

ANNEX B

HORTICULTURAL ESTATES SUB-PROJECT

BOTSWANA RURAL SECTOR GRANT PROJECT EVALUATION

(Project # 633-0077)

May 1986

Gaborone, Botswana

TABLE OF CONTENTS

- I. Summary
- II. Evaluation Methodology
- III. External Factors
- IV. Project Inputs
- V. Project Outputs
- VI. Purpose
- VII. Goal
- VIII. Beneficiaries
- IX. Unplanned Effects
- X. Lessons Learned
- XI. Special Comments
- XII. Recommendations

I. SUMMARY

The development of the Phase II estates continues to run far behind the schedules laid down when the extension of the Horticultural Estates sub-project was planned. The lag in utilization of funds which characterized Phase I are recurring in Phase II. The problem of inadequate supplies of irrigation water that continues to limit production to very low levels on some of the Phase I estates has been avoided in establishing the two new Phase II estates. However, problems due to friction among members and failure to cooperate and to poor technical and managerial leadership that restricted progress in Phase I are re-occurring on one of the Phase II estates. The targeted employment levels are being maintained on Phase I and one of the Phase II estates, but information has not been developed to determine income effects or long-term economic viability.

II. EVALUATION METHODOLOGY

The purposes of the evaluation of the Horticulture Estates sub-project are:

A. Review progress of Ramonaka and Selebi-Phikwe Estates and make a preliminary assessment of Chadibe Estate,

B. Analyze implementation bottlenecks and recommend solutions, and

C. Assess drought effects on estates and suggest means of alleviating avoidable problems or alternative plans.

The evaluation was done by the Agricultural Economist on the evaluation team with the cooperation and assistance of the GOB/MOA Horticultural Officer, the Research Horticulturist and Estate Horticultural Advisors and Agricultural Demonstrators. Project documents, including previous evaluation and status reports, and available financial and production data were reviewed. Visits were made to both Phase I and Phase II estates since financing of Phase I estates has not been terminated; at least one Phase I and one Phase II estate share management personnel; and since knowledge of the current status of the Phase I estates is relevant to an assessment of the viability of the Horticultural Estate concept.

III. EXTERNAL FACTORS

The factor impacting most severely on the Horticultural Estates sub-project was the drought starting in 1981-82 and continuing to the present time. In spite of drought being a common occurrence in Botswana, the present drought being the second five-year period of continuous drought since 1961-62, the

35

possibility of such an occurrence apparently was ignored in planning Phase II. The goal of Phase II was specified as being the same as Phase I, but the purpose varied in that emphasis was no longer placed on developing new strategies and would not be experimental. Apparently, it was incorrectly assumed that the horticultural estates were viable and would not be affected by rainfall. Yet, two of the four Phase I estates suffered complete or near complete crop failure each season since 1982-83. A third estate has suffered serious reductions in at least one season. The 1984 evaluation of Phase Phase I concluded that the Horticultural Estates concept had not been fully tested and that there was considerable evidence that such organizations were not sustainable.

A second external factor impacting on all of the sub-projects has been the marked devaluation of the Botswanan currency which substantially exceeded the internal rate of inflation. As a result, fewer dollars have been required to cover local costs and the problem of over-budgeting of some sub-projects was intensified.

A third factor that may have had some impact on the development of the Horticultural Estates sub-project was the policy of the government to limit overall and some individual items of expenditures regardless of whether internally or externally funded. This policy may have delayed some capital expenditures on the project. However, it appears that these delays would probably have occurred in any event.

#### IV. PROJECT INPUTS

In Phase I, RSG funds were to be provided if needed to cover costs of housing for Horticultural Advisors and Agricultural Demonstrators; net houses for producing seedlings, and vehicles for transporting produce to market. Fencing, draft power and an irrigation system were to be provided where such facilities did not exist. Improvements in some irrigation systems were to be provided as well as operating costs to get the estates into production. Funds to support a research horticulturist and economist at the research station were also included. The GOB was to provide Horticultural Advisors (generally volunteers), Agricultural Demonstrators and a Horticultural Officer and assistants to manage and supervise estate activities. Land would be allotted from communal sources and estate members would clear and prepare sites for production.

