is carried out on all cattle in the district against foot and mouth disease. All cattle are also vaccinated annually against anthrax and 1-2 year-old cattle are vaccinated against rinderpest. This year, for the first time, all heifer calves and heifers between the age of 6 months and 18 months will be vaccinated against contagious abortion. In addition three Livestock Advisory Centres have been built and are operating at Maun, Sehitwa, and Shakawe which supply various veterinary remedies and vaccines for sale to the public. All cattle sold out of the district are quarantined at Makalamabedi Quarantine Camp in the east or Kake Quarantine Camp in the south, and the district is fenced across its eastern and southern boundaries by veterinary cordon fences. Ngamiland cattle are further quarantined at Okakwe, Dukwe, Bibe, and/or Phuduhudu quarantine camps before they reach the abattoir at Lobatse.

(e) Tsetse fly control. Tsetse fly also reaches its natural limit in the north of Botswana, particularly the Okavango Delta. To protect the human and animal populations which have to live in proximity to the water sources of the Delta, the Department of Animal Health manages a tsetse fly control programme. Prior to 1966 the control measures used against the tsetse fly were mainly as follows:

(a) the debarking of trees such as the acacia, in order to kill those trees which were considered essential habitat for the fly;
(b) the erection of harriers to spread of fly by clearing all trees and bushes in certain areas;
(c) the shooting of all game in certain areas to deprive the fly of a supply of mammalian blood.

Following a review of the control measures, it was decided to abandon the old measures and to adopt a new policy of control by selective ground-spraying of tsetse breeding sites with either DDT or Dieldrin, both highly toxic and persistent insecticides. Using this method the fly was eradicated from the Chebe and Tsaou and Nokaneng areas west of the Delta. During the past few years, this method of selective ground-spraying using DDT or Dieldrin has been abandoned in favour of control by aerial spraying using Endosulphan, an insecticide which is far less toxic than the previous insecticides used, and which is not persistent as it breaks up into non-toxic substances a few days after spraying. This method has proved very successful in controlling the fly, but so far 100% eradication in the sprayed area has not been achieved. It is hoped that improvements in spraying technique will improve this method still further. The experimental project, reported on elsewhere, is not yet in its final stages and no decisions about the future eradication programme can be taken until the results are obtained.

(f) Crop production and marketing. As stated above, the principal crops grown in Ngamiland are sorghum, maize, and millet, under either rain fed or mulato cultivation. Cultivation is relatively more developed in the north-western portion of the district along the Okavango River before it enters the Delta. The SWECO report estimates that the total area under cultivation or fallow in a normal year was about 30,000 ha. Analysis of aerial photos indicated an area of 18,000 ha in the Delta alone, excluding the panhandle. Yields are low and relatively few inputs such as fertiliser or with imports of maize meal estimated at about 50 tons per month. Rainfall is not as has been obtained by ox cultivation without fertiliser at the Rural Training Centre. With oxen rather than hand, cultivation would substantially increase yields and could make the district self-sufficient in food grain production.

The BAMBO is just completing the construction of a grain storage depot at Maun, which will buy and sell grains at guaranteed prices. It will also provide a market for livestock products in the area. The BAMBO has already started selling fish to traders and sold R600 worth in its first effort. It will in future handle other agricultural inputs such as seed, fertiliser, bags, pesticides and implements as required.

(g) Irrigated agriculture.

As D. H. Potter has ably demonstrated, the potential of the Okavango for agricultural development has captivated visitors for 120 years. Ten of the thirteen major proposals catalogued by Potter since 1836 have proposed large-scale irrigation schemes for the Okavango area.

The dream of large-scale irrigation derives mainly from the availability of the water resource and from an analysis of soils, markets, or the wishes of the local inhabitants, who have consistently favoured livestock production and hunting as economic activities. In spite of the interest in irrigation, a serious investigation into the potential of the Okavango has only recently been undertaken through an UNDP/FAO project, No. 72-019, and the recently completed SWECO consultation report on the development of the Okavango Corridor.

Taken together, these micro and macro studies of irrigation potential in the region highlight the difficulties of establishing large-scale irrigation projects while giving agronomic experiments at two sites, a mulato research station at Mokolodi and Kalahari sands station using sprinkler irrigation at Motoki on the Boteti River. Most of its findings to date indicate that good management of soils is necessary to overcome certain basic difficulties in the Kalahari sands soils of the area. These soils are of poor texture and are low in organic matter. Fields in the Okavango are characterised by their sandy nature due to levelling and hard pans. Erosion is a problem and pH values are considered by the project to be too high for good cropping. These difficulties can be overcome through careful management including stubble mulching, crop rotations, fertilisation, planting in strips, and the use of wind breaks. On the other hand, mulato soils appear to be quite fertile and to avoid some of the problems of dryland soils, although time of planting is of greater importance. The project considers that mulato cultivation is probably the most economic form of production if certain basic recommendations for cultivation, variety, and fertilisation are followed. Recommended crops include food grains, sun dried fruits, fodder crops, and vegetables.
General Discussion

Mr Gerhart expressed surprise at Mr Campbell’s figure of only 1/5 of the population benefiting from cattle and suggested that the Rural Income Survey in Ngamiland did not examine the villages with large cattle holdings. In particular he felt that Maun was not representative. Mr Campbell replied that Maun contains most of the richer element in Ngamiland, that in any case the figures quoted referred to the Delta and not to Kalahari areas and that the 1/5 figure was probably too high.

