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**PROJECT PERFORMANCE AUDIT REPORT**

**MALAWI LILONGWE LAND DEVELOPMENT PROGRAM PHASE III  
(CREDIT 550-MAI)**

April 7, 1981

Operations Evaluation Department

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### ABBREVIATIONS

ADMARC	-	Agricultural Development and Marketing Corporation
LLDP	-	Lilongwe Land Development Program
MANR	-	Ministry of Agriculture and Natural Resources
NRDP	-	National Rural Development Program
RMEA	-	Resident Mission in East Africa

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PROJECT PERFORMANCE AUDIT REPORT

MALAWI LILONGWE LAND DEVELOPMENT PROGRAM PHASE III  
(CREDIT 550-MAI)

PREFACE

This is a performance audit of Phase III of the Malawi Lilongwe Land Development Program for which Credit 550-MAI in the amount of US\$8.5 million was approved in March 1975. The final disbursement was made on July 11, 1979 and the credit was closed on June 30, 1979, as planned.

The audit report consists of an audit memorandum prepared by the Operations Evaluation Department (OED) and a Project Completion Report (PCR) dated November 1979. The PCR was prepared by the Government of Malawi. RMEA contributed the project overview to the PCR. The Audit Memorandum is based on a review of the Appraisal Report (No. 652-MAI) dated February 28, 1975, the President's Report (No. P-1583-MAI) of March 10, 1975, the Credit Agreement dated May 27, 1975 and the PCR. Correspondence with the Borrower and internal Bank Memoranda on project issues as contained in relevant Bank files have been reviewed. Bank staff associated with the project have been interviewed.

An OED mission visited Malawi in October 1980. The mission held discussions with officials of the Ministry of Agriculture and Natural Resources and project management. A field trip was made and discussions held with farmers and community leaders. The information obtained during that mission was used to test the validity of the conclusions of the PCR and permitted discussion of project design and institutional aspects.

A copy of the draft report was sent to the Borrower on December 29, 1980 for comments but none were received.

The PCR is thorough and frank in its assessment of project achievements and shortcomings, but the audit has reservations on some of the causal relationships presented in the report. The issues discussed in the audit memorandum are selected on the basis of their importance to the Government and future Bank work.

The assistance provided by the Government and the project staff in the preparation of this report is gratefully acknowledged.



PROJECT PERFORMANCE AUDIT BASIC DATA SHEET

MALAWI LILONGWE LAND DEVELOPMENT PROGRAM, PHASE III  
(CREDIT 550-MAI)

KEY PROJECT DATA

<u>Item</u>	<u>Appraisal Expectation</u>	<u>Actual or Current Estimate</u>
Total Project Cost (US\$ million)	12.03	13.26
Cost overrun (%)	-	10.2
Credit amount (US\$ million)	8.5	8.5
Disbursed )	8.5	8.5
Cancelled ) September 30, 1980	-	-
Outstanding )	8.5	8.5
Date Physical Component Completed	3/78	3/79
Time Overrun (%)	-	33
Economic Rate of Return <u>/a</u> (%)	13	25

DISBURSEMENT  
(US\$ 000)

	<u>1975/76</u>	<u>1976/77</u>	<u>1977/78</u>	<u>1978/79</u>
Appraisal Estimate				
Yearly	870	3,270	2,580	1,780
Cumulative	870	4,140	6,720	8,500
Actual				
Yearly	1,441	2,580	2,516	1,963
Cumulative	1,441	4,021	6,537	8,500
Actual/Estimate (%)	165	0.97	0.97	100

OTHER PROJECT DATA

<u>Item</u>	<u>Original Plan</u>	<u>Revisions</u>	<u>Actual or Estimate Actual</u>
Board Approval			03/20/75
Credit Agreement Date			05/27/75
Effectiveness Date	08/29/75		08/12/75
Closing Date	06/30/79		06/30/79
Borrower	Government of Malawi		
Executing Agency	Ministry of Agriculture and Natural Resources		
Fiscal Year of Borrower	April 1 to March 31		
Follow-on Project	National Rural Development Program		
Credit Number	Cr. 857-MI		
Credit Amount	US\$22 million		

/a For all three phases of the program.





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MISSION DATA

	<u>Origin</u>	<u>Month Year</u>	<u>No. of Persons</u>	<u>No. of Weeks</u>	<u>Man- Weeks</u>	<u>Date of Report</u>
Supervision XI/ <sup>a</sup>	RMEA	11/75	1	2	2	
Supervision	RMEA	02/76	2	1	2	03/08/76
Supervision XII	RMEA	09/76	1	1	1	10/29/76
Supervision XIII	RMEA	1-2/77	2	3	6	
Supervision XIV	RMEA		1	4	4	03/14/77
Supervision XIV	RMEA	9-10/77	1	2	2	01/09/78
Supervision XV	RMEA	06/78	1	1	1	
Supervision	RMEA	07/78	1	1	1	09/12/78
Completion/ <sup>b</sup>	RMEA	03/79	1	2	2	04/11/79
Completion	RMEA	10/79	1	1	1	10/29/79

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RATES OF EXCHANGE

<u>Name of Currency</u>	<u>Malawi Kwacha (MK)</u>
Appraisal Year Average 1975	Exchange Rate US\$1 = MK0.83
Intervening Years Average	US\$1 = MK0.86
Completion Year Average 1979	US\$1 = MK0.81

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/a Supervision mission numbers pick up the series started in Phases I and II.

/b Government estimates that the preparation of the PCR required 20 manweeks. In addition, RMEA devoted to it 3 manweeks of field work. Bank expectations for the preparation of PCR's is about 10 manweeks.



PROJECT PERFORMANCE AUDIT REPORT

MALAWI LILONGWE LAND DEVELOPMENT PROGRAM PHASE III  
(CREDIT 550-MAI)

HIGHLIGHTS

The Lilongwe Land Development Program (Credit 550-MAI) was designed in 1966 to help create a suitable environment for increased crop production in a then depressed, but high potential area of Malawi. The program extended over the period 1968-1978 and was implemented in three phases. Program costs amounted to US\$27.7 million to which IDA contributed three credits totalling US\$21.7 million. The program aimed at a target population of about 109,000 farm families and covered an area of about 1.2 million acres. The audit reviews progress during the third and final phase of the program. However, as may be expected, the issues raised and the results analyzed are the product of actions taken over the three phases. Similarly, Government has made a commendable effort in preparing the Project Completion Report and the Bank's RMEA has done an excellent job in encouraging and assisting in the effective handover of this responsibility.

Phase III of the program consisted of a continuation of infrastructure development, including land development, reorganization and registration, construction of marketing and storage facilities, office space and staff housing, provision of extension, training and credit services, initiation of the integration of livestock and crop production activities, provision of health services in the program area, and program monitoring.

The physical implementation of the program was a success. Government gave qualified and motivated expatriate staff support and the needed flexibility to direct an efficient and timely construction of project works. Within the constraints imposed by the policy framework and the country overall conditions, project management also succeeded in providing farmers with reasonably efficient extension, credit and marketing services. The major shortfall of this program is that despite the progress made, it did not go far enough in lessening Malawi's dependence on outside technical assistance and in contributing to the creation in Malawi of an internally generated, self-sustained development process. Moreover, many lessons learnt from this experience still remain to be incorporated in other development activities in the country. The reestimated rate of return is 25% compared to the initial appraisal estimate of 13%.

The following points may be of particular interest:

- Government did not contribute the full policy input needed for successful implementation of the program (PPAM paras. 19 to 22);



- the shortfall in achieving yield targets of the program may be attributable to the lack of sufficient adaptation of technological advice given to farmers and to on-farm economic considerations rather than to the inefficiency of the extension service (PPAM paras. 17 to 19; PCR paras. 5.5.1 to 5.5.4); and
- involvement of target population in the development process through village committees was successfully initiated (PPAM para. 27, PCR paras. 5.13.1 to 5.13.6).



PROJECT PERFORMANCE AUDIT MEMORANDUM

MALAWI LILONGWE LAND DEVELOPMENT PROGRAM PHASE III  
(CREDIT 550-MAI)

I. SUMMARY

The Program

1. The Lilongwe Land Development Program (LLDP) was prepared in 1966 for an area of recognized high agricultural potential in response to (i) threatening soil erosion due to rapid deterioration of the natural vegetation cover and (ii) population pressure on the land base which was reinforcing land fragmentation and the subsistence nature of agriculture. The program objective as stated in the Phase I Appraisal Report was "to raise agriculture production (maize, tobacco, groundnuts) by increasing yields and ensuring the effective use of all suitable land, and by furthering the transition from a subsistence to a market economy." The program's intermediate objectives included infrastructure development (feeder roads, marketing facilities, domestic water supply, soil conservation works and buildings) and provision of services to farmers (extension, marketing, credit, input supply, land use planning, land registration, and health). These intermediate objectives remained consistent over the three phases, except for the addition of support for livestock activities starting in Phase II and for health facilities in Phase III. The LLDP emphasized rural infrastructure development, implemented through capital intensive technology, with heavy reliance on expatriate management operating virtually independently of existing public institutions.

2. The LLDP was implemented over the ten years 1968-1978 in three phases:

<u>Phase</u>	<u>Number</u>	<u>IDA Credit</u>	<u>Total Cost</u> (US\$ M)	<u>Period</u>
		<u>Amount</u> (US\$ M)		
I	113-MAI	6.00	7.00	1968-72
II	244-MAI	7.25	8.59	1971-75
III	550-MAI	8.50	12.10	1975-78
		<u>21.75</u>	<u>27.60</u>	

The difference between total program costs and IDA credits was financed from internal sources except for a grant of US\$1.6 million from the United Nations Capital Development Fund during Phase III. The Phase I Credit Agreement was closed, fully disbursed ahead of schedule, in August 1972 (Project Performance Audit Report No. 751, dated May 23, 1975). The Phase II Credit Agreement was closed, fully disbursed on schedule in March 1976 (Project Performance Audit Report No. 1597, dated May 17, 1977).

3. Phase III, the subject of this report, was appraised in 1975 as a three-year investment representing the final phase of the program which was broadly defined in 1966-67. The area covered by LLDP increased from the Phase I target of 500,000 acres to 1.0 million acres in Phase II and 1.2 million acres in Phase III. The LLDP was initially planned to directly affect the lives of an estimated 53,500 families by 1978-79. As a result of the area expansion the target population increased to about 109,000 farm families representing about 10% of the country's rural population. A detailed description of the Project is provided in Annex III(a) of the PCR. The major innovation in Phase III was the expansion of livestock activities to cover poultry and dairy development programs and the inclusion of funds for the expansion and improvement of health facilities in the program area. An agreement for a credit of US\$8.5 million was signed on May 27, 1975, became effective August 12 of the same year, and was closed fully disbursed in June 1979, as expected.

#### Major Findings of Audits for Phases I and II

4. On basic project design, the PPAR for Phase I raised the question of whether a less capital-intensive approach could have been adopted at least for part of the infrastructure development. The financial and time advantages of the capital intensive approach were recognized but "an opportunity seems to have been missed to stimulate a powerful local commitment to the program and to promote early on a sense of local self-identity. Indeed, in some cases the program actually pre-empted the activities of local people who had organized themselves to provide their own conservation works."

5. The Phase I PPAR also found that built-in monitoring and evaluation had failed to provide the necessary material for evaluating accomplishment at LLDP on the basis of appraisal's principal yardstick, crop yields. Because of wide variation in yields, the PPAR recommended that analysis of the mean values be complemented with analysis of weather variables and presented in the form of statistical distributions indicating the breadth of impact the project may be having.

6. Finally, the Phase I PPAR found the frequency of IDA supervision missions adequate, possibly even excessive since project management complained about the time required to show people around and the diversity of opinions expressed to Government on behalf of IDA. However, supervision missions were narrow in scope and there was room for more thorough follow-up supervision to specifically assist with the problems that arose during implementation and that were likely to affect future phases and the continuation of program activities after the investment period.

7. The extensive literature written about LLDP indicates that outside observers appear to agree that a major characteristic of the program has been its "rather strong and flexible management, adapting to changing circumstances" (PPAR, Phase II). Yet, judging from what has happened over the years, this audit finds that the strength and flexibility of management was an



effective tool for achieving the construction part of the program, but not in incorporating lessons from past practices in order to achieve the ultimate objective of the program. In fact, the same conclusions reached during the review of Phase I continued to be relevant at the end of Phase II.

8. The major finding in the PPAR for Phase II was that no convincing evidence was yet available to repudiate or to confirm the economic viability of the investment undertaken. Hence, LLDP could not yet be called a success by appraisal standards. The PCR for Phase II, specifically, recommended that "If some accurate measure is to be required of the project's impact on farm incomes and farm family well-being, which are the ultimate objectives of the program, the nature of such measure, the means by which it can be obtained, and the resource implications of the data gathering and analysis process should be discussed and agreed with project management as soon as possible." This was not done.

## II. MAIN ISSUES

9. The PCR for LLDP Phase III was prepared by Government and was the first of its kind in East Africa. The report is highly detailed and surprisingly quantitative, considering the quantity and quality of data available. Comments are given below on issues and conclusions of importance for future work which are either insufficiently discussed in the PCR or not discussed at all.

### A. Relative Emphasis on Infrastructure Development

10. LLDP was conceived as a "planned" rural development program in the sense that it attempted to balance infrastructure development and long-term area resources availability and potential. This approach is still viewed by Government as desirable and economical in the long run, but it is increasingly accepted as "unaffordable" in the short and medium runs because of the heavy burden it imposes on the country's development and recurrent budgets. Government is, therefore, increasingly favoring projects with a minimum of physical infrastructure and possibly lower construction standards in order to meet the budgetary constraints and spread the benefits of the limited development funds to a wider area in the country. The National Rural Development Program (NRDP) initiated in 1978 was meant to reflect these Government concerns. The rationale underlying Government concerns is primarily financial, but it seems to suggest either that LLDP could have included less infrastructure and/or could have used lower construction standards or that the same results could be obtained from rural development programs under similar conditions as LLDP but with less investment in infrastructure.

11. Given the objectives set for the LLDP program, this audit found no evidence to suggest that the 18% of total costs initially allocated for infrastructure development was beyond the minimum required for opening up an area with deteriorating land resources and, previously, with basically no

access to the market and to the most basic social amenities (drinking water and health). Furthermore, based on data reconstructed from information in the various appraisal reports, this audit found that expenditures on infrastructure development amounted to about US\$107 per family directly benefiting from LLDP, as opposed to about US\$94 per family in the case of NRDP<sup>1/</sup>. Given the particular emphasis Government put on minimizing expenditures on infrastructure development in the case of NRDP, the small difference supports the finding that (i) LLDP was not overdesigned in terms of infrastructure development, and (ii) under the conditions that prevailed in Malawi, minimum investments in rural infrastructure of the type undertaken under LLDP and NRDP were necessary to make farmers' participation in these programs feasible and beneficial.

12. On the issue of construction standards, the program management elected to use road construction standards lower than those accepted nationally. As a consequence, there remain 1800 kms of roads which the Ministry of Public Works (MPW) refuses to take over for maintenance on the basis that they do not meet national standards. MPW was not involved in selecting construction standards and was not consulted on the trade-off between construction costs in the short run and maintenance costs in the long run. This audit supports the judgment that, in environments with weak institutions and narrow basis for generating public revenues, it is more economical in the long run to opt for relatively high standard construction as a means for minimizing the medium term impact of the investment on the recurrent budget and limiting its demand on overburdened public institutions.

13. With regard to both construction and maintenance of infrastructural facilities, the issues relating to the social cost and benefits of alternative degrees of capital intensity and the lessons learnt from LLDP were not given proper consideration by either Government or IDA in the design of new programs (such as NRDP and others). This was in contrast to the particular attention given to the budgetary implications of different degrees of emphasis on infrastructure development.

#### B. Institution Building

14. Despite the substantial progress made in strengthening local institutions, Malawi today remains heavily dependent on outside technical assistance for conceptual work. Considering that LLDP was conceived 12 years ago, a deliberate bias toward institution-building in project design could have resulted in the country being more self-reliant institutionally than it is today. First, the program did not provide for any training beyond that needed for performing project related specific tasks, despite the fact that this program was initially regarded as the precursor and model for future rural development programs in the country. As a result, Malawi could have developed

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<sup>1/</sup> Both expressed in constant 1978 dollars.

further its own conceptualizing capability, which could make its rural development programs fully responsive to the needs of the people and to the constraints the country faces. Second, the program was implemented by a management unit which, for all practical purposes, operated independently of existing institutions. This was done in the interest of efficiency in the physical implementation of the project but the institution building impact was foregone. As a result, Malawi also remains short of institutional capability to maintain on-going activities and implement new development programs. In conclusion, this audit finds that, from Malawi's point of view, it would have been worthwhile to sacrifice some degree of efficiency in the physical and timely implementation of the program as a price for building a local capability and local institutions to conceive and implement future development programs.

15. A major example was the establishment of a Project Construction Unit as opposed to reliance on MPW or the use of contractors. The decision was based on the recognized lack of technical and managerial capability in MPW, the absence of local Contractors, the absence of supervisory capability to oversee local or international contractors, the anticipated lower cost and more timely implementation. These are legitimate reasons for the decision taken. The only shortcoming was that insufficient allowance was made in the program for remedying these deficiencies so that the country might acquire the capability to efficiently implement subsequent construction programs. Project Construction Unit staff indicated that several opportunities to involve and encourage small local contractors were foregone because program management was not given enough flexibility to adapt its procedures which tended to emphasize strict financial risk aversion and timely implementation. The same staff members also indicated that one major reason for the delays in the takeover of responsibilities by MPW for road maintenance is the fact that MPW was not as closely associated with the program as were the agencies responsible for Project marketing and health services, for example.

#### C. Program Production Targets

16. The appraisal of the three phases of the program chose increased production as the principal yardstick against which to measure success of LLDP. Higher production was to be realized through higher productivity, area expansion and an increase in marketable surplus. Compared to the pre-program situation, the average yield of maize achieved during Phase III increased by about 20%, the average yield of groundnuts declined by about 20% and the average yield of tobacco increased by about 150%. Compared to appraisal targets the program achievements fell far short of expectations in the case of maize and groundnuts and exceeded expectations in the case of tobacco. Estimates of the crop yields achieved may have been higher if it was possible to account for the flow of produce across the border into Mozambique and Zambia where prices were higher.

Yield Estimates (lb/acre)

	<u>Pre-program Estimate/a</u>	<u>Appraisal Program Target/a</u>	<u>End of Program Estimate/b</u>
Maize	1,100	2,000	1,339
Groundnuts	500	650	404
Tobacco	200	400	506

/a Appraisal Report, Phase I, Report No. TO-610a, January 3, 1968.

/b Average achieved during Phase III, 1975-79.

The PCR attributes the shortfall in achieving yield targets to ineffective extension and marketing services as well as to a conservative price policy. This audit differs with the PCR on the relative importance of these factors in explaining yield shortfalls.

17. The audit found that extension was the prime mover in the implementation of the program and the unit most deserving of credit for what was achieved rather than blame for what was not achieved. Extension was successful and effective in the case of technological improvements which had been proven as technically feasible under farm conditions and economically desirable and to which farmers had access. As a result of extensive discussions with program extension staff and limited discussions with farmers, this audit identified many instances where technological improvements, perceived by Government and program management as technically feasible and economically desirable, did not meet farmers expectations and hence were not accepted despite the efforts of extension staff.

18. For example, in the case of groundnuts (PCR, para. 5.4), the audit mission was informed that the recommended plant density had changed three times during the program period. Moreover, recommendations on density did not fully take account of farmers' concern for risk due to weather variations. They also aimed at increasing the quantity with little concern for the quality of the nuts produced (high plant density reduces the size of the confectionery nut, creating problems with marketing). The second major recommendation for groundnuts was the use of sulfur dust, which was hindered by poor quality products distributed to farmers in the early years. In the case of maize, the program concentrated for some time on the introduction of varieties which did not meet local taste standards, and which were more vulnerable to insect attacks in storage. In the case of both maize and groundnuts the recommendations on weeding did not fully take account of the limited family labor supply and the competing demands of other crops. The success of extension in the case of tobacco was not due to a bias in the practices of extension staff (as indicated by the PCR, para. 5.5), but rather to the fact that tobacco technology was proven from the beginning and met farmers' expectations. Extension was well organized in trying to pass technology improvements to the farmers

but made insufficient efforts to review problems with research people and farmers when they failed to adopt recommended practices and take the necessary remedial action to solve such problems in the following season. Generally, better liaison with research and closer evaluation of farmers' acceptability could have enhanced the already good performance of the extension service.

19. LLDP was designed on the assumption that proven technology acceptable to farmers was available or could be developed and that the policy framework to make the use of such technology attractive to farmers also existed. During implementation, however, neither one of these assumptions was found completely valid. On the technology side there was a mixture of practices some of which were both acceptable and desirable from the farmers' point of view, some of which were acceptable but farmers found them undesirable because of prevailing policy constraints (prices, input supply), and some of which were neither acceptable nor desirable from the farmers' point of view. In other words, program staff had to implement an extension program which was substantially different from that conceived at appraisal. Under these conditions LLDP extension staff have performed remarkably well.

20. Marketing, both for inputs and outputs, was the responsibility of the Agricultural Development and Marketing Corporation (ADMARC). The PCR attributes to it some blame for the shortfall in yield achievement (PCR, para. 7.3). The audit found that, although ADMARC could substantially improve its present practices, a major share of its ineffectiveness in serving the program could be attributed to factors outside the control of ADMARC management. Such factors include delays at foreign ports of entry for imported goods, supply controls imposed nationally, disturbances in the local transport system due to political events in neighboring countries, and inefficient planning by program management (late orders). Here again, the issue should not be whether ADMARC was to blame or not, but rather whether conditions which prevailed during implementation were foreseeable at appraisal and the extent to which uncertainty and the attendant flexibility were incorporated in project design. ADMARC appears to have performed as well as it could possibly have performed under the conditions that prevailed during project implementation by adapting to changing country conditions to the extent that its management capability allowed it.

21. Price policy has been an issue since the identification stage of the program. Despite repeated recommendations by appraisal and supervision missions, Government has been very reluctant to utilize price policy as a means to increase production and bring about a change in the relative importance of crops away from tobacco and towards more maize and groundnuts. For example, the program was intended to change maize from being a predominantly subsistence crop to a cash crop. The conditions under which the program was implemented made that objective, at the outset, practically impossible. First, farmers already grew two familiar cash crops, tobacco and groundnuts and were not desperate for a new cash crop. Second, the relative prices that prevailed and the relative returns to labor achieved made the shift away from tobacco and toward maize and groundnuts undesirable. Third, the technology

proposed for maize involved more risk to the farmer. Hence a shift to maize could not have been achieved without meaningful adjustments in the relative prices of crops and in the input/output price ratios.

22. Despite the efforts of RMEA staff, the Bank made very slow progress in convincing Government to link operationally its production programs and targets to its price policy. In fact since price policy continues to be an issue in other development projects in Malawi (on-going or being prepared), it appears questionable whether Government is fully convinced of the seriousness of the negative effects on development programs of unfavorable price policies and whether the Bank, despite the continuous dialogue with the country, has done all it could to assist Government in operationally shifting towards a more production-oriented price policy.

23. Another question hinted at in the PCR and in the audit of Phase II is whether physical appraisal targets are mere illustrations or strict criteria against which success or failure of the project should be assessed. This question is particularly relevant in the case of appraisal parameters which, during implementation, are found not to reflect realities in the field as was the case in LLDP. Four examples are given. First, it was indicated to the audit mission that the base data for the initial appraisal was unrealistic because conditions in the pilot area were different from those in the rest of the program area. This was recognized during the implementation of Phase I but there was not enough flexibility during program implementation to adjust appraisal targets based on "judgments of local people". Instead program management continued to push for achieving the stated targets because the "bottom-up" flow of information did not find its way into the plans drawn by the Ministry of Agriculture and Natural Resources (MANR). Such information did not find its way into the IDA appraisal reports for Phases II and III either. As a consequence, input use and production targets were not significantly adjusted during Phases II and III of the program. Second, extension staff reported that they consistently advised program management that a major reason for the poultry component running into problems was its overcapitalization (expensive cages). Yet this extension finding did not enter the decision process, and project management chose (and the Bank approved) to stop the growth of this component instead of adjusting it to actual needs of the farmers. Third, Construction Unit staff indicated that the Program has foregone the opportunity to involve local small contractors, as a partial substitute to alternative arrangements prescribed in the appraisal report, because of the possible time loss implications and the rigid financial rules. Fourth, senior officials at MANR indicated that the major achievement of LLDP, from their point of view, was that "it has given agriculture a good name among the area's farming and non farming population". This is illustrated by the fact that rural-urban migration is practically insignificant in this area despite the on-going fast development of Lilongwe, the capital city. This evaluation contrasts with both Government and IDA efforts to measure the success or failure of the program on the basis of the yield targets and achievements alone.