Most of the prescribed inputs for Phase I appear to have been provided although considerably later than indicated in the original schedule. Two new estates, Mogobane and Mathubudukwane, have been established. Two existing organizations, Manyana and Mankgodi, were brought into the sub-project in 1982. Current status of RSG funds made available for Phase I of the sub-project is as follows:

	<u>Amount</u>	<u>Percent</u>
Original Budget	\$293,275	100
Earmarked	311,943	106
Disbursed to GOB	222,412	76
Proposed Deobligation	60,000	20
Unliquidated (AID)	29,531	10
Spent by GOB*	197,190	67
Unliquidated (GOB)*	25,222	9

\*Estimated dollar equivalents

Between the beginning of the third quarter of 1981 and the end of the fourth quarter of 1985, an amount equal to 67% of the originally budgeted amount has been disbursed to and spent by GOB agencies. GOB has expended 89% of the funds made available to it. An amount equal to 19% of the original budget remains unliquidated at the end of four and one-half years--10% held by USAID and 9% by the GOB.

Under Phase II, RSG funds were budgeted to provide support for site development, tools and equipment, draft power, housing and supplies to establish three new Horticultural Estates. GOB commitments were similar to those under Phase I. Two of the three estates, Ramonaka and Selebi-Phikwe, have been established and production initiated even though additional development remains to be done. No work has been done physically on establishing the third estate at Chadibe although an allotment of land for this purpose has been approved. Current status of RSG funds for Phase II is as follows:

	<u>Amount</u>	<u>Percent</u>
Original Budget	\$222,000	100
Earmarked	181,800	82
Disbursed to GOB	27,511	12
Proposed Deobligation	70,000	32
Unliquidated (AID)	84,289	38
Spent by GOB*	33,085	15
Unliquidated (GOB)*	- 5,574**	- 3

\*Estimated dollar equivalents.

\*\*Expenditures by GOB exceed receipts of RSG funds.

The first disbursements and expenditures of Phase II funds were made in the third quarter of 1984. Eighteen months later, an amount equal to only 12% of the original budget had been disbursed to the GOB. The GOB, using some of its own funds, had expended an amount equal to 15% of the original RSG budget. Since only 82% of the budgeted amount has been earmarked, the proposed deobligation of an amount equal to 32% percent of the original budget will reduce the total available for expenditure on the sub-project to 50% of the budget originally proposed or \$111,000. With a project assistance termination date of September 30, 1988, or 21 months from the date of last reported expenditures, it is questionable if even this limited fund will be spent.

Varying numbers of Horticultural Advisors and Agricultural Demonstrators have been provided by the GOB at different times, but one advisor and one demonstrator for each project, as specified in the project agreement, has never been achieved. Currently, there is one Agricultural Demonstrator with two assistants, but no Horticultural Advisor, to support the work at both Mathubudukwane and Ramonaka Estates. One Horticultural Advisor and one Agricultural Demonstrator are available to support the work on the three estates of Mogobane, Manyona, and Mankodi. One Agricultural Demonstrator is available to work with the members at Selebi-Phikwe. None are available to work with prospective members at Chadibe in organizing the association or initiating implementation of an estate activity. Thus, instead of 14 Horticultural Advisors and Agricultural Demonstrators to work with members of seven estates as envisioned in original plans, there are one Horticultural Advisor and three Agricultural Demonstrators to work with six existing estates plus one in the earliest stage of development.

A total of \$515,275 was originally budgeted under Phases I and II for development of the Horticultural Estates. Of this amount 29% was either not committed or is proposed for deobligation. Of the remaining 71% available, only 45% had been expended by the end of 1985 and the remaining 26% was still unliquidated. Several factors have contributed to this relatively low level of utilization of available funds. The sub-project appears to have been moderately over-budgeted in the beginning, but this condition was worsened by the rapid rate of devaluation of the Botswana Pula relative to the internal rate of inflation. Beyond these factors, however, the failure to vigorously promote and encourage the development of the projects was a contributing factor.

#### V. Project Outputs

The quantitative outputs targeted for Phase I were achieved although well behind original schedules. Four, as opposed to three originally planned estates were established. The first, aside from shortage of irrigation water during the early seasons after organization, continues to operate effectively. This estate has had technical advisors and managerial direction since early in its organization. It is reported to have operated without serious problems developing among its members and at relatively high levels of production. The two cooperative organizations subsumed in the sub-project during its second year have suffered from severe shortages of irrigation water and have had only limited or no production each season since 1982-83. One of these has also had serious organizational problems with only three of the original members still a part of the organization. The number of members has been restored, but current limited production prospects may seriously impair future motivation of the group.

16

In contrast, the second of these two associations has experienced equally bad or worse production and returns, but still retains its original ten members who reportedly are determined to continue their joint effort. The fourth and last estate to be established appears to have a dependable source of irrigation water, soils moderately well suited to horticultural production and to be favorably located relative to market outlets. Technical problems in production during the first few seasons restricted production below hoped for levels and expenses considerably exceeded levels which members reportedly had been led to expect. Members were very dissatisfied and two-thirds left the association within the first two years. However, a new management team has been installed, several new members have been recruited and production prospects are favorable.