Mr Worthington stated that it was interesting to learn that bilharziasis was appreciated by the local people and that a poisonous plant was used to kill the snails. This led to a discussion on bilharziasis when it was pointed out that the disease is rapidly growing in prominence in Maun itself. Mr Gilmore replied to a question regarding the large-scale approach to fisheries stating that this tended to leave the local people behind with a result that they lost faith in the development of the industry as a whole. He emphasised the need to push rural development keeping it at the rural level so that local people could participate and appreciate projects. Mr Dincer, who had asked the question, was not convinced of this.

Mr Worthington stated that the figure given for fish off-take was the lowest in Africa and that this should be examined. He added that generally in Africa it was possible to import good fishermen into areas like this and to exploit the resource with tried methods. He asked if there were special taboos preventing fish-eating. Mr Campbell pointed out that fishing is considered a fairly low-class occupation and that the Tswana, who revere the crocodile, had once not eaten fish although this is changing today.

Mr Odell asked Mr Afriyie to explain his proposal for formulation of groups to bring about development and examined on what they would build. Mr Afriyie pointed to the Cattle Co-operative in Sehitwe for which results could be seen and suggested similar organisations, since group work was already being practised. Mr Keenan pointed out that migrant labour was often detrimental. He suggested that instead of cash the migrants tend to bring back luxury goods which disrupt the local economy creating a desire for these at the expense of food. With many young men away decisions were left entirely to the old creating increasing dependency on traditional socio-economic patterns. This could only result in an increase in conservatism. In addition the knowledge of mining brought back by the migrants could be of no positive local value. He suggested that a study of migration in the area would be beneficial.

Another discussion on bilharziasis developed and Mr Graham stated that recent research indicated that where there were large populations of water antelope (Kobus spp.) these suffered from their own type of bilharzia and that if transmitted to man this appeared to immunise him from the more severe human form of the disease. He then suggested that with the decrease in population and spread of these antelope, an increase in spread of human bilharziasis should be expected. However, research on this aspect was far from complete.

Mr Graham asked about the possibilities for aquarium fish and Mr Gilmore replied that these are not great. Although there are 35 species in the Delta there would be strong competition with other areas in Africa and America where there are greater varieties and much greater expertise. In any event this would be merely a one-man industry, since the fish occur only in small numbers. Dr Thompson applauded the proposals for careful planning 'strategy', but pointed out that any large-scale fishery operation would involve relocation of considerable numbers of
people which would be difficult. Mr Gilmore agreed with him reiterating the need for proper planning of any fish utilisation scheme. He suggested that an in-depth survey of the existing fishing patterns might produce a Botswana solution to a Botswana problem. Time is not a vital factor so that the research could be thorough.

Mr Hudson pointed out the great difference in labour value between rural and city work. Rural people, through migrancy, are aware of money values and often no longer wish to work for long hours in agricultural lands when they know the return is small compared to, for instance, keeping stock which realise high prices. He cited Botswana-craft buying traditional material such as baskets in remote areas and pointed out that if there were marketing arrangements for fish and grain on hand, then their value would immediately increase and proposed more Marketing Officers for the Okavango. The question of marketing arrangements and prices paid was discussed in detail and it was agreed that local markets were essential if industries like fishing, crop-growing, curio-making, etc, are to be continued let alone expanded.

Mr Gilmore pointed out that there would have to be a major improvement in communications if these industries are to be expanded; rising expectations might be created and without proper outlets the expanding industry might be seriously jeopardised. Mr Gerhart pointed out that rural prices are controlled by the Grain Marketing Board even if only indirectly. He discussed the present major import of grain from abroad and suggested it was not in the country's interests to close its borders. Thus, prices in Ngamiland would always be geared to grain markets outside the area. Mr Keenan pointed out that often in rural societies there is resistance to improved agricultural methods. Mr Gerhart reminded the meeting about the division of labour, women doing agricultural work while men kept cattle. This was another factor inhibiting the low-value cropping from increasing when compared to cattle prices which rose steadily. Mr Molosi suggested that there could be large scale fishing if the water flow into Lake Ngami was regularised. Mr Gilmore pointed out that stabilising Lake Ngami would change it into a vast weed-bed and added that the high productivity of the lake was due to the fluctuating levels. Mr Diner said that there was no intention of stabilising the Lake, but merely of trying to stop if from drying out completely. Mr Fox added that large-scale fishing in the lake was probably impossible as the fish could only be exploited for six months in a year. Mr Reavell stated that three points emerged: a project for development at a national level should be integrated into the Research Project, the local population should be involved at all levels, and decisions should be taken as a result of the present discussions.