24. Physical targets set in appraisal reports should be regarded as a flexible guideline for management. Base line data and project targets should be realistically reassessed (if there is justification for such reassessment as was the case in LLDP) by program staff in conjunction with supervision missions as implementation progresses. Moreover, the PCR should have gone one step further and, in addition to assessment of physical achievements, given decision makers (as opposed to program management) indications as to the extent to which program objectives (which are often different from program physical targets) were achieved and the factors associated with their degree of achievement. Topics which the PCR could have covered include (i) the extent to which the project has helped in setting in motion further development programs in farming or complementary activities, (ii) the extent of learning that has taken place and which could serve as the basis for further locally generated growth (acquisition of skills needed for future development, changes in habits, attitudes and practices), (iii) the extent to which the program objectives are compatible with national objectives and fit within the prevailing policy framework, and the extent to which they are compatible with the needs of the beneficiaries, and (iv) the welfare implications of the program on the region, including income distribution, nutrition, reliability of the farming system (risk), extent of the dependence of the target population on public assistance, and vulnerability of the farming system to changes in the production environment which are beyond the control of farmers and that of local institutions. This evaluation would have required the development of a methodology which should already have been specified and agreed at the appraisal stage.

#### D. Monitoring and Evaluation

25. This audit found that neither Program Management nor MANR appear to be well served by the system developed so far. The Central Monitoring Unit is not providing the necessary management-oriented feed-back to the Project Unit nor is it providing the proper cross-project and sector wide policy-making oriented feed-back to decision makers at MANR. This audit supports the separation of internal monitoring and evaluation of individual projects (as a means of enhancing their successful implementation) from independent monitoring and evaluation of all development projects in a country (as a means of extracting lessons from past and on-going development efforts and facilitating their incorporation in on-going programs and in the planning process). The former type of monitoring and evaluation would concentrate on specified objectives in a given project, whereas the latter type of monitoring and evaluation would concentrate on checking the consistency of the objectives of various projects and the desirability of their aggregate effects, and on feeding back its findings into the policy making and planning processes.

#### E. Supervision Missions

26. As a result of discussions with Government officials and project staff in the field, this audit found an imbalance between the supervision needs of this rural development project and what the Bank allocated to it.

This imbalance was not in terms of number of supervision missions but rather in terms of their nature:<sup>1/</sup>

- One-man missions were often limited in scope and unsuitable for discussing conceptual issues arising in the course of project implementation.
- Short missions did not allow time for meaningful field visits and first hand assessment and appreciation of problems encountered during implementation.
- Excessive emphasis was given by supervision missions to the quantitative targets in the appraisal reports and, in general, missions were unwilling to review such targets in light of evidence from the field.
- Because of the multidisciplinary nature of rural development, supervision missions often lacked the capability and, apparently, the mandate to discuss project wide issues arising during implementation and, together with Government, devise and decide on ways of tackling them.

### III. CONCLUSION

27. The physical implementation of the Lilongwe Land Development Program was unquestionably a success in terms of timeliness and financial control, but one which was achieved at a price in terms of developing local capability for self-generated and sustained rural development. The development program itself was only partially a success. The accomplishments of this program may be expressed in terms of (i) the establishment of an operational extension service at field level, (ii) the commendable increasing involvement of beneficiaries in the development process through the committees at village level, (iii) the initiation of integrating livestock and crop activities, (iv) the opening up of rural areas through rural infrastructure development, (v) the provision of basic social services to the rural population, and (vi) the increased crop production which resulted from a clear build up of farmers' market orientation (provided the opportune policies for the realization of such potential are adopted). The program was less successful in (i) building local institutions capable of conceiving and implementing similar programs,

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<sup>1/</sup> RMEA staff are of the opinion that "considering only the direct supervision of LLDP does not give an adequate measure of the dialogue which went on with Government, and which, through the supervision of other projects, the preparation and appraisal of NRDP, was covering all aspects of rural development in Malawi."



(ii) creating, within Government, full awareness of the complementarity of development programs' technological, institutional and policy aspects, and (iii) being fully responsive to the needs of beneficiaries under prevailing technical and market conditions. Judging from the design and concept of development programs that followed the LLDP, it becomes apparent that lessons from this important experience, although apparently appreciated by Government and the Bank are not, as yet, fully reflected in subsequent development programs. Programs such as NRDP, Karonga and Shire Valley appear to suffer from shortcomings similar to those listed above. This audit suggests that a more comprehensive review of the total LLDP experience and concept (preferably in conjunction with the review of other rural development programs in the country) be undertaken to determine the responsiveness of the country's rural development programs to the needs of farmers and the compatibility of such needs with the objectives of those programs as well as with the policy framework prevailing in Malawi. The Lilongwe has been an experience from which the country and the Bank could learn a lot more than is in this report. This audit raised some project design issues and some policy issues which were not satisfactorily resolved by this evaluation. The issues raised require more in-depth analysis and comparison with other in-country, and may be out-of-country, experiences.



December 2, 1980

MALAWI: LLDP-III (Cr. 550-MAI)

Project Completion Report

Introduction

1. The attached PCR has been prepared largely by Government, i.e. by the Planning Division of MANR and by the Evaluation Unit of LADD (Lilongwe Agricultural Development Division, formerly the Lilongwe Land Development Programme). It follows from two earlier drafts, each of which was reviewed and commented upon in detail by Regional Mission in Eastern Africa (RMEA). A visit was made to Malawi in October specifically to discuss the second draft. Most of RMEA's suggestions have been incorporated.

2. Overall, the document is a commendable effort, especially considering that it is the first PCR prepared by a Government in the Region. The Report is well written and highly detailed, addressing all Project components. It is well cross-referenced, and has a wealth of supportive material in the annexes. It is also surprisingly frank in its treatment of several important, but sensitive issues. Notwithstanding this latter comment, some criticisms have been omitted or toned down and are referred to below. In some places too, questions arise by implication, but are not adequately answered. As with the earlier phases, Project management's financial control and implementation within projected Project costs were exemplary.

Economic Rate of Return

3. The actual economic RØR has been calculated at 25% for the three phases of the Program. This compares with 13% expected at appraisal of the third Phase. No attempt was made to calculate the actual RØR for Phase III alone, which would compare with 18% expected at appraisal. The 25% also compares with 8%, which was discussed in the second Phase PPAR as being the combined RØR achieved under Phases I and II. It follows that the RØR achieved under Phase III was probably rather higher than the expected 18%.

4. Planning Division staff in MANR went to considerable lengths to assess the "without Project," i.e. without Program, situation on which to base incremental performance. The assumptions are well defined in Chapter 8 and Annex VIII. The principle behind the assumptions is that without the Program, i.e. without the three phases, the areas under tobacco and groundnuts would have decreased, with a corresponding increase in subsistence crops, particularly maize. Yields of maize and groundnuts would also have declined, and tobacco yields would have remained constant. The Report notes (para. 8.2) that at the beginning of Phase I, the Program area was already experiencing problems of land degradation and erosion in the face of new economic and social pressures brought about by development of the Capital City of Lilongwe. Stabilization of the rural population and conservation of soil resources were amongst the Program's objectives. It could be argued that had Phase III not

gone forward, already developed units (40 units within the Program) would have shown a decline in production as farmers were attracted into full or part time employment opportunities in Lilongwe.

5. The "without Program" assumptions are responsible significantly for the 25% RØR. Also responsible is the better-than-expected tobacco production. It should be noted that the incremental net benefits accruing to the Dzalanyama Ranch in Phase III are included in the PCR calculation (actually a net loss), as well as the costs of drugs in the Health Component, since it was expected that the drugs would have a fairly direct bearing on farmer performance. Neither of these items were included in the Phase III appraisal RØR estimates, and if excluded from the PCR calculation, the RØR would be higher than 25%. Both the appraisal and PCR calculations assume a zero cost for farm labour.

6. The Report is relatively brief in its discussion of the "social impact" of the Program. As noted in para 5.13.1, the establishment of Unit Centers under the Program has catalysed considerable private initiative and investment. The many shops and services that have sprung up have undoubtedly provided incentives to smallholder farmers to increase their incomes. The ready availability in the stores of new basics such as milk powder supplements for infants, pharmaceutical products and locally made household items attests to an important enhancement of the areas welfare. If the net benefits from these activities were included in the net benefit stream, the RØR would be enhanced.

#### Incremental Production

7. Considerable attention is given in the Report to expected versus actual crop areas, yields and production in Phase III (Tables 5.1, 5.4 5.5 and Annex V (a)). In the case of maize and groundnuts, performance was disappointing. The uptake by smallholders of hybrid maize seed was less than 30% of that expected and maize production overall (hybrid, composite and local unimproved varieties) was 77% of expectations. Groundnut production fell similarly short of targets. While tobacco production exceeded the targets. Several reasons for these divergencies are given, the most important of which, for maize and groundnuts, appear to be the non-availability of improved seeds and fertilizers and relatively discouraging prices (for groundnuts). Tobacco, on the other hand, fared much better in terms of prices and services. Tobacco growers were favoured with the provision of credit and extension advice.

8. Somewhat curious is the observation (not discussed in the Report) that while the uptake of hybrid and composite maize seed was much less than expected (Annex IV (f)), fertilizer uptake was over 90% of the amount expected. It is unlikely that farmers applied fertilizer to their local maize. At least two reasons may be advanced for this; one that farmers applied the fertilizer to their tobacco and two that smallholders resold their subsidized fertilizer to larger farmers for a profit. The large sales of sulphate of ammonia (5,525 tons in 1978/79 compared to zero quantity expected) would suggest more credence to the second reason because S/A, being somewhat acidic, would not be as readily applied to the tobacco crop.

### Marketing

9. The Report makes critical comments in several places (ref. paras 5.5 and 7.3) about the performance of ADMARC. It alleges that had ADMARC provided the seeds and fertilizers in the quantities projected and ordered by Program management, maize production would likely have exceeded appraisal targets. The late arrivals and reduced quantities of fertilizers affecting maize yields have also been discussed in Phase III supervision reports. Project management made persistent efforts to have ADMARC rectify the situation, largely in vain. The PCR discussion underscores the importance of efficient marketing. Assuming that the allegation above in this para is correct, it would have been interesting to have determined the RØR on that basis, thereby imputing a cost of ADMARC's shortcomings. The Report does not discuss, however, the extent to which the non-availability of improved seeds and fertilizers was directly ADMARC's fault. ADMARC, like most importing agencies in Malawi, has had to bear with the vagaries of the ports in and transport across Mozambique.

### Extension

10. The Report points clearly to the ineffectiveness of extension in improving agronomic practices for maize and groundnuts (Annex V (b)). And this, despite the fact that the extension component was relatively well staffed at both the senior and junior levels. The ineffectiveness has been due, in part, to the late availability of improved inputs, as well as to limited enthusiasm of farmers due to unattractive prices (groundnuts). Yet such reasons do not wholly explain farmers' reluctance to follow simple training and extension recommendations for higher maize and groundnut plant populations (groundnuts have been about half the recommended density). Curiously also, these farmers followed closely the recommended practices for tobacco. The Report suggests (para. 5.7) that more attention was given by extension staff to tobacco production and less to food crop production. If true, then a change in emphasis or technique of extension procedure would be called for.

### Research and Trials

11. The Report (para. 5.10) devotes little space to a discussion of this subject, which is one of the sensitive issues referred to earlier. It is unfortunate that MANR did not see fit to fill the post of Senior Research Officer (called Research and Trials Officer in the appraisal report). With linkage through the extension staff to the farmers the research and crop trials staff could have contributed significantly to improving the production of farmers' food crops. It is relevant to note that USAID has recently approved a project to improve the planning and implementation capacity of MANR's national research program.

### Pricing

12. The evidence in the Report is convincing that smallholders are responsive to relative price changes. Tobacco, with its relatively attractive prices has been favoured by the farmers, whereas groundnut areas and production declined through 1977/78. Areas and production of groundnuts increased dramatically in 1978/79 when the pre-season-announced price was upped by over 50%. There is no discussion on the absolute levels of smallholder prices, or that smallholders, c.f. the estates, are contributing more than their fair share to Government revenues (via ADMARC's profits).

### Poultry

13. The poultry component (para 4.3.21) has not been successful. However, the description in para 4.3.21.3 of efforts to resolve the various problems is incomplete. In addition to the three items mentioned, Project management instituted fortnightly meetings of all principal poultry staff to assess progress. New loan agreements were drawn up allowing the Project to collect poultry loans from the marketings of these farmers' other produce. Increased efforts were also made to sterilize farmers' poultry cages and to make birds available to farmers at point of lay rather than as chicks, thereby lessening their susceptibility to disease. The egg grading/packing station financed under the Project also serves larger poultry producers in the Lilongwe area.

### Program Management

14. The contribution of Program management cannot be overemphasized (para 7.1.1). With 11 expatriates engaged throughout Phase III, the involvement of expatriates has been much less than in the earlier phases. LLDP, moreover, more than any other rural development program in Malawi, has trained and made available to other programs a commendable number of staff.

# PROJECT COMPLETION REPORT

## LILONGWE LAND DEVELOPMENT PROGRAMME PHASE III

CENTRAL EVALUATION UNIT  
M.A.N.R.

NOVEMBER, 1979.





## 1: INTRODUCTION AND SUMMARY

1.0 This Project Completion Report is concerned with the implementation and impact of Lilongwe Land Development Programme, Phase III. Being the third phase of a continuing programme, then logically and essentially it has been necessary to integrate the benefits and costs of the earlier phases into this analysis. The results are therefore presented in terms of the total Programme up to the end of Phase III.

1.1 The form of presentation used has generally followed recent guidelines recommended to World Bank staff (Operational Manual Statement 3.58 of February 1979) with some changes where appropriate. The beginning (Sections 2 and 3) provides a scene set in the form of Background and Formulation. The main body concerns Implementation of the plan and the Impact achieved. For clarity these two aspects have been presented separately, each major component being discussed in turn (Sections 4 and 5). Financial performance and Institutional performance are given specific coverage (Sections 6 and 7) as these have a more general bearing on all components. Details of a Rate of Return calculation are then given in Section 8. A section on Discussion and Conclusions completes the main text. Follow up detail has been presented in the form of Annexes and referenced within the main text. To assist the reader in cross referencing to these Annexes, each Annex number corresponds (in Roman numerals) to the section number of the main text.

1.2 In summary, this Report finds that the Programme has been implemented with a high standard of management and financial control. Infrastructure development has been more than adequately completed. and other components which have shown outstanding success are small-holders' stallfeeding in the case of livestock and tobacco agronomy within total crop development. Problems are indicated in the Dzalan-yama ranch component which will not be overcome by a mere adjustment of beef pricing schedules. Some doubts are cast on the effectiveness of extension generally and the fairness by which the credit facility is distributed. The general livestock programme does not appear to have been successful in the face of communal grazing patterns. Other problems highlighted relate to input supply and the transfer of infrastructure maintenance to government revenue account.

1.2.1 Increased tobacco production has been the most obvious measurable impact. A difference in retrospect from what was anticipated at appraisal. Crop pricing structures coupled with an apparent bias by extension and credit towards tobacco production are shown to have been the cause. Groundnut production was discouraged by the prices offered to producers and hybrid maize production was hampered by inadequate inputs. Projected crop production trends for the cost benefit analysis have acknowledged the limited market for tobacco and placed a higher emphasis on groundnut and maize production. The rate of return calculated is 25 per cent on the basis of all three phases of the Programme including ten years of historical and twenty years of projected results.

1.3 The conclusion is that this Programme has played a vital part at a critical time in the history of Malawi. A number of these national benefits are mentioned. Within the context of these, the relatively minor problems of implementation outlined by this Completion Report, can be viewed in their true perspective.

## 2: BACKGROUND

2.1 The first three phases of the Lilongwe Land Development Programme received finance from IDA credits to Malawi as followed:

<u>Phase</u>	<u>Appraisal Report</u>	<u>Credit Number</u>	<u>Amount</u>	<u>Period</u>
I	P. 582 (22/1/68)	113 MAI	US\$6.0 million	1968-1972
II	PA-76a (16/4/71)	244 MAI	US\$7.25 million	1971-1975
III	652-MAI (28/2/75)	550 MAI	US\$8.5 million	1975-1978

In addition the United Nations Capital Development Fund (UNCDF) provided a grant of US\$1.6 million to cover the costs of the health component and injections of capital into the credit fund during Phase III.

2.1.1 The total cost of the entire Programme (including contributions from Malawi Government, ADMARC and credit charges to farmers) amounted to an estimated MK 24.4 million.

2.2 In terms of this Programme, rural infrastructures, roads and bridges, water supplies, farmer credit, extension and training facilities, and health services were simultaneously integrated for the purpose of benefitting the rural population of the Programme area.

2.3 The Programme area lies to the west and south of Lilongwe City at an altitude ranging between 1,100 to 1,230 metres, temperature range of 15°C to 23°C, and average rainfall ranging between 640 and 1,090 mm (confined between November and April). Soils are generally red clay to sandy loams and free draining.

2.4 Phase III of the Programme encompassed approximately 485,600 hectares of which some 348,000 hectares were available for smallholder agriculture. In addition, Dzalanyama ranch, comprising some 65,000 hectares was included within the Programme for the supply of stallfeeders and dairy cows to smallholder farmers.

2.5 The 348,000 smallholder hectares were planned for development into 40 time-phased units, each covering approximately 8,700 hectares and 2,600 farm families (see Map at Annex I(a)). In total the Programme area represented some 5 percent of Malawi and included 3 percent of the country's smallholder farmers.

2.6 By the commencement of Phase III, 30 units had already been developed encompassing over 262,000 hectares and some 77,000 farm facilities. (See Annex I(b)). Other general infrastructure development noted at the end of Phase II was:

Land Demarcation	:	165,600 hectares
Land Registration	:	110,900 hectares
Number of farmers whose land	:	
had been demarcated	:	91,000 hectares
Number of farmers whose land	:	
had been registered	:	61,000 hectares
Roads built	:	2,150 kilometres
Number of boreholes	:	344
Number of markets	:	21

2.7 Phase III of the Programme represented not only a continuation of the necessary support for extension, credit and infrastructure maintenance services for these previously established Units which had not completed their (5 year) phase-over from Development to Revenue account, but also planned for an expansion of the programme into fifteen new Units not previously developed (covering some 100,000 hectares) and the introduction of some new services (poultry and dairy development).

2.8 The principal sources of information which have been used for compiling this Project Completion Report were the reports and records of the Evaluation Unit, the Financial Division (cost accounts and credit fund control) and Programme Management. Numerous other specific sources are quoted in the text and a list of the main references cited is at Annex II.

### 3: FORMULATION

3.1 Provisional proposals for Lilongwe Land Development Programme Phase III were prepared in a comprehensive document by the Planning Division (Ministry of Agriculture & Natural Resources) in August 1973. These proposals were prepared in full consultation and discussion with Senior Staff working in the Programme, the Agricultural Development & Marketing Corporation, Gold Storage Company, Ministry of Health, the Economic Planning Division (Office of the President and Cabinet) and other Departments within the Ministry of Agriculture & Natural Resources.

3.2 The preparation document budgetted for Phase III to commence on 1st April, 1975, with a life of four years (to 31st March, 1979) and a base cost of K8.105 million. Physical and price contingencies were calculated at K1.832 million, giving a total of K9.937 million. Detailed costs breakdown by component were presented and an estimated internal rate of return for the whole programme (Phases I to III) was 7.7 per cent (including incremental tobacco production). With only minor alterations this document was submitted to IBRD/IDA for appraisal. A rate of return for Phase III was estimated at appraisal as 17.65% (including incremental tobacco production).

3.3 An IBRD/IDA Appraisal Mission, consisting of a Financial Adviser and an Agronomist under a Team Leader, visited Malawi in May 1976, spending ten days at LLDP.

3.4 The main differences between the final appraisal document (Report No. 652-MAI of 28th February, 1975) and the original Malawi submission were as follows:-

- (i) The Appraisal document detailed a three year phase (1/4/75 to 31/3/78) compared with the four years requested by the submission;
- (ii) A component for re-afforestation which had been included in the submission was dropped by the Appraisal document;
- (iii) UNCDF was included as a joint donor agency with IDA to assist in the funding of the health and credit fund components;
- (iv) The funding of Extension Field Staff (TAs) was reduced by the Appraisal document by the equivalent of 108 man years;
- (v) Vehicle replacement costs allowed for by the submission were omitted in the Appraisal document;
- (vi) Three additional components were included in the Appraisal document which were not requested by the submission: these were a component to assist financing of preparation for the National Rural Development Programme, and two small components for Dairy and Poultry Development;
- (vii) The Appraisal document included additional funds required for the Credit revolving fund which had been omitted in the submission.

3.5 Base Costs Compared (Excluding ADMARC) MK.'000

<u>Components</u>	<u>Project Submission</u> <u>(4 years)</u>	<u>Appraisal Document</u> <u>(652-MAI) (3 years)</u>
Headquarters	475	517
Conservation and Planning	2,352	2,452
Surveys	379	340
Marketing	52	39
Land Allocation	336	272
Extension	1,071	847
Training	240	203
Credit (Operation)	665	555
Credit Fund	0	498
Health	704	597
Dzalanyama	723	334
Livestock	270	215
Dairying	0	13
Poultry	0	10
Evaluation	171	141
NRDP (Preparation)	0	200
Forestry	379	0
Total Base Cost =	7,817	7,233
Add Contingencies	<u>3,120</u>	<u>2,206</u>
GRAND TOTAL =	<u>9,937</u>	<u>9,439</u>

3.6 Description of the Project - A formal description of the Phase III project as given by the Development Credit Agreement (550-MAI) Schedule 2, is reproduced at Annex III.

#### 4: IMPLEMENTATION

##### 4.1 Effectiveness and Start-up

4.1.1 The funding for Phase III (Credit: 550-MAI) became effective on May 27, 1975, almost two months after official commencement of the Phase. However, a carry over of Phase II funds (244-MAI) was eventually only utilized fully by September 30 of that year. Phase III funds were only used up by March 31, 1979, twelve months later than expected. UNCDF Agreement (MLW/74/031) was effective concurrently with 550-MAI.

4.1.2 Since Phase III was largely a continuation of Phase II activities then the small delay before credit effectiveness did not present any special problems in the timeliness of implementation.

##### 4.2 Revisions

4.2.1 During 1978 IBRD/IDA agreed that MK 120,000 could be utilized from Category I of the Development fund for the building of an Egg Grading and Packing Station in Lilongwe. This facility was expected to augment the smallholder poultry industry of the Lilongwe Plain. The need for this improved facility was emphasized by the problems outlined in paragraph 4.3.21.1.

4.2.2 During 1978 some MK 799,000 was transferred out of the Accumulated Credit Fund as a contribution to Treasury (Revenue Account) resources both for the Project K 490,000 (see paragraph 6.2) and for the General Fund.

4.2.3 Adjustment was made (in 1976) to the implementation design of the Dairy and Poultry components by dropping their separate funding as specialized extension and including them within the overall crop and livestock extension programme. This was done for the purpose of improved administration and within an overall policy of a more integrated extension service. This adjustment does not seem to have improved the effectiveness of extension effort for these particular components (see paragraph 4.3.21 and Annex IV(j) ).

4.2.4 A more comprehensive Research & Trials component was implemented from that originally envisaged at appraisal. (See Annex IV(d) ).

4.2.5 A phasing over of Unit infrastructure maintenance (roads and buildings) from Development Account to Revenue Account was anticipated to be completed five years after Unit development. Difficulties were encountered, however, with the maintenance of 'feeder' roads which had been constructed below Secondary or District road standards; since these could not be handed over to Ministry of Works & Supplies and local councils had insufficient resources, the Project continued to maintain these roads. Similarly, the Project continued to be involved in the maintenance of a large proportion of the buildings in already Developed Unit centres. (See paragraphs 7.2.1.2 and 7.2.1.3).