In summary, it might be noted that organization of two of the Phase I associations--Manyana and Mathubudukwane--reportedly had been initiated and promoted by individuals outside of the group who became members. These two associations are the ones that experienced and continue to experience serious organizational problems. These groups appear to have been less motivated than those that came together because of their common interest and without outside initiatives. It might also be noted that the quality of leadership of the Horticultural Advisors or Agricultural Demonstrators is reflected in the progress or lack of progress in developing the estates. In no case, however, does there appear to be appreciable progress in creating the managerial capability among the members to continue successful operation of the estates if the advisors and demonstrators are removed. Finally, it must be noted that no information has yet been developed from Phase I to indicate whether or not the estate concept is economically viable.

Development of Phase II, like Phase I, has experienced many delays. However, two new estates have been established and are now in production. The allotment of land for the third estate has been approved. The nature and rate of development has varied markedly among the estates so each will be reviewed separately.

#### Ramonaka

Ramonaka is the most advanced and most promising of the estates. Some delays were encountered in site preparation and getting the reservoir installed and the irrigation system in operation. The estate has 3.65 hectares fenced and available for cultivation. Most of the tract is light, sandy soil suitable for any horticultural crop, but a limited area is composed of heavy black soil, the use of which will be more restricted. A tractor was hired to plow the tract prior to preparing the plots for planting by the members using hand tools. Draft power has not been purchased. The lack of draft power may delay replantings and complicate establishing an

effective rotation. In order to avoid the stoppage of work and loss of a crop, such as occurred on the nearby Mathubudukwane estate due to failure of the pump engine, a standby engine should be provided.

The 14 members of the association have worked together without friction and cooperated in carrying out agreed upon production plans effectively. The management staff consists of an Agricultural Demonstrator and two assistants. A Horticultural Advisor is not available, but technical assistance has been provided by MOA staff in solving some technical problems that have arisen. A storage facility has been provided which makes it possible to maintain reserve supplies so that all operations can be performed in a timely manner. A net house has been used effectively to produce seedlings for transfer to field plots, insuring better stands and improved yields.

Limited quantities of produce are sold to people who come to the estate to buy or to shops or individuals in nearby villages. However, most of the produce is sold to SEGA in Gaborone. Deliveries are made twice a week in the vehicle which serves both Ramonaka and Mathubudukwane. Some difficulty reportedly developed in moving the total quantity of produce from both estates during peak production period. Some adjustment in delivery schedules to ease this problem should be possible without resorting to the purchase of a second or of a larger more expensive vehicle.

#### Selebi-Phikwe

The establishment of Selebi-Phikwe has run about one year behind schedule. Some delay was experienced in obtaining an acceptable site. The location finally approved is on the Matloutse River which carries waste water from mines in the vicinity of Selebi-Phikwe so the supply of irrigation water seems reasonably assured. Tests of samples of the water being used for irrigation do not indicate levels of salts or other elements likely to be injurious to horticultural crops. Unfortunately, the site is over 20 kilometers from Selebi-Phikwe where the produce must be marketed. Roads should be passable throughout the year with the possible exception of a few days during the peak of the rainy season. However, transportation costs will be high.

Unusually heavy growth of brush and trees on the site delayed the clearing and site development. This situation was complicated by the fact that all members of the association lived in Selebi-Phikwe and had to commute each day to the estate during the clearing process. In addition to the work done by the six member families, local labor was hired to assist in the clearing process. There is a total of 15 hectares in the site, of which 11 have been cleared, 4.5 fenced and 2.5 placed in cultivation. The four hectares of uncleared

land are scheduled to be used as site for houses for members or other buildings required for the estate.

A pump and sprinkler irrigation system has been installed which is adequate for the 2.5 hectares currently being cultivated. Additional pipe and perhaps the originally planned reservoir will be required if the cultivated area is expanded. A question has been raised as to whether additional water can be pumped from the same location where water is now being obtained or whether a new pump at a different location will be required. The soil and supply of water appear suitable to permit expansion, but this question of location for pumping should be answered before proceeding with any expansion of the cultivated area.

Construction of housing for the Agricultural Demonstrator or of the net house has not been started, nor has the reservoir called for in the original proposal been installed. Draft animals have not been obtained nor the mule paddock fenced.