#### 4.3 Infrastructure Development

Most of the programme for infrastructure development was successfully completed within the implementation schedule and cost targets. In addition, certain facilities over and above those specified in the Appraisal document were provided within the original budget. The following subsections outline achievements under the various project components. Further details of the third phase implementation and achievements over all three phases are given in the appropriate sections of Annex IV.

4.3.1 Roads - The network of roads completed by the end of the 1978 dry season approximated to appraisal estimates. Some 600 kilometres of roads were completed during the phase, bringing the total constructed (Phases I to III) to 2,630 kilometres. Standard input areas averaged 8.5 kilometres per 1,000 hectares, with modified input areas averaging 4.0 kilometres per 1,000 hectares. Although the roads were primarily for crop extraction purposes, they have contributed quite substantially to the social welfare of the rural population. By the end of Phase III, some 800 kilometres out of a total 1,240 kilometres of District and Secondary roads had already been handed over to Ministry of Works for future maintenance. (See Annex IV(b) ).

4.3.2 Bridges - At appraisal it was intended that a total of 118 bridges (38 major and 80 minor) would be constructed by the end of Phase III. No specific target was given for Phase III alone. By the end of the phase only 90 new bridges had been built; 22 existing bridges having undergone major reconstruction. To supplement the change in plan management decided to build 44 additional culverts and dambo crossings together with 7 spillways/drifts/low level bridges. This was considered to be a more practical development than that envisaged at appraisal. (Annex IV(a) ).

4.3.3 Soil Conservation Works - Physical soil conservation structures were provided by the construction unit in the form of embankments, waterways (130 kilometres) and diversion ditches (1,080 kilometres) during the phase. These were somewhat below appraisal targets (which were 270 kilometres of waterways and 1,790 kilometres of diversion ditches). Marker ridges which were not included at appraisal were provided. They were considered necessary by both project staff and farmers for the correct functioning of the diversion ditches (Annex IV(a) ).

4.3.4 Water Supplies - Although the number of boreholes drilled and made operational during Phase III (97) was less than that planned at appraisal (143), the total number of boreholes constructed during the three phases (490) provides an average density of 1 to 166 farm families or 1:5,600 hectares, which falls within the limits set at appraisal (1:175 farm families). In addition, some 151 borehole aprons were constructed in Phase III making a total of 385 for all three phases. (Annex IV(a) ).

4.3.5 Project buildings, unit centres and staff housing - The Project headquarters and town housing for staff were completed prior to the phase. Twelve standard and three modified Unit Centres, which provided the major development thrust of LLDP, were completed by the end of the phase. The Project continued to maintain all Unit Centres and their associated housing developed under previous phases. Facilities at the Nathenje Training Centre were improved with the addition of a dormitory, ablution block, kitchen and stores. The Nambuma Training Centre was also provided with additional kitchens and stores. These additional improvements were not included at appraisal. (Annex IV(a)).

4.3.6 Markets - ADMARC constructed 7 markets and 15 input sheds which were expected at appraisal.

4.3.7 Health facilities - Although at appraisal it was intended that the building of health facilities would be sub-contracted, this work was in fact successfully completed by the Project's Construction Unit. In addition to the targeted 21 health posts and 5 health sub-centres (all with staff housing), extensive renovations were made to the Mitundu Maternity Ward (Unit 24) and 11 guardian shelters and 6 outpatient clinics were also provided. Details of the health facilities are given in Annex IV(1).

4.3.8 Egg grading/packing station - Following a request from Government, an RMEA supervision mission agreed to the use of funds available in Category I for the construction of a new egg grading/packing station on the site of the Capital Dairy, Lilongwe. By March 1979 the Building component had completed the construction at a cost of MK 112,000 which included a cool store and all electrical installations. An egg grading machine of capacity for 15,000 eggs per day was provided under a grant from the British Government. Cold storage capacity is for 35,000 dozen eggs.

4.3.9 Land demarcation and registration - Progress with the demarcations, survey and registration of smallholder land was close to appraisal targets for Phase III. During the phase, 78,200 hectares were demarcated compared with a target of 81,000 hectares, and 132,900 hectares were registered (target 109,400 hectares). This brought the total demarcation and registration under the three phases to 243,825 hectares (266,440 hectares projected).

4.3.10 Extension coverage - During Phase III the ratio of field assistants (TA) to farmers was:

	For new Units under Development in Phase III		For Units Developed in Phase II		For Units Developed in Phase I (i.e. 5 years +)
	Standard Units	Modified Units	Standard Units	Mod. Units	Standard Units
1975/76	1:457	1:372	1:566	1:472	1:533
1976/77	1:523	1:380	1:577	1:481	1:543
1977/78	1:533	1:516	1:589	1:491	1:554
1978/79	1:622	1:526	1:600	1:502	1:566

At appraisal it was anticipated that the extension staff/farmer ratio would remain at about 1:300 in Standard Units and 1:450 in Modified Units during development. In the ensuing five years the ratio was expected to increase in all Units to 1:500.

4.3.10.1 Extension workers provided farmers with information and advice on a wide spectrum of farm activities including crop management and storage, soil conservation practices, forestry, dairying, stall-feeding and poultry. Crop management advice related to the use of improved varieties, timeliness of land preparation, planting and weeding, plant populations, fertilizer application and methods of harvesting. To provide improved contact with female growers, female field assistants were employed in non-specialist capacities (11 in 1976, 15 in 1977 and 10 in 1978).

4.3.10.2 A Chief Extension Field Officer (CTO) based at Project headquarters, coordinated the extension effort of the Senior Development Officers (STO) who headed extension staff in eight area offices. Each area office included a Development Officer (TO) and field assistance (TA) (approximately one per 600 farm families).

4.3.10.3 The effectiveness of extension staff contact was facilitated by the establishment of committee structures at village section, unit and group levels (see under Rural Development). It was through the Committee structure that the main extension effort was channelled in an attempt to broaden and integrate programme impact and direct the target population more toward a self-help approach.

4.3.10.4 Farmer contacts - The extension component provided smallholders with considerable exposure to advice on improved farm practices. (For comment on this see paragraph 5.7).



Proportion of sampled households receiving extension visits  
associated with specific crops

<u>Number of extension visits</u>	<u>Proportion of sampled growers</u>		
	<u>1975/76</u>	<u>1976/77</u>	<u>1977/78</u>
<u>Maize</u> (all varieties)	%	%	%
None	42	42	52
Less than 3	19	24	18
3 - 5	7	11	16
6 - 10	8	8	7
10+	23	19	7
Observations (n)	956	633	953
<u>Tobacco</u>			
None	na	25	34
Less than 3	"	22	23
3 - 5	"	14	18
6 - 10	"	11	11
10+	"	27	14
Observations (n)	-	358	484
<u>Groundnuts</u>			
None	42	39	57
Less than 3	18	25	18
3 - 5	7	11	14
6 - 10	9	8	5
10+	25	17	6
Observations (n)	873	648	640

Source: LLDP, Evaluation Unit

4.3.11 Training - Farmer and staff training was conducted through a net-work of three residential and forty unit day training centres. (See Annex IV(c) ). At farmer level, day training and residential courses were given mainly by project staff with assistance and cooperation from MANR headquarters staff and the Extension Aids media. In-service training of staff has been a regular feature with specialist and refresher courses given at both junior and senior levels.

4.3.11.1 Farmers within the programme area were given considerable exposure to training compared with their non-project counterparts. For example, in 1978/79 some 31 per cent of the programme area farmers sampled by the Evaluation Unit had attended a training course (7 per cent a residential course); this compared with a neighbouring non-project area (Thiwi/Lifidzi) at pre-investment where comparable figures were 2 per cent for both day and residential courses. (Annex IV(a)).

4.3.12 Research and Trials - No specific programme for Research and Trials was mentioned at appraisal although funds were provided for a Research and Trials Officer within the Extension component. In fact a separately budgetted component was implemented which followed an expanded trials programme on major and minor crops during the phase. The majority of trials were undertaken in farmers' gardens with trial crops having been the same as smallholders' crops and supervised by each Unit's technical assistant. Some trials requiring more detailed supervision were run at Unit Centres. Trials were conducted on an agency basis for national research stations or were designed and run independently by the Research and Trials Unit; all trials proved part of the national research programme. An outline of the unit's activities is given in Annex IV(d).

4.3.13 Forestry - In its Phase III proposals to IBRD, Malawi Government applied for a loan of K192,000 to introduce a comprehensive forestry programme aimed at the subsidized supply of seedlings, the establishment of woodlots and the creation of an administrative framework for follow-up activities. It is unfortunate that no forestry component as such was actually included in Phase III, save for the minor exception of K8,000 made available to continue the establishment of woodlot nurseries.

4.3.13.1 Under Phase III the original programme was to provide enough funds to establish 400 hectares of smallholder woodlots. 420 hectares were established under the phase as follows:-

<u>Season</u>	<u>Gmelina arborea</u> (ha)	<u>Eucalypts</u> (ha)	<u>Cassia siamea</u> (ha)	<u>Others</u> (ha)	<u>Total</u> (ha)
1975/76	28.6	-	37.1	1.4	67.1
1976/77	35.6	6.0	25.2	47.2	114.0
1977/78	39.5	22.6	29.5	26.2	117.8
1978/79	68.5	37.5	13.5	3.5	123.0
<b>Total</b>	<b>172.2</b>	<b>66.1</b>	<b>105.3</b>	<b>78.3</b>	<b>421.9</b>

Source: LLDP, Forestry Section.

4.3.14 Agricultural Credit - Both seasonal and medium term credit facilities continued to be made available to project smallholders during Phase III. Seasonal credit for fertilizer and seed on a 'package' basis was issued (at 15% interest for individual loans and 10% for group loans) as follows:

	Seasonal credit issued (at current prices) (MK)	Appraisal projection of issue at constant (1975/76 prices) (MK)	Actual issue converted to constant 1975/76 prices
1975/76	772,400	1,376,000	722,400
1976/77	895,600	1,571,000	1,178,400
1977/78	1,146,100	1,996,000	1,317,400
1978/79	1,149,200	2,064,000	1,320,900
Total	3,963,300	7,007,000	4,589,100

Source: LLDP Credit Section. Conversions using fertilizer price index.

Seasonal credit issues were taken by almost 57,000 smallholder recipients in 1978/79, exceeding the target of 55,000 set at appraisal. The average amount of seasonal credit issued per farmer, however, was only 65% of what was anticipated at appraisal (compared at constant prices).

4.3.14.1 Medium term credit was issued at 10% on an annuity basis with an initial down-payment of 33% of the items' value. The amounts were also less than appraisal estimates.

	Number of items issued 1975/76 to 1978/79	Appraisal projection for same four years
Farm carts	66	740
Ox-drawn implements	3	230
Barbed Wire	32	200
Maize mills	0	140

In addition, the appraisal projected some MK20,000 for tobacco barns and MK4,800 for Rural Craftsmen (at constant prices) but no credit was issued for these items. The above items financed with medium term credit were well below the numbers envisaged at appraisal. The shortfall was due primarily to a reluctance on the part of management to release medium term credit for the purchase of items which it considered not proven appropriate to LLDP smallholder conditions (tobacco barns and maize mills); which could not be backed up by an extension effort (Rural Craftsmen); or which depended upon other credit items which were not available (fencing for dairy enterprises). Further, in the case of ox-carts and ox-drawn implements, ADMARC failed to provide sufficient of the required type throughout the phase.

4.3.14.2 Utilization of credit funds for stall-feeder issues (MK342,900) exceeded the appraisal estimate (MK261,200) over the same four years. Issues for Poultry (MK119,400) also exceeded appraisal estimates (MK103,700). But issues for Dairy development (MK10,700) were lower than appraisal estimate (MK30,000).

4.3.14.3 Details of the Credit fund cash flow and repayment performances are given in Annex IV(e) and (f).

4.3.14.4 Credit was disbursed to those smallholders who were considered credit-worthy by both extension and credit staff in liaison with the local village planning committee. Input packages comprised improved maize and groundnut seed together with recommended quantities of fertilizer (for maize). The proportion of borrowers to total farmer population in Phase III was: 1975/76, 42 per cent; 1976/77, 37 per cent; 1977/78, 40 per cent; 1978/79, 52 per cent.

4.3.14.5 Throughout Phase III the disbursement of credit packages were often late due to ADMARC's inability to arrange adequate transport for delivery to Unit Centres.

4.3.14.6 As in the selection procedures for seasonal credit, during the recovery period credit staff were assisted by extension workers and the local village planning committee. By the end of each marketing season (September 30) each farmer was expected to have paid off all outstanding seasonal loans; those who failed to do so were further approached by credit staff. In some instances defaulters were referred to Traditional Courts. Repayment performance during the phase has been as follows:- 1975/76, 99.97 per cent; 1976/77, 100 per cent; 1977/78, 100 per cent; 1978/79, 99.91 per cent.

4.3.15 Marketing and Inputs - Towards the end of Phase III ADMARC had provided the marketing facilities required under the project. Where delays occurred in the construction of input sheds, ADMARC, after liaison with Programme management, provided temporary structures.

4.3.15.1 Facilities - By March 1978 each unit had been provided with a marketing centre, which included an input shed and a produce purchasing area. By the end of Phase III there were a total of eleven parent markets serving the Project area, each providing at least 450 metric tonnes of input capacity and a minimum produce buying area of 200 square metres. At each of the remaining 30 Unit Centres input storage capacities were approximately 350 metric tonnes with produce purchasing areas of 200 square metres. In addition, 27 temporary purchasing or seasonal markets were provided in 13 units, again with flexible input and produce capacities.

4.3.15.2 Seasonal inputs - Seasonal inputs, namely improved seeds and fertilizers, were provided exclusively through ADMARC channels. A comparison of seasonal inputs purchased by smallholders compared to projected quantities at appraisal, is given in Annex IV(f). In all cases except groundnut seed, smallholder purchases of inputs did not reach the quantities projected at appraisal. The arrival of inputs at ADMARC markets was generally too late and too little to effect timely crop planting and fertilizer application or even to allow the farmers' demand to be satisfied at the time when these inputs were required.

4.3.15.3 Marketed output - With respect to crop surpluses, it is estimated that of the 1977/78 crop only approximately 14% of the total maize production and 27% of the total groundnut production was sold to ADMARC markets (Evaluation data). Although ADMARC tobacco purchases were formerly controlled within the project area by the imposition of quotas restricted to registered growers, this system broke down in 1975/76 when ADMARC failed to purchase the levied quotas and in the following seasons unregistered tobacco was accepted, which encouraged over-production. Throughout Phase III, implementation bottlenecks to efficient marketing were identified as being:

- (a) shortage of sacks at buying;
- (b) transportation difficulties in supplying inputs to markets and taking produce from markets;
- (c) delays in produce purchasing due to inadequate cash supplies at markets and markets opening too late each day.

These resulted in inputs being delayed quite considerably and in severe congestion at many markets during crop purchasing periods.

4.3.16 Maize Shelling - Even though the maize shelling facilities were open to smallholders throughout Phase III the number of bags shelled by the 30 project maize shellers declined quite considerably after 1974.

Number of bags (200 lbs) shelled

1974	69,241
1975	39,620
1976	6,903
1977	7,801
1978	11,372
1979	6,664

The reasons for the decline appear to have been:

- (a) inadequate supplies of improved maize seed (generally the demand for shelling is only for production from hybrids);
- (b) inadequate supplies of fertilizer;
- (c) the removal by management of a subsidy previously allowed;
- (d) inadequate supplies of sacks;
- (e) increased demand at homesteads for shelled cobs for fuel.

4.3.17 Rural Development - The Rural Development Section continued a programme in Phase III designed to train the rural community in committee work, planning and self-help development effort. With the help of extension staff and local Malawi Congress Party officials the section helped set up Village, Section, Unit and Extension group committees. Committee training was undertaken at village meetings and training centres. As the project developed infrastructures in forward areas local leaders were always informed in advance. Where essential services were not provided by the Project, self-help schemes were organized by the Section. The Project provided technical assistance and in some cases transport, cement, firewood and timber in an attempt to stimulate this self-help organization. (See Annex IV(g)).

4.3.18 Dzalanyama Ranch - The main objectives of the ranch were outlined for Phase III as follows:

- (a) to provide suitable animals for stall-feeding by farmers in the Programme area;
- (b) to provide improved Zebu bulls bred on the ranch to assist farmers to improve their own herds;
- (c) to produce half-bred heifers for milk production by smallholder farmers.

The first objective (above) was to be met both by the breeding of young feeders from the ranch breeding herd and the holding, dosing and improving of the condition of additional feeder steers (bought in from market sale-yards) before subsequent issue to stall-feeding farmers. The second objective was to be achieved through a selective breeding programme on the ranch. The third was to be achieved principally by means of an artificial insemination programme using selected ranch breeding cows and imported Friesland semen.

4.3.18.1 These main objectives necessarily had to fall within the overall requirements for a correct ecological management of the area, since it remained a Forest Reserve and all ranch management decisions had to recognize the requirements of forest husbandry. This aspect was particularly stressed by Government since the Dzalanyama Forest Reserve forms the main catchment for Lilongwe Urban Water Supply. For this purpose a Dzalanyama Ranch Advisory Committee had been established (1971) to coordinate these sensitive areas of management decisions. Implementation of this programme was achieved as follows:

(a) Stallfeeders Issued to Smallholders:

	<u>Ranch Bred</u>		<u>Purchased</u>	
	<u>Appraisal target</u>	<u>Actual</u>	<u>Appraisal target</u>	<u>Actual</u>
1975/76	223	420	570	1,043
1976/77	260	487	570	660
1977/78	557	566	570	690
1978/79	<u>762</u>	<u>757</u>	<u>570</u>	<u>286</u>
Totals	1,802	2,230	2,280	2,679

(b) Improved bulls: none were issued and no specific projections were made at appraisal.

(c) Dairy heifers: a total of 78 head were issued to farmers compared with 90 projected at appraisal.

(d) Build-up of Ranch breeding herd: Cows and heifers purchased:

<u>Year</u>	<u>Number Purchased</u>	<u>Appraisal Target</u>
1975/76	688	750
1976/77	565	750
1977/78	375	750
1978/79	<u>483</u>	<u>750</u>
Totals	2,111	3,000

Further details and analysis of ranch implementation performance, including herd composition analysis and cash flow both for Phase III and the total life of the Project are given in Annex IV(h).

4.3.19 Stallfeeders - Smallholder participation in the Project's stallfeeder credit scheme was high and in fact demand continually exceeded the supply of suitable feeder steers available. The total number of stallfeeders issued in Phase III was 4,909 which exceeded the appraisal target of 4,082. Numbers issued could have been considerably higher, but due to foot and mouth disease restrictions in the Southern Region it was difficult to obtain sufficient stock by purchase at markets. With demand exceeding supply, the livestock component was able to maintain a fairly strict system of selection of applicants for stallfeeder stock. Details of stallfeeder performance are given in Annex IV(i).

4.3.20 Dairy - During the phase there was an increasing demand by smallholders to participate in the dairy scheme. However, due to difficulties in obtaining and utilizing suitable semen for the artificial insemination programme, and more particularly a serious

outbreak of contagious abortion within the supply herd at Dzala-nyama ranch, supplies of improved stock could not keep pace with demand.

<u>Year</u>	<u>Number Issued</u>	<u>Appraisal Target</u>
1975/76	6	15
1976/77	14	15
1977/78	47	30
1978/79	<u>11 (replacements)</u>	<u>30</u>
<b>Totals</b>	<b>78</b>	<b>90</b>

There was no reliable data on total milk production by dairy smallholders. Details of dairy performance are given in Annex IV(j).

4.3.21 Poultry - The poultry component introduced in Phase III met with many problems which stemmed primarily from a lack of adequately trained personnel in poultry production and poor administrative machinery to support the scheme. As a result, implementation did not reach the targets anticipated at appraisal.

<u>Year</u>	<u>Number of Layers Issued</u>		<u>Appraisal Target</u>		<u>Number of Eggs sold through Official Channel</u>	<u>Appraisal Target</u>
	<u>Farmers</u>	<u>Birds</u>	<u>Farmers</u>	<u>Birds</u>	<u>-----dozen-----</u>	<u>-----</u>
1975/76	20	2,000	40	3,840	11,785	69,120
1976/77	60	6,000	40	3,840	42,690	69,120
1977/78	60	6,000	40	3,840	24,795	69,120
1978/79	<u>---</u>	<u>---</u>	<u>40</u>	<u>3,840</u>	<u>44,945</u>	<u>69,120</u>
<b>Totals</b>	<b>140</b>	<b>14,000</b>	<b>160</b>	<b>15,360</b>	<b>124,215</b>	<b>276,480</b>

Source: LLDP, Livestock Section. (Years: April to March)

4.3.21.1 Credit repayments were poorly managed and poor accounting links between the grading station, MANR headquarters and Project headquarters caused long delays in payments to producers. Furthermore, irregularities in egg grading at marketing occurred, with some producers losing substantial quantities of eggs even allowing for the high proportion of cracks which followed poor transportation facilities from farm to grading station. Consequently, many of the scheme's participants sold eggs on local markets and not through official channels. As a result, credit recovery was low (58%) and restrictions had to be placed on further issues.

4.3.21.2 It was apparent that in some instances feed quality from the local milling company was sub-standard, and flock mortality was high due to inadequate management and poor extension coverage.

4.3.21.3 Programme management attempted to resolve these problems by liaison with the egg marketing board to (a) provide better transportation facilities; (b) speed up payment to producers; and (c) expand and modernize the egg handling and grading facilities. Feed quality was improved through liaison with the local milling company. However, extension continued to be inadequate although staff levels met appraisal requirements.

4.3.22 General Livestock Development - The continuation of general livestock extension in Phase III included the following programme as



agreed at appraisal:

- (a) encouragement of use of crop residue;
- (b) production and conservation of fodder crops;
- (c) controlled grazing of dambos, by fencing and education on grazing management;
- (d) culling of surplus animals, particularly surplus bulls;
- (e) construction of a further five dip tanks;
- (f) expansion of artificial insemination services;
- (g) introduction of a mobile cattle market.

Implementation performance of this program was as follows:

- (a) Encouragement of the use of crop residues was successfully accomplished for those farmers stallfeeding steers and dairy cattle. However, there was no evidence of a similar success on a more general basis principally because it is common practice for all livestock to be turned on to crop fields after harvest anyway.
- (b) The production of fodder crops was a condition before issue of dairy cattle to smallholders. In most cases, although not all, this condition was adhered to and each dairy smallholder produced approximately two hectares of Rhodes grass (Chloris guyana) which was cut and fed to his unit of two dairy cows. However, even in the case of dairying smallholders, the conservation of this fodder crop was not evident. It was generally cut and fed direct according to requirement without recognition of the need for complete cutting and stacking at the time most suitable for fodder nutrient status. There was no evidence of production of fodder crops by smallholders other than dairymen, basically because the opportunity cost in time spent on such an exercise was obviously better spent in growing cash and food crops.
- (c) The introduction of controlled grazing of dambos remained impossible under the prevailing communal grazing system, and improved grazing management was not adopted by the individual livestock owner.
- (d) Livestock numbers and sales - (see under Impact: paragraph 5.6.5).
- (e) Dip tanks - Compared with the five targeted for at appraisal, only two were constructed. This reduced number was considered adequate by Programme management for the existing livestock population of the area.
- (f) A.I. service - The programme for A.I. service on a general basis with smallholder cattle herds was curtailed sharply for two reasons. Firstly, the availability of suitable semen and its handling was severely limited; and secondly, it was considered by management to be unwise to introduce exotic blood into village herds at the prevailing management levels. A good Malawi Zebu type was expected to perform better than exotic half or three-quarter breeds under these conditions. There was some A.I. input of Friesian semen in Unit 12.

- (g) Mobile cattle market - Because the amount of livestock offered for sale within LLDP continued to be very limited, it was considered inopportune to invest in a relatively expensive mobile cattle market during Phase III. Instead, the Programme cattle buyer purchased some stock on the basis of 'weight-band' valuations in those areas where stock was offered (particularly in Unit 3).

4.3.23 Evaluation Component - Improvement in the implementation of the evaluation component was noticeable during the phase. This principally concerned the achievement of a more representative data base from smallholder surveys (by means of a change from mobile to the use of resident enumerators) and an improved adequacy and timeliness of analysis from a computer tabulation programme which had more practical uses. With the formation of a national Evaluation Working Party (1975) and its coordination and strengthening by means of a Central Evaluation Unit (1978) at Ministry headquarters, a more practical and timely format of data collection and analysis was achieved.