The association is composed of the six original families, several of which are single parent households. Additional members are being sought, but the group has decided that new members would have to contribute 200 Pula as compensation for the work of clearing the tract. Thus far only one of the six members has moved to the estate and is working his plots. The remainder continue living in Selebi-Phikwe and hire local labor to do a major part of the work on their plots. Group participation and cooperation has been poor.

The association has had difficulty in obtaining fertilizer, seeds and pesticides in a timely manner. Delays in spraying to control pests has reduced yields in some instances. Seed sown directly to the field have often failed to produce good stands. Poor cultural practices have also reduced yields in some instances, particularly of tomatoes.

The first harvest started in October, 1985. The types of vegetables sold and gross receipts are shown below.

Cabbages	P1,435
Tomatoes	P1,330
Maize	P 991
Spinach	P 471
Carrots	P 208
Onions	P 85
TOTAL	<u>P4,520</u>

Sales by individual members, deductions for inputs and payments to members are indicated below.

<u>Member</u>	<u>Sales</u>	<u>Deductions</u>	<u>Payments</u>
1	P 642	P 165	P 477
2	P 755	P 139	P 616
3	P1,097	P 244	P 853
4	P 778	P 170	P 608
5	P 625	P 149	P 476
6	P 623	P 122	P 501
TOTAL	<u>P4,520</u>	<u>P 989</u>	<u>P3,531</u>

It should be noted that the deductions are not any reflection of total expenses. For example, transportation costs for the last quarter of 1985 reported to AID totaling P2,870 were not included nor were any depreciation charges. The deductions made by the association were made to cover at least part of the cost of inputs and will be held to purchase inputs for the next crop.

### Chadibe

The allotment of land, scheduled to be accomplished in April 1984, was completed in April 1986. The general area proposed for location of the estate has been determined, although the specific site has not been designated. The area is on a moderate slope with an uneven, stony surface. It is expected that the site will have between six and seven hectares and it is proposed that two hectares be used for producing horticultural crops and the remainder planted with fruit trees. On or adjacent to the expected site for the estate are two small free flowing springs, plus two boreholes used to supply the nearby village. The flow from the springs appears to be quite limited even at this season. The stream carrying water from the springs is currently being absorbed into the soil and disappears within about 300 yards of the spring. It is questionable if this limited flow, even if maintained throughout the year, would irrigate more than a fraction of the proposed estate area. It is possible that the supply from the springs could be supplemented by water from new boreholes. However, this action would increase both the beginning capital cost and the continuing operating costs. In any event, before initiating work on developing the site, the adequacy of the potential water supply should be carefully assessed and, if it appears necessary to supplement the springs with boreholes, costs should be re-calculated.

The soil survey specified in the project document should also be completed prior to the initiation of site development. Considerable re-shaping of the surface will be necessary to facilitate irrigation and prevent erosion. In light of this requirement, depth of soil becomes particularly pertinent.

The analyses that have been made of potential markets in the area and the projected costs and returns cannot be quantitatively tested. However, the estimates used in making the analyses

appear reasonable if it is assumed that an uninterrupted adequate flow of irrigation is attained and that effective managerial leadership is provided. Past experience on the other estates clearly indicates that attainment of those assumed conditions cannot be assured.

#### VI. PURPOSE

The purpose of the project, of which Horticultural Estates is a sub-project, is to provide the rural population with increased access to productive employment opportunities. The purpose of the sub-project is to establish several operational Horticultural Estates, increase the income of members of the estate associations and partially meet consumption requirements of urban markets. At the end of the project it was expected that the Ministry of Agriculture would have developed a successful model for commercial horticultural production based upon organized groups of small farmers and that Horticultural Estates would be established and commercially viable. There is no assurance that end of project conditions can be attained.

The time schedules set for attaining the physical establishment of the estates, achieving the behavioral changes required in the adoption of a complex and demanding new technology and establishing new forms of organized behavior essential for successful planning and managing common interests and resources were unrealistic. Selection of several sites for establishing production enterprises based on irrigation was ill-advised from the standpoint of assuring dependable adequate supplies of water. The design and installation of irrigation systems appears to have been faulty in some instances and may require corrective action. Technical guidance provided members was inadequate in several instances. Vigerous and coordinated action by all sponsors of sub-projects could make very substantial progress in correcting the conditions noted above. Whether sufficient progress could be made within the time remaining before the termination of project to achieve the end of project objectives cannot be assured. Further, unless steps are taken very quickly to assemble information relative to the economic performance of estates, it will not be known at the end of project whether the Horticultural Estate concept is viable.