The Lilongwe Evaluation Unit conducted the following surveys during Phase III:

1975/76		1976/77		1977/78		1978/79	
Survey Title	Sample Size	Survey Title	Sample Size	Survey Title	Sample Size	Survey Title	Sample Size
Demo-graphic, Garden & Yield	939	Demo-graphic Garden & Yield	955	Basic farm	959	Basic farm	572
		Improved maize	130	Improved maize	83	Tobacco management	226
				Tobacco management	502	Resources	255
						Farm management	102
				Resources	949	Credit	170

The basic farm survey under the new format (introduced in all Projects in the 1977/78 season) covers representative data on household demography, training and experience, labor availability, cropping patterns, agronomic practices and timeliness, sources and uses of inputs, objective measures of garden size and crop yields, contact and advice from extension staff, attitudes to adoption of improved practices, and supplementary reasons for crop performance.

The following analyses and presentations of survey results were completed during the phase.

<u>Survey title</u>	<u>Partial analysis</u>	<u>Full analysis</u>	<u>Partial Write up</u>	<u>Full Write up</u>
Farm Management (1969/72)	✓	-	-	-
Demographic (1975/76)	✓	✓	✓	✓
Garden (1975/76)	✓	✓	✓	✓
Yield (1975/76)	-	✓	-	✓
Demographic (1976/77)	✓	✓	✓	✓
Garden (1976/77)	✓	✓	✓	✓
Yield (1976/77)	-	✓	-	✓
Improved maize (1976/77)	-	✓	-	✓
Basic Farm (1977/78)	-	✓	-	✓
Improved maize (1977/78)	-	✓	-	✓
Tobacco Management (1977/78)	-	✓	-	✓
Resources (1977/78)	-	✓	-	✓
Credit (1978/79)	✓	-	-	-
Basic Farm (1978/79)	✓	-	-	-

4.3.24 Management and financial control and reporting - A high standard of management and financial control was maintained throughout Phase III. In the case of Management control, regular weekly co-ordination meetings were held with Divisional heads and Evaluation. Management appeared to be continually aware of the major activities, findings and problems of every project component. Financial control was similarly well administered and the computerised cost accounting system was able to provide timely analysis of component costs compared to budget, on a monthly basis. The project produced monthly and quarterly reports regularly. No annual reports were produced during the phase.

4.3.25 Project preparation for the National Rural Development Programme - Included under the Credit Agreement was finance to assist in the preparation of projects for the National Rural Development Programme by the Ministry of Agriculture & Natural Resources. This included mainly operating expenditures for Land Resources Survey, Population Survey, Agro-economic Survey and Crop Experiments. For the implementation of this, the Lilongwe project passed a cheque for MK200,000 to Ministry Headquarters; this money was entered into a "Special Development Vote" (046). (For details of its Departmental Warranting see Annex IV(k).) This was of course not the only source of funding for N.R.D.P. preparation. Implementation was effective from the point of view that baseline data was collected and analysed by the Ministry's Land Husbandry, Research and Agro-Economic Survey departments and this information formed a reasonably adequate base for preparation of project submissions for N.R.D.P. appraisal. Negotiations were accomplished successfully in 1978.

5.1 LLDP was set up to improve the living standards of smallholders within the Lilongwe Plain. It was envisaged that the target population would receive major benefit from increased production of maize, groundnuts and tobacco. Benefits were expected to accrue also to smallholder dairy, stallfeeder and poultry farmers. Whilst those benefits have been more obvious in terms of production and hence in financial and economic terms, it must be borne in mind that benefits of a social bearing have also come as a result of project activities. These latter are considered here as far as possible.

5.2 Crop Production - Considerable data are available relating to smallholder crop production and may be found in project evaluation records. Rather than reiterate these facts, the following paragraphs compare projected with actual crop production performances and discuss possible reasons for the divergencies. A more detailed analysis and discussion of yields and associated data from 1977/78 farm survey is given in Annex V(b).

5.3 Cropped Area - Of the total land available for smallholder cultivation a reduction in the proportion actually cultivated was evident during Phase III. This is partly because during the phase the Programme extended into modified input areas with lower population density and reduced cultivation pressure. The emphasis on tobacco production also influenced this trend to smaller average areas cropped by smallholders.

5.3.1 Table 5.1 provides a comparison of projected and actual cropped areas by season during Phase III. Some noticeable differences from the pattern envisaged at appraisal are evident. The three main reasons advanced for these differences were: (a) an inadequate supply of improved maize seed and fertilizer (paragraph 7.3.1.1); (b) an obvious rational smallholder response to producer prices and input/output price relationships (see paragraph 9.2 and more detailed discussion in listed References 4 and 5); and (c) the emphasis which was placed by extension and credit administration on tobacco as a more viable enterprise (see Annex V(b) and (c)).

5.3.2 The competition for smallholder labor between alternative crops (see listed Reference 5) also had an effect; for example in 1977/78 increased emphasis on tobacco resulted in a reduction of groundnut area. Groundnuts were afforded less priority by smallholders at prevailing price levels.

5.3.3 The total area allocated to maize production over the same time remained relatively stable. As a basic food the demand for this crop remained inelastic. The amount of improved seed available was insufficient to enable total demand to be met by a smaller crop area.

5.4 Crop Yields - Since the smallholders encompassed by this Programme remained a relatively stable farming community with expansion of individual holdings limited by land availability, then the most pertinent parameters to be highlighted from a point of view of Programme Impact must be in terms of yield per unit of land area. A key indicator in this regard is physical crop yield per hectare; the value of this yield in terms of smallholders labor input and money invested must also be considered as part of the Programme Impact. It should be noted that the original development plan for the programme area stressed the danger of crop yields actually

Table 5.1: LLDP Phase III: Comparison of Actual and Projected Crossed Areas

	1975/76		1976/77		1977/78		1978/79	
	<u>Projected</u>	<u>Actual</u>	<u>Projected</u>	<u>Actual</u>	<u>Projected</u>	<u>Actual</u>	<u>Projected</u>	<u>Actual</u>
<u>Cross LLDP Developed Areas ('000 ha)</u>	285	285	306	334	349	349	349	349
<u>Cultivated Areas ('000 ha)</u>								
Maize	105.6	99.6	114.9	122.0	130.7	120.9	136.4	123.3
Groundnuts	37.2	43.5	40.9	41.7	46.5	28.9	18.2	31.7
Tobacco	21.4	20.1	23.1	21.2	26.3	30.3	27.9	29.9
Other	5.7	10.3	6.5	8.3	7.9	8.8	7.4	7.9
TOTAL	169.96	173.8	185.4	193.2	211.4	188.9	215.4	191.9
Cultivated As % of Total LLDP Developed Area	59.8	61	60.6	58	60.5	51	61.7	54

Source: LLDP, Evaluation Unit

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declining in the face of population pressures and erosion, if intensive soil conservation measures were not implemented.

5.4.1 The Evaluation Unit of the Programme has placed specific emphasis on the collection of representative crop yield data in all seasons, with comparison between developed areas and those not yet being developed and also between improved and local crop varieties. These yield data were collected with emphasis on maize and groundnuts as the two key crops of the Programme. Estimated yields for tobacco and wood production have been derived largely from non-project sources but are felt to be representative of yields within the project. The following paragraphs summarize the results of the crop yield analysis. More detail is available in References 3, 4, and 5.

#### 5.4.2 Maize Yields:

Table 5.2 Comparison of projected and actual mean maize yields by variety and season: LLDP, Phase III

<u>Variety</u>	<u>Projected</u> <sup>1</sup> (kg/ha)	<u>A c t u a l</u>			
		1975/76 (kg/ha)	1976/77 (kg/ha)	1977/78 (kg/ha)	1978/79 (kg/ha)
Local: unimproved	1,120	1,164	714	980	1,100
improved	-	1,393	1,073	1,075	1,332
Hybrid	3,584	3,323	4,006	3,175	3,771
Synthetic	1,344	1,719	1,332	1,436	n/a
Composite	2,240	2,117	2,517	2,262	1,948

Note 1. Projections same for each season; no improved local maize projection.

Source: LLDP, Evaluation Unit.

Seasonal yield variations followed marked differences in climate. High maize yields were associated significantly ( $P = 0.05$ ) with time of planting, plant densities and rate of fertilizer application. For further discussion see Annex V (b).

#### 5.4.3 Groundnut Yields:

Table 5.3 Estimated mean Chalimbana groundnut yields: LLDP Phase III

<u>Season</u>	<u>Projected (improved)</u> (kg/ha)	<u>A c t u a l</u>	
		<u>Unimproved</u> (kg/ha)	<u>Improved</u> (kg/ha)
1975/76	560	306	346
1976/77	579	278	359
1977/78	597	278	283
1978/79	616	315	531

Note 1: Unimproved yields:

1975/76 & 1976/77 within the project area;  
1977/78 assumes 1976/77 undeveloped estimates;  
1978/79 Thiwi/Lifidzi Project estimate.

Source: LLDP, Evaluation Unit.

The mean recorded groundnut yields for LLDP declined over the first three cropping seasons of Phase III. Adverse climatic conditions coupled with an inadequate improvement of smallholder crop management were the basic causes. By comparison, the favorable growing conditions of the 1978/79 season returned groundnut yields almost double the 1977/78 means, even though only marginal improvements to crop management were evident. The lack of improvements in agronomy can be linked to a poor extension effort for this crop (see Annex V (b) ) and to labor competition from an increased tobacco area.

Sulphur dust was not generally used throughout the phase since, at prevailing prices, the level of groundnut crop management was not considered sufficient to warrant its use on a general basis. (But some farmers who did use sulphur dust and improved management returned yields of over 800 kg/ha). A wide variation around the estimated mean yield values occurred (as with maize) with an average coefficient of variation of 68%. It was found that for groundnuts early planting and high plant densities were rewarded by above average yields. Evaluation Survey comparisons showed that the management applied to the 1978/79 LLDP groundnut crop was slightly superior to that of the Thiwi/Lifidzi crop (non-Project area) of the same year.

5.4.4. Tobacco Yields:

Table 5.4 Comparison of projected and estimated tobacco yields <sup>1/</sup>: LLDP, Phase I

	<u>Projected</u> (kg/ha)	<u>Actual</u> <sup>3/</sup> (kg/ha)
Unimproved	380	380
Improved: 1975/76	426	500
1976/77	426	566
1977/78	426	480
1978/79	426	480 <u>2/</u>

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Notes: 1. Represents yield sold to ADMARC  
2. Using 1977/78 estimate  
3. Source: Chitedze Research Station

Owing to practical difficulties involved in obtaining accurate objective measures of effective smallholder yields of cured leaf, the Evaluation Unit did not collect tobacco yield data during Phase III. However, results of smallholder trials conducted by Chitedze Research Station staff have been used to compare appraisal and actual yield estimates. The Evaluation Unit monitored tobacco crop management practices during the latter three seasons of Phase III. Compared with maize and groundnuts, tobacco crop management practices followed closely to extension recommendations (Annex V (b) ).

5.4.5. Owing to the enormously overriding effect of climatic variation between areas and seasons, a more representative assessment of Programme Impact is perhaps obtained by comparing yield parameters for the two main crops (maize and groundnuts) between developed and undeveloped areas over a longer time span of seasons than for Phase III alone. This is also relevant from the point of view of considering the overall and longer-term impact of the Programme, particularly concerning the value of soil conservation measures and inputs of improved management. Table 5.5 provides a comparison of maize and groundnut yields between those areas not yet reached by the Programme and those already being developed each season from 1969/70 to 1978/79. The comparison provides an indication of the average



Table 5.5 Maize and Groundnuts : Yields and Agronomy

Season rating #	1969/70 (P)	1970/71 (M)	1971/72 (G)	1972/73 (P)	1973/74 (E)	1974/75 (G)	1975/76 (M)	1976/77 (P)	1977/78 (P)	1978/79 (G)
<b>Maize yields (kg/ha)</b>										
(All maize) Developed areas	1,201	1,455	2,066	1,280	1,167	1,425	1,391	1,220	1,206	1,540
Undeveloped areas	1,131	1,290	1,249	1,129	985	1,017	1,158	991	-	-
Total per sample	1,146	1,322	1,515	1,232	1,107	1,340	1,350	1,120	1,206	1,540
(Coefficients of Variation) %			(65)		(88)	(73)	(71)	(76)	(78)	(71)
Number of observations	704	687	1,011	nl	709	693	956	663	777	1,081
<b>Groundnuts yields (kg/ha)</b>										
Developed areas	585	549	483	362	445	547	430	372	283	531
(Coefficient of Variation) %					(48)	(53)	(46)	(47)	(68)	(68)
Undeveloped areas	659	605	445	343	405	551	408	304	-	-
Total per sample	616	582	458	351	420	549	427	372	283	531
Number of observations	634	549	984	nl	701	640	631	648	640	427
<b>Maize Growers (%)</b>										
(i) Using improved seed: Developed areas	8	15	49	nl	32	15	11	10	9	7
Undeveloped areas	15	17	14	nl	12	6	4	3	-	-
(ii) Using fertilizer : Developed areas	4	13	56	nl	36	17	18	19	31	25
Undeveloped areas	5	15	18	nl	23	14	15	49	-	-
(iii) Applying manure : Developed areas	-	-	6	nl	5	5	6	5	5	4
Undeveloped areas	-	-	4	nl	7	8	6	14	-	-

Notes: # Season rating: P = poor; M = mediocre; G = good.  
nl = no information

Source: Evaluation Unit Surveys. Based on Yield sub-plots in farmers' own gardens.

Table 5.6 Yields and Agronomy Results of the First Development Units (1 and 2)

	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79
Season rating	(P)	(M)	(G)	-	(H)	(G)	(M)	(P)	(P)	(G)
Groundnut yields (kg/ha)	534	533	334	ni	545	460	323	319	280	590
(Coefficients of Variation) %	-	-	(61)	ni	(45)	(58)	(47)	(47)	(61)	(66)
Maize yields (kg/ha)	1,226	1,490	1,827	ni	1,040	1,572	1,058	1,270	1,140	1,480
<u>Percentage of Growers</u>										
(i) Using improved maize seed	8	15	25	ni	20	12	4	0	ni	ni
(ii) Using fertilizer	4	13	17	ni	20	9	8	11	ni	ni
(iii) Using manure	-	-	6	ni	10	6	6	4	ni	ni
(iv) R'iging early (before mid-November)	-	93	46	ni	66	72	76	77	ni	ni
(v) Planting early (before 1st December)	-	25	9	ni	9	6	8	4	ni	ni
(vi) With maize at optimum plant density (35,000 p/ha)	-	6	8	ni	6	2	8	6	ni	ni
(vii) With groundnuts at optimum plant density (65,000 p/ha)	-	0	0	ni	0	0	2	0	ni	ni
(viii) Applying sulphur dust to groundnuts	-	-	16	ni	16	4	2	8	ni	ni
(ix) With groundnuts receiving visits by Extension Staff	-	- )	55	ni	43	67	45	40	ni	ni
(x) With maize " " " " "	-	- )		ni	56	59	50	52	ni	ni
(xi) By Extension advice on use of improved seed	-	-	18	ni	6	9	0	0	ni	ni
(xii) By Extension advice on use of fertilizer/ manure	-	-	63	ni	35	46	61	50	ni	ni
Number of observations: Maize	226	94	46	ni	79	112	48	27	43	147
Groundnuts	161		31	ni	66	94	44	20	32	37

Source: Evaluation Unit Surveys. Based on Yield sub-plots in farmers' own gardens. For 1977/78 and 1978/79 Evaluation data on detailed agronomy not yet analysed for this sub-strata.  
ni = no information. Season ratings: P = poor; M = mediocre; G = good.

differences between farmers within the Programme activities and those outside. Particularly in the later years of the Programme, it is noticeable that farmers within the areas of Programme activity were obtaining consistently better yields. The declining proportion of maize growers using improved seed and fertilizer is noticeable even in this table, although it must be remembered that each succeeding year encompasses a greater number of farmers. Table 5.6 provides, as an indication, a comparison between seasons, choosing only the first Developed Units (1 and 2) with data between 1969/70 and 1976/77. Rates of adoption of recommended 'packages' and better agronomy have shown no signs of clear improvement over the ten years covered by these indications. Crop yields also have shown no marked improvement on average.

5.5 Incremental Crop Production -Table (i) at Annex V(a) presents a comparison of actual and projected crop production parameters over the four seasons of Phase III. Due to the lower than anticipated uptake of improved maize seed and a change in relative farm-gate prices of smallholder crops, incremental maize production was lower than projected at appraisal. However, had the marketing system provided fertilizers and improved seeds in the quantities projected and ordered by management, it is likely that maize production under the monitored target crop management regimes would have considerably exceeded appraisal targets. As it was, total incremental maize production was 77 per cent of the projected target. This again emphasises the role ADMARC had in assisting smallholders to achieve the anticipated level of maize production using improved maize seed and fertilizer. For the whole of the phase incremental groundnut production was approximately 13,019 metric tons, 76 per cent of the 17,036 metric tons envisaged at appraisal. Clearly, had adequate emphasis been placed by extension staff on plant populations and timeliness of planting, and had on adequate pricing policy been implemented, then anticipated production levels would have more easily been realized. In the case of tobacco, although gross production exceeded marketed production, the situation is not as anomalous as it appears. Much tobacco was rejected by ADMARC. However, a buoyant internal market existed for ILDP smallholder tobacco in other localities of Malawi as a 'twist' (for cigarettes) and snuff. Evaluation surveys revealed a slight deterioration in the level of tobacco crop management since 1976/77; more farmers grew the crop but received less extension assistance. Secondly, the heavy storms during 1975/76 and again in 1977/78 damaged many tobacco barns, which reduced the standard of curing. The increased number of tobacco growers placed heavy demands on thatching grass and fuel-wood which accentuated curing problems and shortages of

grass for domestic thatching.

5.5.1 In an attempt to establish some of the many inter-relationships which existed in smallholder crop production, the Evaluation Unit conducted basic correlation and regression analyses on crop management and associated data collected during the 1977/78 season (see Annex V (b)). The approach tested various hypotheses derived from field observations and first-stage analysis of the data, primarily to establish broad relationships between crop yields, crop management and the activities of various project components. Whilst the approach is considered incomplete, it provides valuable insights into the 'linkage' effects of the Programme. In summary this analysis indicated the following:

- (a) Hybrid maize growers appear to be the most progressive, adopting major extension recommendations for most crops.
- (b) On the whole, tobacco growers followed the main extension recommendations for tobacco cultivation even though for subsistence crops no significant crop management improvements were evident.
- (c) The provision of essential project input, such as extension, farm training and credit, was biased in favor of tobacco-growers.

5.5.2 An additional indication of the availability of extension advice for the main crops on key issues of agronomy is also reproduced from a basic farm survey analysis table at Annex V (c). This also shows that not only was extension coverage more concentrated on tobacco, but also that a high proportion of those farmers who were following recommended practices did so despite having had no advice.

5.5.3 Reference to Table (i) of Annex IV(g) provides a comparison of projected and actual inputs of fertilizers and seeds sold to Programme smallholders each season by ADMARC. ADMARC purchases of smallholder crops is also given. In summary, the indication given here is that actual compared with projected input sales for the whole of Phase III were only 17% in the case of improved maize seeds but 93% in the case of fertilizer (although sulphate of ammonia proved more in demand than the compound 20:20:0). Groundnut seed inputs were better at 103% of projected levels.

5.5.4 Table (i) of Annex V(d) shows that LLDP has been a major purchasing area of fertilizers in the Central Region of Malawi. A point of interest from the data embodied in this table is that the bonuses paid to smallholder tobacco producers at the end of one season appear to be positively associated with cash purchases of fertilizers at the beginning of a subsequent season.

This data seems to indicate that:

- (a) The uptake of fertilizer through cash sales was higher sensitive to payment of tobacco bonuses.
- (b) The seasonal credit schemes in LLDP played a major role in stabilizing maize production between seasons.

## 5.6 Farmer's Benefits

5.6.1 Arable Incomes - Using the preceding data on yields and cropped areas, average arable incomes were calculated for LLDP small-holders during Phase III at constant 1978/79 ADMARC farm-gate prices. Considerable interseasonal variation in average incomes were experienced due to yield differences. However, between the first and final year of the project average incomes remained at K136 even though there was a reduction from 2.10 ha to 1.76 ha in the mean cropped area. (see Annex V(e), Table (i)).

5.6.1.1 However, this 'mean value' could be misleading as small-holder farms exhibited a wide variation both in terms of cultivated area and type of crops grown within each season. Furthermore, there was a high proportion of smallholders growing tobacco (for example, 52 per cent in 1977/78 and 45 in 1978/79) and it was noticeable that they were associated with large holdings in both seasons. Therefore to show more clearly the differences in farm incomes between project participants and non-participants, gross margins for each major crop have been calculated on a per hectare basis (Annex V(e) Table (ii)). Then, using these value, complete arable budgets were calculated for holdings of: - 1.80 hectare with and without tobacco 3.0 hectare with tobacco; and 1.0 hectare without tobacco (See Annex V(e) Table (iii)). The summarized results were:

Table 5.7 LLDP:Arable gross margins,projections compared to actual (1978/79 prices)

	<u>Unimproved</u>		<u>Improved</u>	
	<u>Projected</u>	<u>Actual</u>	<u>Projected</u>	<u>Actual</u>
1.0 ha(non-tobacco)	133.75	59.54	200.35	70.74
1.80 ha(" )	167.51	107.87	233.01	116.36
1.80 ha(tobacco )	295.59	132.80	429.82	164.54
3.0 ha ( " )	295.59	245.19	429.82	335.05

Source: LLDP, Evaluation Section.

The disparity between projected and actual arable budgets stems from higher projected crop yields than were achieved by smallholders in 1978/79. Although it can be seen that arable incomes were substantially improved, the greater benefits seem to have been derived by tobacco growers.

5.6.2 Clearly, from the above, although the improved packages adopted have increased farm arable incomes, the actual increases has not reached the levels projected. Since, for tobacco and maize in particular, it has been shown that smallholders have achieved crop yields per hectare above appraisal projection, then the lower incomes than anticipated were due to a less favourable cost/price environment as indicated by the following:

Table 5.8 Output value to direct ratios for improved package

	<u>Maize Hybrid</u>	<u>Maize Composite</u>	<u>Groundnuts</u>	<u>Tobacco</u>
Projected at Appraisal <u>1/</u>	2.03	2.99	9.84	3.62
Actual Result <u>2/</u>	2.19	2.03	6.05	2.23

Source: 1/ Report 652-MAI, Annex 13, Table 1  
2/ Annex V(e) Table (ii)

Hybrid maize was the only improved package which returned a higher than projected return per Kwacha of direct expenditures; however, as has already been indicated (Annex (IV)(f) the availability of suitable hybrids for the farmer was severely limited.

5.6.2 The Stallfeeder Enterprise - Details on slaughter grades and gross returns on stallfeeders issued to credit farmers, during Phase III and compared with earlier issues, are given in Annex IV(i). Based on the results for 1978, a stallfeeder budget (at Annex V(f) indicates that a gross margin of K25.41 was probably earned on average. Average slaughter grades during Phase III were below those achieved in Phase II and dressed weights were also lower, however, this must be related to the fact that the number stalled in the latter phase was more than double that projected.

5.6.3 The Dairy Enterprise - Impact of the dairy enterprise was of course limited by the small number of participants due to the limitations of supply of dairy stock outline in paragraph 4.3.20. A budget for a two-cow enterprise at Annex V(g) indicates that an average annual gross margin of K263.09 was possible.

5.6.4 The Poultry Enterprise - Unfortunately no objective record was kept of poultry enterprise performance. Whilst it is clear that a large proportion of egg production was sold outside the official marketing channel, there are no reliable data on actual total egg production. The poultry enterprise budget presented at Annex V(h) can therefore offer only a rough approximation of performance. The budget indicates that profits of K186.73 per annum from a 120 bird enterprise was theoretically possible, rising to K351.48 per annum after five years when capital repayments would be completed. For the purpose of calculating incremental benefits (Section 8), it has been assumed that achievement reached only 60 per cent of this theoretical budget level.

5.6.5 General Livestock Husbandry - Implementation of the general livestock improvement programme was somewhat limited compared with the ideas suggested at appraisal (see 4.3.22). As a result of these changes, and also the fact that LLDP extension input in general livestock formed only a part of the Veterinary Department input, its impact would appear to have been minimal. This is evidenced by the fact that there was no noticeable improvement in general management levels of the herd or the natural grazing resource. As an example, one of the basic improvements sought in cattle herd management through LLDP extension was a reduction in the number and ratio of stags (uncastrated males) with the use of selected (or improved) bulls. A comparison of herd statistics over the four years of Phase III indicates that there was no improvement in this respect (see Annex V(i)). The number of castrated males showed no significant increase in the face of a sharp increase in the proportion of uncastrated males and a marked reduction in the cow to 'whole-male' ratio. There is of course evidence of improved management of individual herds; however these are too few to provide any bearing on the general statistics. On the basis of all evidence therefore, no incremental benefit has been counted from general livestock management (see Section 8).

5.6.6 Dzalanyama Ranch - Details of the performance and achievements of Dzalanyama ranch both during Phase III and for the entire Programme are given in Annex IV(h).

5.7 Extension and Training - Whilst a measure of extension and training impact is more related to improvements in yields, production and husbandry, it is also relevant here to consider their impact from a more general point of view. The extension component has provided farmers with a considerable exposure to advice on improved farm practices (see 4.3.10.4); however it is apparent that emphasis was, in the main, on crop production. By comparison, advice on aspects of livestock management, conservation practices and the business of farming' seems to have been lacking.

5.7.1 Farmers acceptance and implementation of crop management extension advice appears to have been high when given (see Annex V (c), Table (i)). However a major aspect of improved agronomy which was not followed (except for tobacco) and was not emphasized by extension, was adequate plant populations. Except for the tobacco crop, plant densities were well below the recommended levels and in fact the number of farmers who received advice on plant population was also low relative to that on other crop management aspects (see also Annex V(b)).

5.7.2 The emphasis which extension staff placed on tobacco in preference to other crops is also indicated. (Annex V(b)).

5.7.3 Previous evidence (Phase II) within LLDP and also from other areas suggest that losses of crops in storage under traditional methods is high (perhaps 16 percent of stored production). One would therefore have expected some emphasis to be placed by extension on improved storage facilities. However, survey by the Evaluation Unit in August 1978 revealed that storage cribs still remained unimproved (97 percent).

5.7.4 Since tobacco production featured as an important aspect during Phase III, more emphasis could have usefully been placed on extension on fuel-wood planting in the knowledge that this was becoming an important limiting factor.

5.7.5 The discussion on linkages in crop production (Annex V(b)) also reveals that farmers who had attended training courses were not significantly associated with higher plant populations and timeliness of planting; two critical determinants of crop yields. It would appear that both staff and farmer training did not address some of the most critical aspects of crop and livestock management practices in a manner sufficient to motivate the necessary improvements here.

5.8 The Credit Facility - There can be little doubt (see 4.3.14 and Annex V(d), Table (i)) that the availability of seasonal credit had enormous bearing on the adoption of improved packages. In 1978/79 the credit facility was utilized by an estimated 52 percent of all LLDP smallholders.

5.8.1 It is evident that the seasonal credit facility was not available to all smallholder farmers on an equal basis. For example, studies conducted by the Evaluation Unit indicated that tobacco growers were a significantly favored group with respect to credit disbursements (see Annex V(b)). A survey in May 1979 indicated that, of a random sample of 170, 45 percent were tobacco growers, of whom 91 percent received credit during the 1978/79 season at an average of 4.6 packages per borrower. But only 61 percent of the non-tobacco growers received credit, with an average of 3.8 packages each. Moreover, of the tobacco growers taking credit, 70 percent did so through a credit group whereas only 4.5 percent of non-tobacco credit recipients were available of this facility. If this pattern prevailed throughout Phase III then the slightly higher repayment rate for group recipients is not surprising.



5.8.2 Seasonal credit on an individual smallholder basis was disbursed according to Government guidelines; however (as has been the case in most other project areas) although credit groups were supposed to be self-accounting, few in fact were. Credit groups were short-lived and usually disbanded after receipt of inputs (having first paid the necessary 10 percent deposit). There was little development of a self-help approach to upgrade management by the poorer members of the group, and individual members of the group were generally responsible for their own repayments without evidence of pressure by the group 'committee'. Thus 'group' members obtained inputs at a lower credit charge yet still left accounting and policing procedures to project staff.

5.8.3 Under the prevailing conditions outlined here, therefore, Programme management decided to continue to allow credit disbursement on an individual basis until such time as group improved their self-help ability.

5.8.4 Costs of Credit Disbursement - On the basis of the four years ending 30th September 1978, the Credit Fund earned a net trading surplus of K156,029. However, this did not include the administration and running costs of the Credit component (which for the four years of Phase III totalled K395,000). The total credit programme therefore operated at a net cost of approximately K239,000 which was 5.4 percent of the total loans issued in the four years up to 30th September 1978. On this basis, in order for the Credit Fund to be completely self-financing the average rate of interest charged on loans issued would have to be raised by 5.4 percent.

5.8.4.1 There are few instances where a credit component could operate without the full cooperation of the extension service. It is therefore very difficult to quantify the total cost of any credit programme or its total effects. It must be looked at from an overall achievement point of view when measuring the success or failure of such a programme as this. Indications that the seasonal credit scheme in LLDP played a major role in stabilizing maize production between seasons have already been noted (paragraph 5.5.4).

5.9 Land Demarcation and Registration - The impact of this particular on-going programme has been difficult to measure in economic terms. However, LLDP has been the only area in Malawi where the Customary Land Development Act (1967), the Registered Land Act and the Local Lands Board Act have been applied for the benefit of smallholders. The smallholders have indicated strong approval of the scheme with the security it has given to family units in the face of increasing land pressure. It is perhaps too soon to evaluate fully the impact of such a programme, but already it is evident that the growth of rural trading centers has been stimulated with the issue of over 400 leases for small scale industries and stores. It would seem that the success of this programme has stimulated the concept of a Rural Growth Center project on a national scale.

5.10 Research and Trials - This unit conducted crop trials on an agency basis for the national research programme since no project specific trials were indicated at appraisal and also since the post of Senior Research Officer remained vacant throughout Phase III. Consequently the results of the trials programme were not made available to management until 1979 (see Annex IV(d)) following the arrival of a British volunteer.

5.11 Forestry - Whilst meeting the appraisal requirement, more woodlots could have been established. Enough seedlings were raised by the Forestry component to cater for 700 hectares of smallholder plantations. Many seedlings did not establish because of late planting which was caused by competition for family labor from staple and cash crops. Where *Gmelina* species, in particular, were planted and open to goat browsing, severe damage reduced the established area. Once woodlots were satisfactorily established little attempt was made by farmers to follow up a program of woodland management year by year; instead the only operation was a sporadic cutting of stems. The two most common faults evident were: failure to thin the woodlot in time and failure to thin the resulting coppice shoots after felling the original stem.

5.11.1 Smallholders devoted insufficient attention to woodlot establishment even though the supply of wood for the construction of houses, cattle stalls and tobacco barns as well as for domestic and tobacco curing became increasingly reduced during Phase III. The lack of forestry extension follow-up was probably a root cause of this problem.

5.12 Staff Training - In addition to the programme of regular refresh training courses for junior staff at the Staff Training Center (paragraph 4.3.11), considerable emphasis has been placed on specific staff training at all levels. This took the form of in-service training, external training elsewhere in Africa and overseas.

5.12.1 Training for management assistants was also arranged within the Programme. During the period of this report, eight senior officers spent a minimum of eighteen months on management assistant and other training programmes. Of these, two have since filled posts of Project Managers, one as Assistant Project Manager, two as Assistant Regional Agricultural Officers and one has assumed a senior post in Ministry headquarters. The remaining two are at present overseas undergoing further training. Other staff members from LLDP have also been promoted to take up responsible positions in other departments and institutions within the Ministry of Agriculture and Natural Resources and other Ministries.

5.12.2 In addition, ten senior officers attended (through LLDP efforts) the course in Swaziland in Planning and Control in Agricultural Management and twelve senior officers attended various other seminars and training courses in countries overseas.

5.13 Social Impact - At the onset of this Development Programme, weaknesses in what may be called the private economy were clearly evident throughout the area:

- (a) the purchasing power of the rural people was weak;
- (b) marketable surpluses were small;
- (c) private entrepreneurs were few;
- (d) markets were dispersed;
- (e) distribution points were few and stocks limited.

5.13.1 The establishment of Unit Centers by the Programme for these services have provided a sound starting point. Here was an area of land, agreed upon by the people, for entrepreneurs, shopkeepers, craftsmen, etc., to establish themselves. They did so with their own private investment and were soon beginning to supply a wide range of materials and services. It is accepted that many of their major transactions are undertaken only during peak crop or livestock marketing seasons. But they are already offering many opportunities and services which were not previously available.

5.13.2 Committee structures have been based at these service centers with representatives from all walks of life. They discuss freely their achievements and ambitions, also policy, their problems and they suggest remedies for these and propose new ideas.

5.13.3 Greater job opportunity is provided and, with the teaching at health facilities based at these centers, basic eating diets have improved considerably. The centers also provide commercial and recreational areas for development resulting in diminishing flow to the larger urban areas.

5.13.4 A strong awareness for the necessity of improving housing has been created but has not yet been finally resolved. This is understandable because of very strong traditions and custom.

5.13.5 The complexity of the integrated system has increased the awareness of education and has led to the request for adult literacy programmes.

5.13.6 This approach has provided the framework, by liaison with other Departments and Ministries through the farmers' own efforts, to form a basis for introducing rural industry opportunities. Many additional skills which have been acquired by farmers and staff members have been introduced into other areas of the country as they have moved on to other forms of employment, or when visiting relatives and friends.

5.13.7 LLDP has developed a valuable partnership with the urban development of the new Lilongwe Capital City. Again, the benefits of an integrated approach are numerous yet extremely difficult to quantify. This approach of LLDP has followed Government's plans and objectives and so far has gone a long way to achieving them.

## 6: FINANCIAL PERFORMANCE

6.1 The total cost of Phase III amounted to some MK11.41 million compared with the appraisal estimate of MK10.1 million. The sources of finance towards this cost compared with those planned at appraisal were as follows:-

<u>Source</u>	<u>Appraisal Plan</u> (MK million)	<u>Actual Result</u> (MK million)
I.D.A.	7.1	7.31
U.N.C.D.F.	1.3	1.40
Malawi Government	0.8	1.29
Farmers	0.2	0.27
Dzalanyama Ranch	0.2	0.44
ADMARC	<u>0.5</u>	<u>0.70</u>
Total	<u>10.1</u>	<u>11.41</u>

6.2 Withdrawal of the IDA credit (550-MAI) and the UNCDF grant resulted in 4 per cent more Malawi Kwacha than anticipated at appraisal due to a strengthening of the US dollar from an expected exchange rate of (MK) 0.83 to 0.86 actual average. For details see Annex VI (a).

6.3 The Malawi Government contribution amounted to much more than was intended at appraisal. It was more than 61 per cent higher than estimated. The main reason for this increased contribution was that the Treasury accounting procedures for drawdown of the loan did not fit the intended pattern at appraisal. The 15 per cent local contribution (to complement IDA's 85% contribution and excluding ADMARC) was to have been made up from Government (two thirds) and from farmers and ranch revenues (one third); but the Treasury claiming procedure did not allow for reimbursement of the expenditure. Reimbursement related only to expenditure on Government account. With Dzalanyama revenues and farmers' contributions retained for re-use within project account, then a complete drawdown of the loan (IDA 85 per cent reimbursement) resulted in a Treasury contribution which was greater than would otherwise have been the case. As noted above, the increase was also due to the strengthening of the dollar which required more Kwacha expenditure to fully draw down the dollar loan.

6.4 The Farmers' Contribution to project finance was made up of interest and charges for seasonal and medium term credit (not 'deposits' as suggested by the appraisal document). This contribution was in the form of 'trading surpluses' made available to the credit fund.

6.5 The higher than anticipated contribution from Dzalanyama Ranch income was mainly the result of the extra year of project life (incomes received over four years instead of three years as planned at appraisal). There was also a considerably greater trading of stallfeeder steers than projected which tended to offset somewhat the lower culling performance. (See also 4.3.18 and Annex IV (h)).

6.6        Infrastrucutre development for markets and input facilities was estimated by ADMARC to have cost MK 0.7 million compared with the MK 0.5 million anticipated at appraisal.

6.7        Comparison of costs by Project Category (Tables at Annex VI(a)) indicates that the costs of Category III (Personnel and Operating) considerably exceeded the appraisal estimate and that the cost of civil works were less. These indications, however, are misleading as demonstrated in the tables of Annex VI (b) and (c). Personnel and Operating Costs were actually below the appraisal estimate (contingencies added) by MK 558,000 (Annex VI(b)). Civil Works added during Phase III (excluding ADMARC, Health and NRDP) amounted to MK 1.7 million more than is indicated by Category I of Annex VI(a). It is clear that the claims for IDA reimbursement were not correctly allocated between Categories I and III due to the fact that considerable expenditure was claimed under Category III before subsequent capitalisation to Civil Works in the assets schedule. This may be understandable from the point of view of drawing down funds before the subsequent financial postings on completion of works in progress, but it also demonstrates a weakness of IDA Category analysis for non-going monitoring or ex-post evaluation purposes.

6.8        A more detailed look at the table at Annex VI(b) indicates that total project operating costs amounted to MK 5.036 million compared with the appraisal estimate (contingencies added) of MK 5.864 million. This is a commendable performance considering that: (i) the actual costs covered a period of four years as against three years for the planned costs: (ii) in the fourth year (1978/79) the Extension and Credit administration components incurred added costs in areas outside of Phase III; (iii) maintenance costs (Building and Construction Component) included costs of maintaining infrastructures which were planned to have been maintained by Government revenue account; (iv) price escalations were above those envisaged at appraisal (see paragraph 6.11 and Annex VI(e)). Apart from these more general observations it is noticeable that operating costs for Earthworks (i.e. maintenance of conservation works) was considerably down on planned expenditure and the Health Component received much less operating funds than anticipated. On the other hand, the cost of operating Dzalanyama ranch considerably exceeded the appraisal estimate (see also Annex IV(h)).

6.9        The schedule of assets summarised at Annex VI(c) indicates that during Phase III an additional MK 3.9 million of fixed assets and equipment was added to Programme development, bringing the total for the entire life of the Programme to MK 9.5 million at cost, with a depreciated value (as at 30/9/78) of MK 5.2 million. Road facilities added in Phase III cost an additional MK 754,000; boreholes MK 390,000; conservation works MK 875,000; and buildings (including health) MK 1.1 million.

6.10       Quarterly reibursement of calim against the IDA loan fitted closely to appraisal forecasts with drawdown completed in the third quarter of IDA fiscal year 1978/79 as planned. (See Annex VI(d)).

6.11 Contingency allowances provided at appraisal were overgenerous in the case of Physical contingencies (5% staffing and 10% other costs, per annum) although of course the addition of a fourth year to the planned three year project would not have been possible without this generous allowance (see Annex VI(e)). No project specific index of input costs was maintained, but a summary of national price trend indices provides a comparison of actual price inflation against price contingencies allowed at appraisal. This comparison indicates that for all items except salaries and wages, the contingency allowed (compounded) did not keep pace with price inflation. In the case of building materials, prices jumped in 1976 and 1977 to levels considerably above the contingency allowance at a time when the bulk of the civil works programme was being implemented.

6.12 Generally, it was found that the funding of the project was more than adequate for implementation needs. This is evidenced by the fact that the project was able to continue for a year more than planned and at the same time adequately complete the infrastructure programme. The tight control of expenditure in the face of the difficulties outlined above (paragraph 6.8) should be highly commended; as also should the good standard of computerised cost-accounting maintained throughout the phase. With the minor (unimportant?) exception of that outlined in paragraph 6.7 above, all financial covenants were adequately fulfilled and no difficulties were encountered in the procedures for tendering or drawdown of funds.

## 7: INSTITUTIONAL PERFORMANCE

7.0 Institutional performance is here reviewed in four components: Performance of the Project itself, of the parent Ministry headquarters, of the parastatal marketing organization (ADMARC), and of the Donor agencies involved.

7.1 Performance at Project Levels - The organizational structure effected in Phases I and II continued in Phase III, an outline of which is given in Annex VII(a). Within each of the five divisions of the programme, individual section heads were responsible to their respective divisional chiefs who in turn were responsible to the Programme Manager.

7.1.1 Management organization - The size and diversification of this Programme made management no easy task. Manpower constraints were faced with many problems relating to procurement and supplies of inputs had to be overcome. Management continued none the less to implement the Programme with commendable efficiency. This is evidenced by the fact that in spite of having to overcome these considerable difficulties, the Programme has continued to be a showpiece for visitors within Malawi and from other countries, as well as an example for other rural development projects to follow.

7.1.1.1 In addition to the good informal links maintained between the five divisions of the Programme, formal management control meetings have been held every week in the Programme Manager's office. They have been attended by senior staff from the Credit, Marketing, Finance, Administration, Extension, Training, Research, Livestock and Evaluation Sections. Each meeting reviewed progress during the previous week and project policies were formulated

or adjusted and implemented according to the situation and requirement. The meetings were constructive, ensuring a team approach to management. Activities were well co-ordinated with the various sections being kept informed of policy and implementation details.

7.1.1.2 Management has been purposeful and displayed a considerable strength of leadership. As a result, many staff who have served in the Programme have gained invaluable training and experience. (See also Staff Training, paragraph 5.12).

7.1.2 Staffing - Large differences between staff required at appraisal and those actually in post, both at senior (STA and above) and junior levels, existed during Phase III. The following statistics are representative of the staffing situation from 1975 to 1979.

<u>Staff Ratio</u> <u>Appraisal:Project</u>	<u>Post</u>	
	<u>Senior</u> %	<u>Junior</u> %
Created:Appraisal	83	76
Filled:Appraisal	57	67
Filled:Established	73	75

7.1.2.1 A breakdown by division is given in Annex VII(a) Table (i). The number of posts established by Government differed from appraisal estimates, particularly in Divisions I and II and differences also existed between established and filled posts in Divisions I, II and III. It appears that the Extension and Administrative components enjoyed comparatively low vacancy rates at senior level whilst Division II, the Land-Use, Construction and Building component, experienced high vacancy rates at this level. Similarly at junior level the latter component was seriously hit by high staff vacancies. In comparison Accounts, especially the Credit Section, Extension and Administration were relatively fully staffed, but Evaluation, Land Allocation and Surveys all experienced large shortfalls at junior staff levels (see Annex VII). These shortfalls stemmed primarily from cumbersome recruitment procedures and a shortage of suitably qualified personnel at the conditions of service offered. These problems also affected other rural development projects in Malawi.

7.1.2.2 An important issue arising from the above discussion is that of staff motivation and performance in the various Programme components. Although the Building and Construction component faced severe staff shortages its performance surpassed appraisal expectations. The Extension component on the other hand, while enjoying a reasonably high staffing rate, seems to have failed to impart effective extension advice to encourage improved agricultural production. To some extent this may have been due to poor staff motivation, but the questionable economic attractiveness of the improved packages offered must also have been a factor limiting smallholder response.

7.1.2.3 In the formative years of the Programme, the number of expatriates employed was considerably more than during Phase III. In December 1972 some 31 expatriates were in post compared with 11 throughout Phase III. Including the Project Manager, there were eight expatriates in senior posts and three in the middle grades.



7.1.3 Administration - Division IV, the Administrative component of LLDP Phase III, was responsible in the main for personnel recruitment; the maintenance of an adequate store of clerical items and other equipment essential to the smooth running of the project; and the organization and maintenance of the Project's transport fleet.

7.1.3.1 With respect to personnel recruitment, LLDP followed Government procedures. As noted, those procedures are cumbersome and time consuming, slowing down and even impeding the replacement of essential staff. Had the project been free to advertise and subsequently employ staff, still within the guidelines of Government, then positions would probably have been filled more easily and efficiently.

7.1.3.2 Throughout Phase III no major shortage of essential stores, equipment or fuel were experienced. Transport in particular was not a constraint to project implementation. However, an over-use of vehicle power, especially four-wheel-drive, was noticeable. The following outlines the number of vehicles operational (including those from Phases I and II) on 31st March, 1979:

	<u>Number</u>
Four-wheel drive: Land Rover	63
Daihatsu	15
Saloon car	24
Pick-up truck	4
Lorries (cattle truck, trippers, etc.)	18
Tractor	3
Motor cycle	33

7.1.3.3 Not only were four-wheel drive vehicles expensive to run, but their effectiveness under difficult driving conditions were severely eroded by inexperienced drivers. Moreover, it is questionable whether the road conditions warranted the number of four-wheel drive vehicles used. Had more use been made of bicycles and motor-cycles and had saloon cars/pick-ups and four-wheel drive vehicles been issued more judiciously, operating costs might have been substantially reduced without adversely affecting project implementation.

7.1.4 The Financial Division (Division III) maintained adequate and regular records of expenditure by type for all project components. Management received detailed trail-balances at the end of each month and less elaborate breakdowns weekly. Vehicles and equipment were procured according to credit agreement standards on the basis of two tenders accepted from international competitive bidding. (See Annex VII (b)).

7.1.5 Reporting - Financial reports were sent to the Programme Manager (and to MANR) weekly. Section heads submitted to the Programme Manager, through their divisional chiefs, monthly and quarterly reports for collation into project reports. In addition the weekly formal meetings held between component heads and the Programme Manager served as a useful reporting system through which weekly details of project performance were discussed in depth. Towards the end of Phase III the Central Evaluation Unit of MANR produced a standard reporting format for all major projects in Malawi.

7.1.5.1 Some difficulty was experienced in compiling of this Completion Report, however, caused by incompatible reporting years. For example, financial records were geared to a year ending September 30, whereas project years ended March 31. Certain information, e.g. for livestock, has been maintained only be calender years.

7.1.6 Land Demarcation and Registration Many problems were encountered in the land allocation processes particularly disputes over who was the family head. Registration of land was delayed accordingly. Staff vacancies at senior level forced the section to place junior staff in supervisory posts which at times confused important issues; the training of Land Allocation staff did not go beyond the usual in-service training courses given to all project staff which probably accentuated poor motivation at junior levels. With respect to the issue of land tenure certificates to family units, the main problem was long delays in the preparation of the documents which were issued by the Commission for Lands.

7.1.7 Evaluation - During this phase the Evaluation Unit, together with the other major projects in Malawi, adopted a common survey design and computer program to monitor and analyse crop yields and associated management practices. This development followed the establishment of a Central Evaluation Unit at the headquarters of the Ministry of Agriculture and Natural Resources and an improved coordination of Evaluation Unit work programmes and methodology through an Evaluation Working Party.

7.1.7.1 Since the introduction of the above system in 1977/78, management has been provided with the results of the common survey conducted by this unit in a more timely manner than was previously experienced. However, it was felt that a more in-depth analysis of agro-economic conditions was warranted. To this end the unit introduced a full farm management survey to a sub-sample of the common survey respondents, with the assistance of the University of Malawi in the 1978/79 season. Data from this are not yet available.

7.1.7.2 A waekness of the Evaluation Unit performance was that it did not actively enourage improved record keeping by project components in the interest of developing an on-going monitor of component activity against t target plans.

7.2 Malawi Government Performance - As indicated in part 4 of this report, the Malawi Government fulfilled most of the conditions required for successful implementation in Phase III. There was an adequate control of procedure for reimbursement claims with detailed audited accounts maintained and made available to the donor agencies. Although it was necessary for recurrent account contribution by the Malawi Government to be assisted by drawings from the LLDP Credit Fund (see Annex IV(e), Table (i)), this was due mainly to an under-provision in the recurrent budget as a result of a project financial design which did not fit existing Treasury accounting procedure, and also the need for increased Kwacha contribution to draw down the inflated dollar laon. (See paragraph 6.3). In this context, cost inflation (see Annex VI(e)) coupled with an extra year of project life had considerable effect.

7.2.1 There were, however, two important areas where performance might have been better. These related to staff recruitment procedures and the phasing over of developed Units to revenue account.