#### VII. GOAL

The long-term goal is to stimulate rural development and a more equitable distribution of income in Botswana. A subgoal appears to have been, that following demonstration of the viability and success of the model for commercial horticultural production based on small farmers, the establishment of a number of horticultural associations great enough to have a significant impact on employment and on filling domestic demands for horticultural products would occur. Substantial

secondary benefits would likely occur as input and commodity marketing organizations and processing plants were established that would also have contributed to attainment of the national goal. Currently six estates have been established, but there is not yet any basis for concluding that they are commercially successful.

#### VIII. BENEFICIARIES

Direct beneficiaries include some 40 families who are members of associations formed during Phase I, plus 20 families in associations formed during Phase II. These are poor rural people who were generally unemployed and many are female heads of households. There have been no significant indirect or secondary beneficiaries.

#### IX. UNPLANNED EFFECTS

No unplanned effects have been identified.

#### X. LESSONS LEARNED

The project illustrates the dangers inherent in designing and attempting to implement a project without appropriate technical expertise. An agriculturalist should have been aware that recurrent and extended droughts were almost certain to occur in a country with the historical rainfall pattern of Botswana and that irrigation water--from either surface or ground sources--would be affected immediately or in the relative short run. An agriculturalist should also have advised the economist against basing the economic analysis on the completely unrealistic assumption of constant yields over a 10-year period. Irrigation specialists could have foreseen the probable failures of irrigation sources and systems on several of the estates and have proposed alternatives that would have avoided or at least minimized the probability of failure. Low yields or crop failures experienced intermittently on several estates could have been avoided with better direction as to the most effective agricultural practices.

#### XI. SPECIAL COMMENTS

Not pertinent at this time.

#### XII. RECOMMENDATIONS

The following recommendations are made with respect to the Horticultural Estates sub-project:

44

1) It is recommended that collection and analysis of data on cost and returns on Phase II estates currently being undertaken by the MOA Agricultural Economist be extended to Phase I estates and continued as a part of the quarterly reporting systems. This information would not only strengthen the monitoring system, but also provide a basis for verifying if MOA attained its end of project objective of developing a successful model for commercial horticultural production based on small farmers as specified in the Log Frame. The feasibility of supplementing the analyses of the estates with a comparative study of private horticultural crop producers should be explored.

2) It is recommended that collaboration of specialists on the farming systems project be sought in developing analyses of the combination of crops and rotations that would optimize the use of the limited water and labor which would provide guidelines for planning and managing each of the estates.

3) It is recommended that Ramonaka estate personnel be required to decide on the type of draft power to be used and that such be secured within three months or that funds currently being held for this purpose be deobligated.

4) It is recommended that the house scheduled for construction at Ramonaka for an Agricultural Demonstrator or Horticultural Advisor not be built. At present, Ramonaka and Mathubudukwane are being served by an Agricultural Demonstrator housed at Mathubudukwane. This appears to be a most reasonable and satisfactory arrangement and it is recommended that it be continued.

5) It is recommended that a spare pump engine be provided for the Ramonaka/Mathubudukwane estates so that future breakdowns will not deprive the estates of essential irrigation water.

6) It is recommended that efforts be initiated immediately to arrange for all members of the Selebi-Phikwe association and the assigned Agricultural Demonstrator to transfer their residence to the estate site. The present arrangement of living in Selebi-Phikwe, visiting the estates occasionally and hiring local labor to do most of the work on the estate is completely unsatisfactory, not in accordance with either the spirit or letter of the project agreement and will almost certainly doom the estate to failure. No further new capital investment should be made until arrangements for on-site residence of members are completed.

7) It is recommended that the Horticultural Officer work with the Selebi-Phikwe Agricultural Demonstrator or other appropriate individuals to arrange for the timely supply of seed, fertilizer, pesticides and other essential inputs.

57

8) It is recommended that work on the Chadibe estate not be initiated until a determination is made of the adequacy of the water supply to support the projected production without interruption and a soil survey is made as provided in the original proposal to determine if the soil is suitable for horticultural crop production and of sufficient depth to permit reforming the surface to facilitate irrigation and prevent erosion. It is recommended that the irrigation specialists of the Ministry of Agriculture be requested to undertake the assessment of the adequacy of the water supply and, if the current proposals are not feasible, develop alternative arrangements.

9) It is recommended that the irrigation specialist of the Ministry of Agriculture also be requested to undertake a technical investigation of all of the estates as soon as possible to determine if there is any technically and economically feasible means of salvaging the irrigation potential of Manyana and Mankgodi estates and of increasing the efficiency of water use and reducing the hazard of future failure of supplies at other estates.