7.2.1.1 The problem which the Project faced from inadequate staffing levels was outlined at paragraph 7.1.2. This relates both to the creation of posts as required by project design and also the filling of posts. Only 83 per cent of the senior and 76 per cent of the junior posts were in fact created, of the posts agreed at appraisal. This problem could only be overcome in the future by a liaison with the Department of Personnel Management and Training at the time of Project appraisal and negotiation, to avoid the necessity for their own separate assessment of project needs after negotiation has already been completed. Methods to circumvent the delays in recruitment should also be determined at the time of appraisal.

7.2.1.2 Although it was intended at appraisal that there would be a progressive hand-over of Developed Units (after five years) to Revenue account funding, this was in fact only partially achieved. It was not until April 1978 that the first hand-over of staff on Development account to Revenue account was effected (at a budgetted cost of MK 25,259 to September 30th, 1978). The maintenance cost of all (40) Units was also carried by LLDP Development account up to April 1978. Although contribution towards the cost of maintenance amounting to MK 13,600 was requested and negotiated for in 1977/78 in fact none was received from Revenue account. For 1978/79 MK 18,400 was requested for 23 Units and only MK 9,500 was received. Phase III funds therefore had to continue the maintenance and operating expenditure of virtually all Units previously developed.

7.2.1.3 In addition, although some 800 kilometers (240 Secondary and 560 District) of roads had been handed over to the Regional Engineer for maintenance by the end of Phase III, there still remained 1,800 kilometers of other roads which had been built and were still being maintained by the project. Much of these roads (classified as 'feeder') were of a standard which would not permit hand-over, leaving maintenance to be continued by the Programme or by poorly equipped local councils.

7.2.2 Two other points should also be noted with reference to performance. The first concerns the inter-ministry liaison committee which was supposed to function as a means of improving co-ordination to overcome project implementation problems. This committee did not function in Phase III, which is unfortunate, since some of the problems outlined in this PCR could probably have been overcome. The second concerns the Dzalanyama Ranch Advisory Committee which also did not function on a formal basis. Some of the problems highlighted in Dzalanyama ranch management and planning could perhaps have been overcome by a more formal liaison.

7.2.3 As detailed under Article III of the Credit Agreement document (550-MAI) there were a number of agreed recommendations for execution of the Project by the Government.

7.2.3.1 Sections 3.01 through 3.04 were fully completed without problem.

7.2.3.2 Section 3.05 - the posts of Programme Manager and Financial Controller were adequately filled throughout, but that of Principal Agricultural Officer was filled for only part of Phase III.

7.2.3.3 Section 3.06 - the Project liaison committee did not function effectively during Phase III.

7.2.3.4 Section 3.07 - a revised detail of proposals for continuation under Revenue Account after the Project was prepared. (See Annex III (b)).

7.2.3.5 Section 3.08 - a Senior Medical Officer was appointed but the health subcentres and health posts were not adequately staffed during the phase.

7.3 ADMARC Performance - The greater bulk of the benefits envisaged at appraisal were centred on the provision of inputs and marketing facilities to smallholders. The Programme was responsible for the credit institution whilst marketing was organized by ADMARC. The credit facilities extended undoubtedly allowed for improved agricultural production by project participants but the full potential of the Programme's efforts was eroded by ADMARC's failure to provide enough seasonal inputs on time.

7.3.1 The marketing section of the Programme being autonomous with ADMARC, provided timely marketing intelligence to Programme management at weekly meetings (see paragraph 7.1.1.1). Thus constraints in the marketing system were quickly identified by management who related the information to ADMARC. However, due to logistical constraints, the marketing organization was not always able to make the necessary adjustments.

7.3.1.1 ADMARC did not manage to provide enough seasonal inputs (improved seeds and fertilizers) or at the time required for smallholders to adopt the extension recommendations correctly. Had the required quantities of input been available before the planting period in each cropping season, then all indications are that incremental production of maize and groundnuts predicted at appraisal could have been appreciably surpassed. As it was, a large proportion of seasonal inputs arrived well after the planting period. Moreover problems were experienced by ADMARC in the marketing of smallholder produce, which resulted in considerable congestion at many markets during the crop purchasing periods. Many of the problems could have been overcome had ADMARC managed to bring inputs to unit markets at the time of transporting their produce back to depots. (See also paragraphs 4.3.15.2 and 4.3.15.1.).

7.3.2 In view of these difficulties which seem to be of recurring nature, a study by ADMARC of ways to improve the logistics and administration of its facilities would seem appropriate.

#### 7.4 Donor Agency Performance

7.4.1 The appraisal document (652-MAI) provided a very adequate basis on which to formulate component budgeting and the overall implementation of the Programme. It was easy to follow and gave a clear indication of project objectives and targets. This greatly assisted the monitoring of on-going performance and the compilation of this PCR. It is considered particularly important that an appraisal document should provide this comprehensive guideline to

project implementation. Targets should be clearly specified in detail for the entire phase. Only by constant reference to such a basic document can annual work plans maintain a continuity with overall project objectives.

7.4.2 During project implementation, the donor agencies provided six supervision missions for the general project and two specifically for the health component. A total of approximately 32 man days was spent at the project on supervision. Most of the problems highlighted in this PCR were identified and discussed at supervision round-up meetings, in particular those relating to pricing and the cost of inputs, crop yields and plant populations, seed supply, staff vacancies and the transfer of Developed Units to Revenue account. In addition the supervision mission for the health component stressed the need for making measles vaccine available and further investigation into bilharzia control measures.

7.4.3 Generally, although project management reported that total man days provided in supervision were fewer in Phase III than for earlier phases (smaller teams) it would appear that, with the serious exception of Ranch Management (see Annex IV(h)) donor agency performance was entirely adequate considering the high standard of the Programme's own management control.

## 8 : RATE OF RETURN

8.1 As indicated in parts 4 and 6 of this report, Programme activities (and hence costs) during Phase III were not related solely to the new areas under development. The benefits attributable to increments earned in the new areas covered by Phase III do not therefore fully reflect a return to project costs.

8.1.1 In view of this and also the limited value that would be gained from an ex-post analysis of Phase III costs and returns in isolation from the total Programme design, (the original Malawi Government project submission in 1968 formed the basis for a thirteen year programme) it has been decided to present an economic rate of return calculation on the basis of the entire three-phase programme.

8.2 Comparison of Phases I to III results against a 'without-project' situation requires certain assumptions relating to crop area and yield situations which would have developed from the basic agro-economic environment prevailing at the beginning in all areas covered by the programme. Reference to background data for the first project submission for Lilongwe Plain would seem to indicate a situation which was already experiencing problems of land degradation and erosion in the face of new economic and social pressures brought about by the development of the Capital City of Lilongwe. The need was to stabilise the rural population, conserve the soil resources and raise crop yields and incomes to more viable levels. The danger of a decline in soil fertility and yields without a project was emphasised.

8.2.1 On the basis of this background (and survey baseline data obtained between 1968 and 1971) it is reasonable to assume that the cropping pattern in a 'without project' situation would have emphasised continued expansion of subsistence and food crops into more marginal land resources to fill the joint needs of increased population pressure and declining yields. For the 'without project' situation therefore, the area of maize and 'other crops' is assumed to increase at two per cent per annum. The area of tobacco and groundnuts is assumed to decrease by two per cent per annum thus releasing land to the basic subsistence crops. This trend would continue to the maximum estimated arable area of 245,000 hectares. With soil erosion and declining fertility, and an increased pressure to move into more marginal land, it can be assumed that maize and groundnut yields would probably have shown a declining trend of two per cent per annum; and yields for tobacco and 'other crops' would have remained constant. (See Annex VIII (a) Tables (i) and (ii).)

8.3 Against this 'without project' assumption the incremental production for crops as a result of Programme activities is obtained on the basis of three time series as follows:

8.3.1 The first relates to the seasons 1968/69 to 1976/77 inclusive when Units under the direct influence of Programme activities did not encompass the entire final Programme area. Since the Evaluation Unit had continued to collect crop yield data both within and outside the Units under development (see Table 5.5

under Project Impact) then incremental production for this time series was calculated as crop areas in Units included under development (see 2.5 under Background) multiplied by the difference in yield between these Units and those not yet covered by the Programme. (Annex VIII(a), Table (i) and the first part of Table (iv).)

8.3.2 The second time series relates to the years during Phase III when Programme activities had reached all Units (1977/78 and 1978/79). For these two years incremental production has been calculated as the difference between actual production figures and those provided by the 'without project' projection (8.2.1). (See Annex V(a), Table (i) and Annex VIII(a), Tables (ii) and (iv).)

8.3.3 The third time series relates to a comparison of future projection (1979/80 to 1998/99) for a with and without project situation. Following Phase III it is projected that the Programme inputs have set a trend which would provide maize production increases made up of a two per cent area and one per cent yield increase on the average per annum. Due to quota and fuel-wood restrictions, tobacco area is projected to decrease by one per cent per annum with yield constant. The area and yields of groundnuts and other crops is projected to remain constant. These projections fall within the estimated total available land for arable cultivation (70 per cent of gross Unit areas) of 245,000 hectares. Incremental production in this time series is then taken as the difference between this projection and the projections in 8.2.1. (See Annex VIII(a), Tables (iii) and (iv).)

8.4 It should be noted here that this calculation of incremental crop production clearly takes account of increments in tobacco production. As has been noted (see under Project Impact) tobacco received emphasis under project extension and credit facilities. Although this pattern was not intended at appraisal (emphasis was on hybrid maize and groundnut) it is considered incorrect to exclude the benefits from tobacco which clearly resulted from the inputs of this programme.

8.5 Other benefits included in the analysis were derived from forestry (woodlots), Dzalanyama ranch, the stallfeeder programme, dairy and poultry programmes.

8.6 Historical project costs (1968/69 to 1978/79) have been taken from previous records (Reference 11) inflated to 1978/79 prices by the Blantyre low income cost of living index. The costs for the following Phase III components were considered to have had a direct bearing on benefits and were therefore included in the analysis: Management, Administration, Building and Road Maintenance, Financial Control, Extension, Training, Livestock, Credit Administration, Marketing, Rural Development, and Evaluation. The cost of drugs utilised in the Health component was also included. Dzalanyama ranch costs were already accounted for in the benefit calculations for that component (Annex IV(h), Table (iii).)

8.6.1 Projected costs of services required to maintain the calculated flow of benefits included Extension, Training, Livestock, Credit Administration, Marketing, Rural Development, and Evaluation, plus the average cost of drugs used in the Health component all on the basis of the full average annual

operating cost for these components in Phase III. To this was added an allowance for maintenance of fixed assets at 2-1/2 per cent of total (at cost) value. (See Annex VI(c).) An allowance for Management, Administration and Financial Control costs was also included on a proportionate basis.

8.7 The Economic Rate of Return for the three phases of this Programme was calculated on this basis as 25 per cent over a total period of thirty years (1968/69 to 1998/99) or 24 per cent over twenty years (1968/69 to 1988/89). Details of this cost and benefit calculation are given at Annex VIII(c).

## 9 : DISCUSSION AND CONCLUSIONS

9.1 On the basis of the analyses of Impact (Part 5) and Rate of Return (Part 8) both the Phase III project and the entire Programme (Phases I to III) appear to have been highly successful. To a very large extent the favourable rate of return has been due to an emphasis by extension and the credit facility on smallholders' tobacco enterprise. Although this was not the original intention of the Programme (which emphasises maize and groundnuts) it was the correct approach in the circumstances. Tobacco production provided a better return both to smallholders and to the economy; tobacco growers were obviously more motivated and receptive to improved agronomy as a result. The same could not be said of maize and groundnuts; maize returns were blunted by a continued shortage of hybrid seed (and high input costs); groundnut yields did not reach the levels forecast due to poor plant populations and no application of sulphur dust (perhaps it was difficult for the smallholder to accept groundnuts seriously as a cash crop).

9.2 Particularly in the case of groundnuts, producer prices paid by ADMARC seem to have had some effect on the proportion of land which smallholders allocated to the main crop alternatives. (Annex V(a) gives a comparison of actual crop hectares).

9.2.1 The actual average prices paid by ADMARC, at their markets serving LLDP smallholders, have been as follows:

### Average Prices Paid\*by ADMARC in LLDP (tambala/lb)

<u>Smallholders Crop Year</u>	<u>Cured Tobacco</u>	<u>Shelled Groundnuts</u>	<u>Shelled Maize</u>
1973/74	9.51	7.13	1.25
1974/75	11.72	7.18	1.75
1975/76	13.36	7.86	2.25
1976/77	15.25	8.42	2.25
1977/78	19.32	9.33	2.25
1978/79	18.89	14.17	2.25

\* Note: Calculated as Total Value of purchases divided by Total Quantity for each crop.



9.2.2 A comparison of these prices in index form with indices for prices of smallholder fertilizer and the Lilongwe low income cost of living is as follows:

Price and Cost Index Comparison in LLDP

<u>Smallholders</u> <u>Crop Year</u>	<u>Crop Prices to Smallholders</u>			<u>Fertilizer</u> <u>Cost to</u> <u>Smallholders</u>	<u>Lilongwe Low</u> <u>Income c.o.l.</u> <u>(N.S.O.)</u>
	<u>Tobacco</u>	<u>Groundnuts</u>	<u>Maize</u>		
1973/74	100	100	100	100	100
1974/75	123	101	140	248	120
1975/76	140	110	180	248	126
1976/77	160	118	180	188	134
1977/78	203	130	180	216	141
1978/79	198	199	180	216	157

Considering that crop and fertilizer prices are announced in advance of the planting season (tobacco bonus payments have been added here) comparison of these indices with cropped areas (Annex V(a) ) is revealing. With cost price relationships moving against groundnuts and maize, then tobacco was the crop which smallholders favoured increasingly during Phase III. This pattern has been reversed in the final year when prices offered for groundnuts rose sharply.

9.2.3 Some further comparisons on cost price relationships are also presented here in the form of smallholders' groww margins. These are compared for the crop seasons after conversion to a constant level for purchasing power of the Kwacha as follows:

A Comparison of Gross Margins at Constant Yield Levels Converted to  
1978/79 Values (Kwacha per hectare) 1/

<u>% of total cropped</u> <u>area in 1978/79</u>	<u>Tobacco</u> <u>Improved</u>	<u>Groundnut</u> <u>Unimproved</u>	<u>Local Maize</u> <u>Unimproved</u>	<u>Maize Hybrid</u> <u>with Fertilizer</u>
	15%	15%	58%	5%
<u>Crop Year</u>	(K)	(K)	(K)	(K)
1973/74	94	47	46	71
1974/75	51	43	58	75
1975/76	75	47	71	127
1976/77	123	49	67	136
1977/78	154	54	64	122
1978/79	130	82	53	102

1/ Based on the 1978/79 Gross Margin calculations in Annex V(e) adjusted for each year for changes in fertilizer price and crop producer price levels. The current gross margins for each year then adjusted to 1978/79 value by the Lilongwe low income group cost of living index.

These comparisons further emphasise the more favourable economic 'climate' for tobacco production compared with the other two major crops during Phase III. A move of economic 'forces' against the value of return to maize production is also evident.

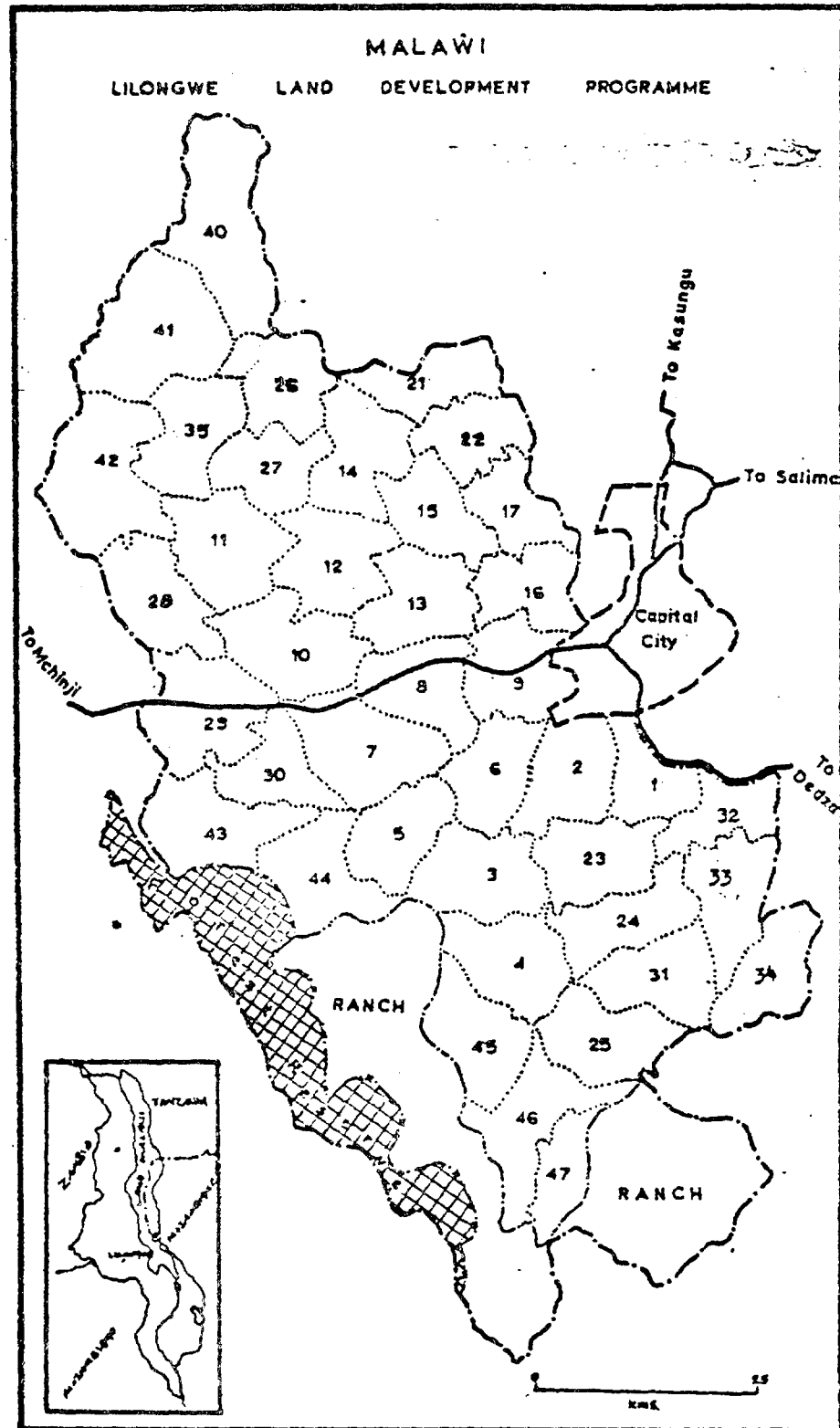
9.2.4 This brief analysis will, it is hoped, serve to encourage an understanding by those recommending future price policies, that smallholders in Malawi do respond to price incentives and do compare returns between alternative crops.

9.3 The poor financial performance of Dzalanyama ranch was a subject of discussion at NRDP appraisal. This is also particularly disconcerting since the long-term future of the ranch was originally suggested as being to hand it over for commercial enterprise. Pressures to increase the breeding herd and even to adjust national beef price levels to suit the ranch, have been the result. An overriding consideration must be the fact that the ranch lies within a forest reserve and, more important, forms a large part of the catchment for Lilongwe urban water supply. Under the inadequate level of ranch management that has existed from a point of view of economic efficiency and ecological understanding, it would be entirely inappropriate to continue the build-up of the herd or even to adjust official prices to suit the existing cost structure (see also Annex IV(h) and in particular the discussion at paragraph 4: Achievements).

9.4 Conclusion - Has it been worth it? Apart from the considerations of government cash flows and rates of return and the like, was the NK24 million and all the concentration of effort worth spending on the Lilongwe Land Development Programme? Reference has already been made to the fact that the Programme has been regarded as a showpiece. It is clearly more than that. Apart from the fact that it was a well conceived integrated programme, developing within a firm base of local support, this Programme has clearly fitted the context and balanced the needs of development at a critical time in the history of Malawi.

9.4.1 In too many developing countries the growth of urban centres has resulted in a disproportionate movement of population from the land. Agricultural pursuits and the qualities of rural life have been forsaken for the mirage of easy money in town. A reduced influence of family and social structures and high unemployment have resulted in a crisis of expectation and unrest. The benefits of the Lilongwe Land Development Programme in this context would appear to be enormous. It has provided an essential stability and given the rural community some pride in their agricultural pursuit. It has enabled a more controlled urban growth of the adjacent new capital city (Lilongwe). It has helped raise the status of the Central Region to that of a dependable maize granary to ensure national self-sufficiency.

9.4.2 In this Programme the concept of integrated rural development, combining finance with the energy of the people, under an efficient and controlled system of management, can be seen to be succeeding. This within the constraints of a country which is relatively new on the ladder of development and within the structure of a strongly traditional social milieu, is surely noteworthy. Within this overall context, the relatively minor problems of implementation outlined by this Completion Report, can be viewed in their true perspective.



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Lilongwe Land Programme : Phasing of Development

The timing of Unit Development over the three phases thus far completed was:

<u>Development</u>	<u>Total Developed Units (Cumulative Number)</u>	<u>Total Area Developed (Cumulative hectares)</u>	<u>Total Farm Families (Number)</u>
<u>Phase I</u>			
1968/69	2	13,949	8,266
1969/70	5	35,349	15,685
1970/71	9	70,507	27,338
1971/72	14	111,291	38,795
<u>Phase II</u>			
1972/73	17	135,769	46,984
1973/74	23	194,286	61,562
1974/75	30	262,373	77,210
<u>Phase III</u>			
1975/76	32	282,850	82,603
1986/77	38	333,637	99,954
1977/78	40	347,882	106,490
1978/79	40	347,882	108,000

ANNEX III (a)

Extract from Development Credit Agreement 550-MAI  
2-19-75

SCHEDULE 2

Description of the Project

The Project is the three-year final phase of the Lilongwe Land Development Program, a long-term program for the development of infrastructure and the improvement of smallholder agricultural production of the Program Area. The project consists of the following parts:

Part A: Land Development

- (i) The construction of about 265 miles of earth roads.
- (ii) The drilling and equipping of about 145 boreholes.
- (iii) The construction of about 1,000 miles of drainage ditches, about 160 miles of waterways and demonstration ridges.

Part B: Land Reorganization and Registration

- (i) The survey and demarcation of land holdings on about 200,000 acres.
- (ii) The registration of land holdings on about 270,000 acres.

Part C: Unit Centers, Marketing and Storage Facilities

- (i) The construction by LLDP and the Geological Survey Department of MANR of about 15 Area Unit Centers, each consisting of offices, staff housing, roads, conservation works and a borehole.
- (ii) The construction by ADMARC of an agricultural input store with a 380 ton fertilizer storage capacity for each of the Area Unit Centers referred to in paragraph (1) of this Part.
- (iii) The construction by ADMARC of permanent produce markets, each consisting of facilities for weighing, grading and bulk-ing produce, storage facilities, offices and staff housing for about seven of the Area Unit Centers referred to in paragraph (1) of this Part.

Part D: Extension, Training and Credit Services

- (i) The provision of intensive agricultural extension services and training services for LLDP staff at the LLDP training school in Lilongwe and for farmers and their families at Nsaru and at the Area Unit Centers referred to in Part C (i) of the Schedule.
- (ii) The provision of seasonal, short-term and medium-term credit to farmers.

Part E: Livestock Development, Dairy Development and Poultry and Egg Production

- (i) The continued development of the Dzalanyama Ranch to provide farmers in the Program Area with upgraded feeder stock for stall feeding and breeding heifers for dairy development.
- (ii) The expansion of a stall feeder program, including the provision of credit, extension services and artificial insemination services, to provide farmers in the Program area with about 4,000 cattle.
- (iii) The establishment of a dairy development program, including the provision of credit and extension services, which would include about 60 farmers.
- (iv) The establishment of a poultry and egg production program, including the provision of credit and extension services, which would include about 120 farmers.

Part F: Health Facilities

- (i) The construction and equipping of about five health sub-centers and about 20 health posts.
- (ii) The improvement of about two primary health centers, one health sub-center and about five health posts.

Part G: Project Evaluation and Future Project Preparation

- (i) The carrying out by the Program Evaluation Unit of field surveys and the processing and analysis of data obtained therefrom.
- (ii) The carrying out by MANR of such activities as agro-economic surveys, land resource surveys and crop trials to assist the Borrower in preparing the NRDP.

Part H: Administrative Services and Support

- (i) The provision of administrative services by LLDP.
- (ii) The purchase, utilization and operation by LLDP staff of vehicles, machinery and equipment.

Treasury letter outlining proposals for transfer to Revenue Account

Ref. 28/7/37/4/111/57

22nd December, 1976

J.D. Roulet, Esq.,  
Chief of Country Programs Division  
Eastern Africa Regional Office,  
International Development Association  
1818 H Street, N.W.  
Washington, D.C. 20433, U.S.A.

Dear Sir,

Credit 550 - MAI Article III - Section 3.07  
of the Loan Agreement for Lilongwe Land  
Development Programme (Phase III)

We refer to Article III Section 3.07 of the Loan Agreement for the Lilongwe Land Development Programme (Phase III). The Malawi Government's proposals for follow up on arrangements after the completion of the Lilongwe Land Development Programme (LLDP) in December 1978 are as follows:-

We envisage that under the National Rural Development Programme, (NRDP) the LLDP Management Unit will become responsible for a much larger geographical area namely the Lilongwe Agricultural Development Division which is envisaged as covering the whole of Lilongwe and Mchinji Administrative Districts, Dedza Administrative District excluding the Lakeshore area, and possibly, as a temporary measure until the Ntcheu Management Unit is set up, that part of Ntcheu Administrative District not covered by the Bwanje Valley development programme. It will become in fact one of the ten Agricultural Development Division Management Units envisaged under the NRDP and its establishment will be modified as necessary to fit into the NRDP context.

The basic management unit consisting of central supervision, planning and evaluation, credit fund management, accounting, maintenance and transport, and the extension and training services for the Lilongwe Land Development Programme area, will have to be reduced to the order of K500,000 per annum (currently the project's operating costs are nearer K1 million per annum) and to this will be added the revenue account facilities available for the rest of the geographical area controlled and the finances are made available for specific development programmes under NRDP, e.g. Thiwi/Lifidzi.

It is envisaged that as far as extension staffing level is concerned three of LLDP's units will be amalgamated to form one Ecological Planning Area (EPA), the basic unit of NRDP, and trained senior staff of Technical Officer (TO) and Senior Technical Officer (S10) level so released will become available to implement new NRDP projects. Fewer junior staff will become available for transfer as it is proposed to maintain all the unit



ANNEX III (b) Cont'd

centres identifying of each group of three as a parent or EPA centre, the other two becoming rather higher class satellite markets than can be provided elsewhere.

The LLDP Credit Fund will become the credit fund for the Lilongwe Agricultural Development Division (ADD), the existing funds being used primarily for the farmers in the LLDP area, but being increased by the credit funds being made available for other projects or settlement schemes in the ADD, and by any booster tranches of general credit funds that may be negotiated from time to time. It is Government policy to encourage cash sales where possible and to disburse credit, where necessary, on a group basis to reduce overhead costs. The main function of the credit fund management is to ensure that necessary inputs are available to the farmers in adequate quantities, at the right time, within easy reach, on credit if need be, but with a substantial discount for cash.

The land husbandry planning, research and evaluation units will assist in the preparation and execution of new NRDP programmes within the ADD. These include special programmes for Dedza North, Mchinji South, Dedza East and Mchinji North (probably implemented in that order) together with the extension of modified input area benefits to the rest of north-eastern Lilongwe District not so far covered by the LLDP or Mpeni programmes.

The construction unit will be modified to suit the needs of NRDP and will probably become the Central Region construction facility financed from new NRDP projects, and helping the Ministry of Works and Supplies to maintain roads, field structures and buildings when not needed for new developments.

Responsibility for the maintenance of feeder roads is being gradually taken over by the Ministry of Works and Supplies, acting as the agent of the District Councils. Maintenance of buildings will become the responsibility of the Ministry of Works and Supplies in the bigger centres and of the ADD Management Unit in the remoter areas.

Field structures such as drains will be maintained as far as possible on a self-help basis by the villagers, assisted in the case of serious damage by the ADD construction unit.

ADMARC will continue to run markets, improve facilities of the provision of farm inputs as necessary, and assist with the collection of seasonal credit.

Boreholes are being handed over to the District Council which will arrange maintenance finance with the Ministry of Local Government, which will in turn pay the Wells Maintenance Service of the Ministry of Agriculture Resources to carry out necessary repairs and maintenance. This is normal Government procedure.

The structure of liaison committees will be retained, and the system spread to the rest of the ADD.

A special request will be made for continued finance for the Land Allocation and Survey Units to continue their work under the umbrella of NRDP

ANNEX III (b) Cont'd

for so long as it is considered desirable by the community.

In order to cover the period during which the LLDP Management Unit and project area will be fitted into the overall scheme of the NRDP, we propose a small three or four-year consolidation LLDP (Phase IV) of a rather smaller cash value as has also been suggested for the Shire Valley Agricultural Development Project. This will provide finance for the continuation of the Survey and Land Allocation Units, the 'development' costs of these units brought into LLDP in recent years until they have completed their four-year development phase and can be taken back onto Revenue Account, and the continuation of key management units for the Lilongwe Agricultural Development Division until these can be transferred by stages to the Recurrent Budget of the Ministry of Agriculture & Natural Resources.

Table 13)

HEALTH FACILITIES AND PERSONNEL - 1979  
IN LEP HEALTH CENTRES - 1979

407021 10 11

UNIT	HEALTH FACILITY	VETERANSHIP	NAME	STAFF AVAILABLE	STAFF NOT EMPLOYED	AVERAGE NO. OF PATIENTS PER MONTH	AVERAGE NO. OF PATIENTS GIVEN PER MONTH										S/S	AVERAGE NUMBER OF		
							SMALL PUP	B.C.U.	D.I.			D.I.			D.I.	D.I.		D.I.	ATTENDANCE PER MONTH	DELIVERIES PER MONTH
									1st	2nd	3rd	1st	2nd	3rd						
1	Health Post	Govt.	Chitame	Nil	1 MW	266	49	65	123	59	10	0	34	16		794	105	-		
2	"	"	Chivenga	Nil	1 MW	215	55	54	55	40	41	81	24	5		463	35	-		
3	H. Hosp.	Dist.	Malinguwa	1 MA, 2N/MW, 2CA, 1S	1 MA	87	36	36	39	39	86	20	14		449	131	35			
4	Health P	Govt.	Dickson	1 MW	-	56	78	71	39	35	48	16	13		527	190	36			
5	Health P	Govt.	Librilla-ajusi	Nil	1 MW	388	46	64	83	49	32	79	26	4		642	207	-		
6	Health P	Govt.	Kalima	Nil	1 MW	200	68	80	96	58	37	74	26	2		651	109	-		
7	Health P	Govt.	Likuni	Doctors, nurses, servants, N.M.		2683	45	74	83	59	30	56	21	5		987	127	161		
8	Health P	Govt.	Namole	Nil	1 MW	709	76	66	62	47	34	51	24	1		209	48	-		
9	Health P	Govt.	Mpiaga	Nil	1 MW	699	58	50	44	54	20	80	32	18		844	178	-		
10	Health P	Govt.	Chitodwa	1MA, 3N/MW, 4S	1 MW	4369	50	67	67	42	13	58	22	14		749	35	83		
11	Health P	Govt.	Chilasa	Nil	1 MW	288	39	47	52	31	21	45	14	11		500	102	-		
12	Health P	Govt.	Mg'ambe	Nil	1 MW	200	29	33	45	26	8	24	7	5		501	48	-		
13	Health P	Govt.	Namole	1MA, 1N/MW, 3S	1MA, 1MW	11336	107	230	191	76	27	127	43	15		720	233	51		
14	Health P	Govt.	Chipukwa	Nil	1 MW	276	20	37	80	19	9	80	22	5		275	79	-		
15	Health P	Govt.	Namole	Nil	1 MW	200	36	57	62	39	10	50	12	5		430	34	-		
16	Health P	Govt.	Dike	1MA, 1N/MW, 3S	1MA, 1MW	1785	115	150	141	78	4	100	13	3		215	70	17		
17	Health P	Govt.	Buli	Nil	1 MW	286	45	28	60	36	7	31	27	5		452	190	-		
18	Health P	Govt.	Mgungwa	Nil	1 MW	200	12	30	23	8	1	41	20	3		239	28	-		
19	Hospital	Dist.	Namole	1MA, 2N/MW, Servants	(Mq)	150	156	103	25	14	64	14	1		386	428	45			
20	Health P	Govt.	Mgungwa	Nil	1 MW	200	16	71	49	22	5	15	5	1		179	189	26		
21	Health P	Govt.	Mgungwa	Nil	1 MW	200	70	102	100	47	9	6	3		256	98	-			
22	Health P	Govt.	Mgungwa	1MA, 2MA, 1N, 1S, 4N/MW, 4S		3562	76	104	120	21	24	44	16	6		409	391	71		
23	Hospital	Dist.	Mgungwa	1MA, Servants	(Mq)	34	32	55	10	10	41	11	6		82	51	53			
24	Health P	Govt.	Bugala	1MA, 1 S/MW		1524	3	1	9	3	1	11	8	4		58	-	-		
25	Health P	Govt.	Kampini	Nil	1 MW	200	56	47	73	42	9	8	13	15		463	127	-		
26	Health P	Govt.	Chikwa	1MA, 1N/MW, 2S	1MA, 1MW	1963	64	91	93	18	1	102	4	6		488	160	41		
27	H. Hosp.	Dist.	Malinguwa	1CG, 2MA, 3N/MW, 4S		4624	35	79	50	30	16	19	12		511	302	92			
28	Health P	Govt.	Nyanja	2MA	1 MW	288	72	88	116	62	54	31	18	13		516	112	-		
29	Health P	Govt.	Chilasa	2MA, 1S, 1N/MW	15CII, 1MW	6479	158	121	69	59	46	58	30	37		1030	236	-		
30	Hospital	Dist.	Namole	1 Doctor		32	96	55	16	8	46	7	1		202	108	127			
31	Health P	Govt.	Mgungwa	1MA, 1MA, 1N/MW, 3S	1 MW	1969	139	143	111	91	27	97	41	31		559	184	32		
32	Health P	Govt.	Namole	1 MW		-	-	-	-	-	-	-	-	-		-	300	17		
33	Health P	Govt.	Namole	1MA, 2N/MW, 1MA, 2S	1 MW	3505	195	283	283	82	52	216	54	14		1268	216	66		
34	Health P	Govt.	Chedza	Nil	1 MW	200	67	33	20	11	5	28	1	1		540	26	-		
35	Health P	Govt.	Kachela	1MA, 2N/MW	1MA, 1MW	4550	162	180	208	8	4	49	2	1		373	151	21		
36	Health P	Govt.	Khangul	1MA, 2N/MW, 2S		760	47	76	66	41	46	22	29	35		436	224	35		
37	Health P	Govt.	Chikwa	Nil	1 MW	200	39	43	88	14	15	52	14	5		445	109	-		
38	"	"	Namole	Nil	1 MW	200	73	39	46	22	7	56	22	1		600	148	-		
39	"	"	Namole	Nil	1 MW	200	62	46	55	30	8	77	9	3		541	148	-		
40	"	"	Chikwa	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
41	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
42	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
43	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
44	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
45	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
46	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
47	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
48	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
49	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
50	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
51	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
52	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
53	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
54	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
55	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
56	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
57	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
58	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
59	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
60	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
61	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
62	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
63	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
64	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
65	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
66	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
67	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
68	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
69	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
70	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
71	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
72	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
73	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
74	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
75	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
76	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
77	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
78	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
79	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
80	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
81	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
82	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
83	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
84	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
85	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
86	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
87	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
88	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
89	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
90	"	"	Namole	Nil	1 MW	288	72	88	116	62	54	31	18	13		541	148	-		
91	"	"	Namole	Nil	1 MW	288	72	88	116	62	54</									

S.W. = Sub Health Centre  
 M = Maternity  
 E. = Extension  
 U = Unit  
 M. Rural  
 HI = Health Inspector  
 B/MW = Nurse Midwife  
 MA = Medical Assistant  
 CO = Clinical Officer  
 CA Cholera Assistant  
 S = Servant  
 HA = Health Assistant  
 MW = Bonecraft Worker

SOURCE: District Medical Officer

ANNEX IV(a)

Infrastructure Development: Phase III

	Phase III		Phases I - III
	Target	Achievement	LLDP Total Completed
Roads (miles)	265	399	1,575
Major Bridges	7	25	47
Major Bridges Reconstructed	0	2	10
Minor Bridges	20	5	44
Culverts	0	45	165
Minor Bridges Reconstructed	0	1	12
Boreholes Functional	143	139	490
Borehole Aprons	143	181	398
Diversion Ditches (miles)	1,075	1,053	4,853
Waterways (miles)	100	91	554
<u>Housing - Town</u>			
Class A	0	0	1
Class B	0	0	10
Class C	0	0	39
Class D	0	0	52
Class E	0	0	108
Class F	0	0	94
<u>Housing - Field</u>			
Class C	0	0	0
Class D	0	2	14
Class E	15	47	79
Class F	7	160	505
Low Cost	153	1	101
<u>Training Centers - Residential</u>	0	0	3
<u>Offices - HQ</u>	0	0	5
<u>Workshops</u>	0	1	2
<u>Dips</u>	5	3	8
<u>Health</u>			
Primary Centers	0	3	3
Sub-Centers	5	6	6
Clinic Improvements	0	6	6
Health Posts	21	24	24

Note: # excluding Dzalanyama ranch shown separately at Annex IV(b) and also NRDP preparation infrastructure at Annex IV(k).

ANNEX IV(b)

Roads Handed Over to Ministry of Works for Future Maintenance

<u>Year Handed Over</u>	<u>Development Units</u>	<u>(Miles)</u>		
		<u>Secondary</u>	<u>District</u>	<u>Total</u>
1974/75	1, 2, 3, 4, 5	36	73	109
1975/76	6, 7, 8, 9	27	66	93
1976/77	12, 13, 15, 16, 17	32	78	110
1977/78	10, 29, 30	15	42	57
1978/79	11, 14, 27, 28, 43, 44	35	69	104
<u>Remaining to Hand Over</u>				
1978/80	21, 22, 26, 35, 40, 41, 42	29	64	93
1980/81	4, 23, 24	15	31	46
1981/82	31, 32, 33	22	33	55
1982/83	25, 34, 45, 46, 47	20	57	77
TOTALS		<u>231</u>	<u>513</u>	<u>744</u>

Total projected hand-over for all Units would be the 1,575 miles of roads constructed over the entire life of the programme. However, the majority of the remaining roads are of a class of construction unsuited to Ministry of Works standards.

Source: LLDP, Construction Unit

November 19, 1980

LLDP Phase III: Training Activities

<u>Residential Centers</u>	<u>Number of Agricultural Courses</u>	<u>Number of Home Economics Courses</u>	<u>Attendance Male Students (Days)</u>	<u>Attendance Female Students (Days)</u>
Staff Training Center (Lilongwe)	139	5	12,539	1,390
Nsaru Residential Training Center	134	32	11,879	7,406
Nathenje Residential Training Center	26	6	1,880	2,297
<hr/>				
Total Residential Centers	299	43	26,298	11,093
Unit Centers <u>1/</u>	2,913	3,991	87,345	94,489

<u>Other Events</u>	<u>Number of Events</u>	<u>Student Days</u>
Staff Training Center	473	13,485
Nsaru Training Center	86	4,933
	559	18,418

Overseas Training - 14 staff members from T.O. grade and upwards attended overseas training for periods of between one and twelve months.

1/ 1975/76 = 25  
1976/77 = 32  
1977/78 = 40

Source: LLDP, Training Section.

November 19, 1980

LLDP, PHASE III. SUMMARY OF RESEARCH AND TRIALS COMPONENT ACTIVITIES

1. MAIZE

Maize trials were carried out throughout Phase III. These trials were designed and analysed by staff at Chitedze and Mbawa Research Stations, and were carried out on farmers' gardens in LLDP on all major soil types.

<u>Maize</u>	<u>1973/74</u>	<u>1974/75</u>	<u>1975/76</u>	<u>1976/77</u>	<u>1977/78</u>
Variety trials	4	11	4	3	2
Agronomy trials	44	55	22	22	11

(a) Variety Trials

New introduction from the breeding programme at Chitedze Research Station, and new imported varieties were screened on all major soil types in LLDP. The trials led to the recommendation that SR.52 from a Rhodesian source, should be grown by farmers as a cash crop where their crop management is of a high standard. Yields of over 12,000 kg/ha SR.52 were recorded. UCA was recommended for farmers who needed to store maize, due to its superior storage qualities under local conditions. UCA yields of 9,000 kg/ha were recorded in trials.

(b) Agronomy Trials

(1) Types and sources of nutrients - These trials investigated the response of SR.52 and UCA to levels of major and minor nutrients. No significant response to copper, manganese, zinc or boron were found. Responses to different nitrogen sources were variable; a low response to calcium ammonium nitrate (CAN) in the 1975/76 season was thought to be due to soil sulphur deficiencies, but subsequent experiences denied this. In general, calcium ammonium nitrate, sulphate of ammonia and urea gave similar yield increases when applied at a rate of 56 kg/ha N.

<u>Variety</u>	<u>Nitrogen source</u> (as 50 kg/ha N)	<u>No. of trials</u>	<u>Mean yield(kg/ha)</u>	<u>%</u> <u>Increases</u>
SR. 52	no nitrogen	74	6,407	
SR. 52	CAN	74	8,114	126
SR. 52	Urea	74	8,058	125
SR.52	SA	74	7,883	123
UCA	no nitrogen	74	4,710	-
UCA	CAN	74	5,674	120
UCA	Urea	74	5,757	122
UCA	SA	74	6,024	127

(2) Fertilizer response curve - The response of SR.52 and UCA to 3 levels of nitrogen, phosphate and potassium was examined. Both varieties showed a quadratic response to applied nitrogen but only small responses to applied phosphate and potassium. Phosphate application resulted in earlier cob ripening. Yields of both varieties levelled off at applications over 100 kg/ha N.

ANNEX IV (?)

<u>Variety</u>	<u>Fertilizer</u>	<u>No. of trials</u>	<u>Mean yield (kg/ha)</u>	<u>% Increases</u>
SR.52	-	80	4,211	-
SR.52	122 kg/ha N	80	7,834	186
SR.52	224 kg/ha N	80	8,405	199
UCA	-	80	4,578	-
UCA	112 kg/ha N	80	6,792	148
UCA	224 kg/ha N	80	7,151	156

(3) Sulphur requirements of maize - No response to applied sulphur was found even in trial sites in the (then) South Western Modified Input Area. Trial sites were presumed to have previously been dressed with SA.

(4) Types and times of nitrogen application -- Trials compared sulphur coated urea, a slow nitrogen release source, with other nitrogenous fertilizers; sulphate of ammonia gave the highest maize yields, sulphur coated urea the lowest. Nitrogen applied basically have higher yields at 55% of the sites than split dressings or top dressings.

(5) Fertilizer response curve trial - Maize grown on trial plots following a well fertilized tobacco crop showed little response to applied nitrogen. SR.52 gave a yield increment of 20 bags/ha over the base yield for every 2 bags of fertilizer applied up to a total application of 100 kg/ha nitrogen, i.e. 5 extra bags of maize were obtained for each bag of CAN or SA applied per hectare. UCA showed a similar response up to 70-80 kg/ha nitrogen applied. A blanket recommendation for phosphate application was not made due to isolated responses to phosphate shown in trials.

(6) Spacing and variety trials - An inter-plant spacing of 30 cms with 90 cms between ridges was recommended for SR.52 and UCA. Fertilizer application levels of 100 kg/ha N for SR.52 and 80 kg/ha N for UCA were recommended as a result of these trials, which were terminated in 1976/77.

(7) Maize herbicide screening trials - In 1974/75 and 1975/76 a wide variety of herbicides were screened. Primextra applied pre-emergence was found to give the best weed control, although this chemical did not give significantly higher yields than hand-weeding. The range of herbicides tested was narrowed in trials from 1976/77 to Primextra and Bladex. No significant differences in yield between the different herbicide treatments were found.

(8) Striga (witchweed) control - Yields of shelled SR.52 were found to increase from 600 kg/ha to 3,800 kg in badly Striga infested plots when control measures, fertilization, animal manure application and hand pulling of Striga, were applied.

(9) Maize storage - An intensive campaign on improved methods of storage was conducted. An improved nkshokwe was designed and insecticide application was recommended. Crop storage surveys were conducted in conjunction with Bvumbwe Research Station



## 2. GROUNDNUTS

Groundnut variety and agronomy trials were carried out on an agency basis for staff at Chitedze Research Station.

<u>Groundnuts</u>	<u>1973/74</u>	<u>1975/75</u>	<u>1975/76</u>	<u>1976/77</u>	<u>1977/78</u>
Variety trials	4	4	4	4	4
Agronomy trials	10	12	12	12	5

### (a) Variety Trials

Varieties from the breeding programme at Chitedze Research Station were screened. Chalimbana, a confectionary nut, was recommended for the LLDP area. Rosette resistant varieties, including lines from Senegal, were screened against Chalimbana, the most promising variety being B222/RR/6/B1/1.

<u>Variety</u>	<u>No. of Trials</u>	<u>Mean Yield (kg/ha) Shelled Nuts</u>
Mani Pinter	16	1,081
Chalimbana	16	716
RG1	16	688
PR60B	16	723
B222/RR/6/B1/1	16	701
Mwetunde	16	710

### (b) Agronomy Trials

(1) Lime, gypsum, phosphate trials - Where soil phosphate levels are below 50 ppm yields can be significantly and economically increased by the application of 112 kg/ha double superphosphate, banded at planting. A yield response is also obtained with lime and gypsum application, especially if used in conjunction with phosphate or sulphur dust. Generally, the most effective treatment combinations are P + S + L and P + S + G.

(2) 'Pops' trials - Pops, poor pod filling, was found to depend upon the amount and seasonal distribution of rainfall, which was more limiting to pod filling than soil type. In dry years, calcium ion mobility is low, and the application of calcitic lime or gypsum will significantly increase yields. In wet years, the best groundnuts are produced on light sandy soils where the physical resistance to pod growth by soil particles is low.

(3) Spacing trials - These trials led to a recommendation that plants should be spaced 15 cms apart, 1 row per ridge on ridges 90 cms apart, giving a plant population of 65,000 - 70,000 per hectare.

### (c) Pathology Trials

(1) Sulphur dusting - 20 x 1 acre sulphur dusting plots were laid out in 1973/74 and 1974/75. Sulphur dusting was found to be economic in LLDP areas

when applied in 6 fortnightly applications, starting 2 weeks after emergence. Yield increases of 25-60% over control plots were obtained when the dusting was carried out entirely by farmers. Increases of 24-40% over control plots were obtained from trials managed by research assistants at Unit Centers.

(2) Systemic fungicides - The best control of leaf diseases was shown by Daconil in trials run in 1976/77 and 1977/78.

### 3. TOBACCO

<u>Tobacco</u>	<u>Number of Trials</u>				
	<u>1973/74</u>	<u>1974/75</u>	<u>1975/76</u>	<u>1976/77</u>	<u>1977/78</u>
Variety trials	--	--	--	--	--
Agronomy trials	--	3	--	--	--

#### (a) Agronomy Trials

Few trials were conducted in the programme area as the level of supervision required resulted in trials being confined to district research stations. Results from the large programme of station trials were confirmed by field trials in year II.

Agronomy trials led to the recommendation that plants should be spaced 90 cms x 90 cms, that no pruning should be carried out and that plants should be topped when 1% of the garden is in flower. Leaf quality was improved, but total yields depressed, when plants were spaced 120 cms x 90 cms.

#### (b) Storage

A monitoring survey of contamination of tobacco by storage insecticides was conducted in 1974/75.

### 4. BEANS

<u>Beans</u>	<u>Number of Trials</u>				
	<u>1973/74</u>	<u>1974/75</u>	<u>1975/76</u>	<u>1976/77</u>	<u>1977/78</u>
Variety trials	--	6	--	--	--
Agronomy trials	--	10	6	16	--

Trials were undertaken on an agency basis for staff at Bunda College.

#### (a) Variety Trials

Trials were conducted to screen new varieties for resistance to halo blight (Pseudomonas phaseolicola) and anthracnose (Colletotrichum lindemuthianum). Lines showing resistance were further screened at Bunda College.

For half-acre and six quarter-acre observation plots set up in 1973/74 showed that pests and diseases severely limited yields.

(b) Agronomy

(1) Bean crop husbandry - the trials led to the following recommendations.

- (i) Determinate beans should be planted 2 rows/ridge, 7.5 cms between plants, on ridges 90 cms apart, giving a plant population of 300,000 plants/hectare.
- (ii) Indeterminate beans should be planted 1 row/ridge, 10 cms between plants, on ridges 90 cms apart, giving a plant population of 140,000 plants/hectare.
- (iii) 20-60 kg/ha N should be applied to determinate and indeterminate beans, as a split dressing, half applied basically, half as a top-dressing.

(2) Bean/maize intercropping - These trials showed that yield of maize are not reduced when beans are interplanted with maize.

<u>Planting scheme</u>	<u>Mean Yield in kg/ha</u>		
	<u>Maize</u>	<u>Beans</u>	<u>No. of Trials</u>
Maize (pure stand)	4,843	---	6
Determinate beans (pure stand)	---	2,512	6
Indeterminate beans (pure stand)	---	2,454	6
Maize + determinate beans	4,847	1,359	6
Maize + indeterminate beans	5,624	514	6

(3) Fungicide trials - A wide spectrum of fungicides were tested. The best control of leaf diseases, especially anthracnose was given by Benomyl, resulting in yields of 2,063 kg/ha 252/1.

(4) Fertilizer trials NPKS - Mean yields from 15 trials of 873 kg/ha 253/1 were obtained with applications of 60 kg/ha and 80 kg/ha P, compared with yields of 576 kg/ha 253/1, where no fertilizers were applied.

5. SORGHUM

<u>Sorghum</u>	<u>Number of Trials</u>				
	<u>1973/74</u>	<u>1974/75</u>	<u>1975/76</u>	<u>1976/77</u>	<u>1977/78</u>
Variety trials	--	--	3	3	1
Agronomy trials	--	--	5	7	--

(a) Variety Trials

These trials were conducted on an agency basis for the Shire Valley Agricultural Development Project from 1976/77. Selection of suitable varieties continues.

(b) Agronomy Trials

Plant spacings of 25 cms between plants on 90 cms ridges were recommended.

6. SUNFLOWER

<u>Sunflower</u>	<u>Number of Trials</u>				
	<u>1973/74</u>	<u>1974/75</u>	<u>1975/76</u>	<u>1976/77</u>	<u>1977/78</u>
Variety trials	--	4	4	2	--
Agronomy trials	8	5	12	9	5

(a) Variety Trials

These trials were carried out to identify a high yielding variety suitable for smallholder production in LLDP. The two highest yielding varieties were Arrowhead and Polestar. An observation plot set up in 1975/76 gave record as the highest yielding variety, with a yield of 2,715 kg/ha seed. Kenya Local White and Kortrus both gave yields of over 2,000 kg/ha. Introduced hybrids from Australia gave low yields of around 1,200 kg/ha.

Sunflower act as hosts to the tobacco nematode and they are not grown on a large scale by farmers in LLDP.

(b) Agronomy Trials

(1) Spacing trials - These trials led to the recommendation that sunflowers should be spaced 30 cms apart on 90 cms ridges.

(2) Fertilizer trial NPKS - A linear response to applied nitrogen was shown, up to 112 kg/ha N. Basal applications of 224 kg/ha single superphosphate and 224 kg/ha sulphate of ammonia as a top-dressing gave yield increases of 179% over the base yield. Responses to applied N were shown at 9 of the 12 sites in 1976, and to applied P at 2 of the 12 sites. There was no significant response to K or S at any site. It was recommended that up to 50 kg/ha N should be applied basally, or as a top-dressing when plants were 60 cms high.

7. EUCALYPTS

<u>Eucalypts</u>	<u>Number of Trials</u>	
	<u>1973/74</u>	<u>1974/75</u>
Variety trials	2	--
Agronomy trials	--	2

(a) Variety Trials

A variety trials of 10 Eucalypt species was planted in 1973/74.

(b) Agronomy Trials

(1) Chemical repellants - Chemicals to protect young trees from damage by browsing goats were tested. Cervacol and Nikel Fix were effective. It was recommended that these chemicals should not be applied to the terminal bud, and should be applied to upper leaf surfaces only.

8. VEGETABLES

23 vegetable gardens were set up at Unit Centers in 1974. From trials in these gardens, varieties were recommended for the Lilongwe district; sowing dates, plant spacings and fertilizer recommendations were made.

LLDP Phase III: Total Credit Fund Cash Flow

<u>MK '000</u>	<u>1974/75<sup>1/</sup></u>	<u>1975/76<sup>1/</sup></u>	<u>1976/77<sup>1/</sup></u>	<u>1977/78<sup>1/</sup></u>	<u>1978/79<sup>1/</sup></u>
Unspent Balance b/f	846.5	1,122.8	1,227.5	1,686.8	1,692.4
New Funds Received	159.9	39.4	159.1	334.6	39.0
<u>Loan Repayments</u>					
Seasonal	731.3	855.0	1,064.6	1,319.5	661.6
Medium Term	29.3	24.5	28.6	19.7	5.4
Stallfeeders	37.3	47.2	126.7	92.5	114.7
Poultry	3.2	12.6	24.6	18.3	14.2
Dairy	-	0.2	1.1	0.3	2.1
Other Income: Interest, etc.	35.1	57.3	79.6	90.6	41.3
	<u>1,842.8</u>	<u>2,159.1</u>	<u>2,711.8</u>	<u>3,562.3</u>	<u>2,570.7</u>
<u>Utilization of Funds</u>					
Contribution to Treasury				562.4	236.4
Seasonal	643.9	772.4	895.6	1,146.1	1,149.2
Medium Term	19.9	4.9	-	19.0	1.0
Stallfeeders	56.2	118.7	91.4	98.8	14.0
Poultry	-	34.8	36.2	35.0	13.8
Dairy	-	0.8	1.8	8.1	-
	<u>720.0</u>	<u>931.6</u>	<u>1,025.0</u>	<u>1,869.4</u>	<u>1,434.4</u>
Balance At End of Year	<u>1,122.8</u>	<u>1,227.6</u>	<u>1,686.8</u>	<u>1,692.4</u>	<u>1,136.3</u>

Notes: 1. October 1 - September 30  
2. October 1 - March 31

Source: LLDP, Credit Section

November 19, 1980

ANNEX IV (g)

Table (i) Rural Development: Outline of facilities provided on  
self-help scheme - LLDP, 1975/76-1978/79

	<u>1975/76</u>	<u>1976/77</u>	<u>1977/78</u>	<u>1978/79</u>
Postal agencies	-	2	1	1
Bridges	-	-	1	1
Dambo crossings	41	40	35	37
Culvert rings	510	476	337	320
Clinics	-	1	-	1
Schools	1	3	3	1
Cash contribution (MK)	10,550	12,000	11,170	10,000

Source: LLDP, Rural Development Section

ANNEX IV(2)

Table (ii) Proportion of Total Inputs Purchased on Credit.

<u>Seeds</u>		<u>1975/76</u>	<u>1976/77</u>	<u>1977/78</u>	<u>1978/79</u>
		%	%	%	%
Maize	: hybrid	68	73	72	57
	: composite	34	31	15	9
Groundnuts:	GDA	95	83	75	83
<u>Fertilizer</u>					
20:20:0		88	93	84	91
CAN		78	96	93	96
S/A		63	71	60	76
Urea		63	64	66	72

In 1977/78, when more inputs were available and provided on time, LLDP smallholders purchased proportionately more inputs by cash than in the previous two seasons.

Table (iii) LLDP Phase III: Seasonal Credit Disbursements and Repayments.

	<u>1975/76</u>	<u>1976/77</u>	<u>1977/78</u>	<u>1978/79</u>
<u>Individual Credit</u>				
Value disbursed (MK)	624,066	627,256	453,354	656,000
Number of recipients	24,618	23,450	14,618	23,383
Number of packages issued	41,184	41,462	26,063	37,267
% repayment at Sept., 30	94.64	99.85	99.81	99.89
<u>Group Credit</u>				
Value disbursed (MK)	234,619	385,022	839,165	804,351
Number of groups	410	670	1,257	1,199
Average group membership	24	20	22	28
Number of packages issued	30,305	55,752	111,630	104,297
% repayment at Sept., 30	97.82	100	100	99.77

Source: LLDP, Credit Section



Table (i) LLDP Phase III:

Comparison of Rejected and Actual Inputs and Quantities of Crops Marketed Through ADMARC

	1975/76		1976/77		1977/78		1978/79	
	<u>Projected</u> (m. tons)	<u>Actual</u> (m. tons)	<u>Projected</u> (m. tons)	<u>Actual</u> (m. tons)	<u>Projected</u> (m. tons)	<u>Actual</u> (m. tons)	<u>Projected</u> (m. tons)	<u>Actual</u> (m. tons)
<u>INPUT</u>								
<u>Seeds</u>								
Maize: Hybrid	235	19.1	313	80.2	453	190.8	528	149.34
: Composite	417	17.6	168	27.6	566	54.1	594	33.14
Groundnuts: GDA	456.4	447.40	498.2	581.8	756.8	636.4	850	969.4
<u>Fertilizer</u>								
20:20:0	2,748	1,483	3,282	1,823	4,228	2,326	4,638	2,644
CAM	3,302	757	4,844	317	4,489	1,342	7,277	2,036
S/A	-	3,620	-	4,211	-	5,799	-	5,525
Urea	-	7.5	-	11.3	-	18	-	18
<u>PURCHASES</u>								
Maize	39,485	13,024	51,080	17,475	71,954	23,701	82,681	19,175
Groundnuts	4,690	7,770	5,846	5,263	7,047	2,209	8,291	6,125
Tobacco	954	6,550	1,040	11,156	1,141	11,092	1,208	10,359
(Tobacco Quota)		(9,134)		(9,481)		(9,648)		(9,556)

Source: LLDP, Marketing Section

November 20, 1980

The Dzalanyama Ranch

1. Background: Initial physical development of the ranch commenced in September 1970 in the form of staff housing, fencing, establishment of a quarantine area and a cattle dip. This work was initiated in the North-Western Sector.

Principal Physical development proceeded as follows:

<u>Item</u>	<u>Total as at end of Phase III</u>	<u>Number Developed</u>		<u>Total to date as at end of Phase III</u>
		<u>Target for Phase III</u>	<u>Additions in Phase III</u>	
Ranch Manager's House	1	-	0	1
Assistant Ranch Manager's house	1	-	0	1
Stores and offices	3	-	0	3
Houses (Technical Officers)	2	-	0	2
Houses (Technical Assts.)	8	-	0	8
Large stores and work- shops	2	-	0	2
Portable houses (herdsmen)	58	Ablutions (11)	0	58
Thatched houses (workmen)	54	41	21	75
Major bridges	7	-	0	7
Minor bridges	9	10	0	9
Culverts (large)	13	-	0	13
Fencing (miles)	420	30	60	480
Boreholes	4	-	0	4
Water pumps and engines	4	-	0	4
Electric generator	1	-	0	1
Dips	3	-	0	3
Spray races	3	1	0	3
Major roads (miles)	81	-	0	81
Minor roads (miles)	66	-	0	66
Firebreaks, used as roads (miles)	163	-	0	163
Approach roads (miles)	46	-	0	46
Land clearing (cares)	100	-	4	104

2. Objectives: The main objectives of the ranch were outlined for Phase III as follows:

- (1) To provide suitable animals for stall-feeding by farmers in the Lilongwer Land Development Programme Area.
- (2) To assist farmers in an area of similar ecology and climate to improve their own herds by providing improved Zebu bulls bred on the ranch (from selected cows and performance tested bulls).
- (3) To produce half-bred heifers (Malawi Zebu X Friesland) for milk production by smallholder farmers.

The first objective was to be met both by the breeding of young feeders off the ranch breeding herd and the holding, dosing and improving of the feeder steers brought in from market saleyards throughout the country before subsequent issue to stall-feeding farmers.

The second objective was to be achieved through selective breeding principally within the 'Chitedze' herd which formed the nucleus of a 'national' improved of running costs and benefits, managed with the main Dzalanyama Ranch.

The third objective was to be achieved principally by means of a breeding programme using Artificial Insemination with imported Friesland semen.

These main objectives of the ranch necessarily had to fall within the overall requirements for a correct ecological management of the area, since the Dzalanyama forest reserve formed the main catchment for the Lilongwer Urban Water Supply. The area of the ranch therefore remained a forest reserve and all ranch management decisions had to recognize the requirements of forest husbandry. For this purpose a Dzalanyama Ranch Advisory Committee had been established in 1971 to co-ordinate these sensitive areas of managerial decisions.

3. Specific targets of Phase III: Specifically the target of Phase III was to continue the build-up of the Dzalanyama herd in order to reach a maximum number of 5,000 breeding cows by 1979/80 (year 4 + 1). The Phase III budget therefore allowed for the buying in of 750 cows and 600 immature steers per annum (1975/76 to 1978/79). In addition further investments were to be made, mainly for additional fencing (30 miles), a spray race, dambo river crossings, some traditional housing and machinery replacements.

The funding of Phase III was calculated on the basis of the amount required to offset the annual net cash deficit resulting from a programme as follows:

Capital costs + livestock purchases + operating costs minus  
total income from sales = net cash deficit.

4. Achievements of Phase III: The table of infrastructure development (see paragraph 1 of this Annex) indicates that there was little development of facilities during Phase III. In particular the additional spray race, planned for at appraisal, was not constructed. However, one important development was the construction of a boundary fence along the entire international border of the ranch. Table (vi) of this Annex provides some comparisons of operating achievements against appraisal projections. The most pertinent differences highlighted by this comparison relate to calving and culling percentages and operating costs. The weighted average number of calves and warners for the four years of Phase III was only 49 per cent of breeding females. Although this provides only a crude estimate of calving percentage (no accurate records were maintained) and relates to 'surviving' calves at the end of March each year, it still suggests a poor breeding performance. A background to this poor breeding performance must surely be the extremely low culling rates of non-performing cows and bulls. (6% and 4% respectively). When the source of the majority of the ranch breeding herd is considered (purchased from traditional herds at markets throughout the country) then a more comprehensive culling policy would have been more sensible. As a general rule, the owners of traditional cattle know their animals well and will only in exceptional circumstances offer proven breeding females for sale at markets. The fact that the Dzalanyama herd contains a large proportion of poor (or non-) breeders is therefore hardly surprising. Perhaps the low culling by management was a result of policy to build up numbers as quickly as possible; surely not very sensible if, as seems to have been the case, this meant the carrying of a large number (2,000+?) of unproductive 'passengers' in the herd. The variable operating costs per livestock unit (dips, feed, medicines, fuel and wages) were higher (75 per cent) than the targeted figure with contingencies added. Since the cost index (see (vii) of this Annex) rose by only fifty per cent more than the compounded contingencies allowed, then some would seem to be indicated. The fact that the average number of employees per month included 163 herdsman (and 132 others), an extremely high figure by commercial ranch standards, does suggest that there was some considerable room for improvement in cost performance.

4.1 The table at (v) of this Annex provides annual comparison of the same ratios (at (vi) ) and some others for the entire life of the ranch.

4.2 A further aspect, which relates to achievement of the Dzalanyama ranch component in general, is the very poor design of facilities (particularly fencing, paddocks and water points) on the ground. Generally, paddock sizes are highly variable and inappropriate to the needs of a well managed ranch. Paddock boundaries have been placed with little indication of a knowledge of the relative palatability of grass types or the needs for sensible grazing management (to avoid selective grazing, over-grazing or allow seasonal resting of the different grass species). Expensive boreholes and watering points have also been sited without reference to grazing management or economy. There has been little control in the cutting of indigenous timber for fencing or other structures which has resulted, together with poor grazing management, in a serious bush encroachment problem in many parts of the ranch. Although a considerable background of knowledge is available within Central and Southern Africa on appropriate grazing management of mixed brachystegia woodland, and it was intended that further research would be conducted at Dzalanyama on management of this natural grazing, there seems to have been no attempt to come to grips with this problem. Ecological deterioration at Dzalanyama is therefore becoming increasingly obvious. For this reason it has been considered essential to assume projected carrying capacity at no more than twenty acres per livestock unit in this analysis.

5. Cost/benefit analysis: The analyses of cost and benefit have been made on the economic results of the ranch. The first (Table iii) considered the total life of the ranch, incorporating the results of activities in Phase I and II together with Phase III. The second (Table iv) considered the aspect of Phase III alone, taking into account an incremental performance compared with what would have happened had Phase II continued without Phase III. These analyses are then projected to the point of constant results.

6. Both analyses showed markedly negative return. The first indicated a negative return up to 1978/79 totalling K696,013, with continuing negative return from the year of constant projections, of K58,655 annually. The second analysis indicated a negative return during the life of Phase III (1975/76 to 1978/79) totalling K185,945 with only minor positive annual returns predicted from 1983/84 to 1988/89 becoming a zero annual increment (with biological merging of the two herd comparison) from 1989/90 onwards. On these results the calculation of the standard Internal Economic Rate of Return for this particular component itself would be pointless, although the analysis will be incorporated into the E.R.R. for the total Phase III project.

Table (1)

Dzalanyama Ranch: Phase II Projected Without Phase III (April to March years)

Class:	1974/75 Year 0	1975/76 (1)	1976/77 (2)	1977/78 (3)	1978/79 (4)	1979/80 (5)	1980/81 (6)	1981/82 (7)	1982/83 (8)	1983/84 (9)	1984/85 (10)	1985/86 (11)	1986/87 (12)	1987/88 (13)	1988/89 (14)	1989/90 and up to year 2000
Cows	2505	2470	2320	2332	2554	2689	2802	2954	3128	3283	3450	3630	3700	3700	3700	3700
Bulls	158	131	108	94	102	108	112	118	125	131	138	145	150	150	150	150
Heifers	490	363	501	725	680	684	749	805	821	866	917	963	1012	1065	1083	1083
Steers	683	364	501	725	681	684	749	805	822	869	917	963	1012	1065	1083	1083
Weaners	765	1055	1526	1433	1440	1577	1693	1730	1824	1931	2027	2131	2242	2280	2280	2280
Calves	1111	1606	1508	1516	1660	1784	1821	1920	2033	2134	2243	2360	2400	2400	2400	2400
<b>Total</b>	<b>5712</b>	<b>5989</b>	<b>6464</b>	<b>6825</b>	<b>7117</b>	<b>7526</b>	<b>7928</b>	<b>8332</b>	<b>8753</b>	<b>9212</b>	<b>9692</b>	<b>10192</b>	<b>10516</b>	<b>10660</b>	<b>10696</b>	<b>10696</b>
<b>Livestock Units</b>	<b>4581</b>	<b>4510</b>	<b>4792</b>	<b>5090</b>	<b>5314</b>	<b>5594</b>	<b>5803</b>	<b>6213</b>	<b>6526</b>	<b>6865</b>	<b>7224</b>	<b>7596</b>	<b>7834</b>	<b>7942</b>	<b>7971</b>	<b>7971</b>
<b>Salant Cows</b>		375	371	348	350	383	403	420	443	469	492	518	545	555	555	555
<b>Bulls</b>		19	16	13	11	12	13	13	14	15	16	17	17	18	18	18
<b>Steers</b>		649	364	476	689	647	650	712	765	781	824	871	915	962	1012	1083
<b>Heifers</b>		0	0	0	0	0	0	0	0	0	0	0	118	222	272	290
<b>Purchases:</b>																
<b>Bulls</b>		0	0	4	24	23	22	25	27	27	30	31	29	26	26	26

- Notes:** (1) Projections based on: Mortality (all classes) = 5%; calving = 65%; culling (cows) = 15%; culling (bulls) = 12%  
 (2) Livestock Units calculated as: Cows = 1.0; Bulls = 1.4; Heifers = 0.8; Steers = 0.8; Weaners = 0.6; Calves = 0.4  
 (3) Herd compositions as at 31st March each year. See also explanation in table 1(a) on Projection to Constant Herd.  
 (4) "Quarantine herd" of Year 0 (1974/75) split proportionately between Cows and Steers (67 to each class).

ANNEX IV(b)

ANNEX IV (h)

Table (ii) Dzalanyama Ranch : Phase III, Actual and Projected (April to March years)

Class	1975/76 Year (0)	1975/76 (1)	1976/77 (2)	1977/78 (3)	1978/79 (4)	1979/80 (5)	1980/81 (6)	1981/82 (7)	1982/83 (8)	1973/84 & up to year 2000
Cows	2,438	3,008	3,476	3,778	4,607	3,700	3,700	3,700	3,700	3,700
Bulls	158	197	198	248	277	150	150	150	150	150
Heifers	490	1,290	1,096	1,228	1,191	883	995	1,083	1,083	1,083
Steers	616	1,625	1,356	1,736	1,768	866	955	1,083	1,083	1,083
Weaners	765	275	0	233	110	2,095	2,280	2,280	2,280	2,280
Calves	1,111	987	1,564	1,405	2,205	2,400	2,400	2,400	2,400	2,400
Quarantine	134	61	348	205	0	0	0	0	0	0
Total	5,712	7,443	8,038	8,833	10,158	10,094	10,520	10,696	10,696	10,696
Livestock Units	4,581	6,237	6,686	7,403	8,310	7,526	7,830	7,971	7,971	7,971

Phase III, Actual Money Values (MK)

Sales: Cows					677	555	555	555	555
Bulls	55,577	147,141	117,307	117,742	113	18	18	18	18
Steers					866	823	945	1,012	1,083
Heifers					300	99	205	272	290
Purchases: Bulls, etc.	109,834	114,454	83,069	79,470	0	26	26	26	26

Notes:

- (1) Projections based on: Mortality (all classes) = 5%; Calving = 65%; Culling (cows) = 15%; Culling (Bulls) = 12%
- (2) Livestock Units calculated as: Cows = 1.0; Bulls = 1.4; Heifers = 0.8; Steers = 0.8; Weaners = 0.6; Calves = 0.4.
- (3) Herd compositions as at 31st March each year.
- (4) Actual money values of sales and purchases used for 1975/76 to 1978/79 in absence of reliable data on number.

Projection to Constant Herd

On the basis that at the existing levels of management and development, the carrying capacity of Dzalanyama should be limited to no more than one livestock unit to 20 acres. This factor together with the herd objective of 'breeding to grow out feeder steers for sale' and the projection parameters outlined in Note (1) above, gives a constant herd composition as a future projection as for the last year on this table.

Table (iii) Dzalianyama Ranch: Actual and Projected Benefits and Costs <sup>(1)</sup> (April to March Years), (M.K.) at current prices

ANNEX IV(b)

Item	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84 and on
<b>Sales:</b>	4,305	11,287	38,624 <sup>(2)</sup>	47,086	59,284	55,577	147,141	117,307	117,742	148,620	112,340	127,400	116,110	142,690
<b>Less:</b>														
Purchases	11,179	25,471	60,520	100,231 <sup>(3)</sup>	96,794	109,814	114,454	83,069	79,470	0	5,200	5,200	5,200	5,200
<b>Add:</b>														
Net Herd Increments	-7,360	+18,570	+67,585	+86,415	+58,425	+108,190	+21,870	+51,715	+61,870	-84,800	+23,320	+11,400	0	0
<b>Total Benefits</b>	476	4,386	40,689	133,270	200,915	53,953	54,557	96,023	100,142	64,820	130,460	113,600	110,910	137,490
<b>Variable Costs <sup>(4)</sup></b>	10,000	16,365	41,879	60,095	81,776	115,362	151,822	177,805	168,412	138,930	144,542	147,145	147,145	147,145
<b>Non-variable Costs <sup>(5)</sup></b>	5,000	10,000	17,500	30,127	28,090	42,576	44,350	44,857	49,258	49,000	49,000	49,000	49,000	49,000
<b>Total Costs</b>	15,000	26,365	59,379	90,222	111,866	157,938	196,172	222,752	217,680	187,930	193,542	196,145	196,145	196,145
<b>Net Result Costs to Benefits:</b>	-14,514	-21,979	-18,710	-55,922	-60,951	-104,005	-141,615	-130,729	-117,538	-126,110	-63,082	-62,505	-65,235	-58,655

- Notes:** (1) Using current prices (results) through to 1978/79 and constant (1978/79) prices thereafter.  
(2) Includes allowance for holding fees for Chitedze herd kept with no benefit (445 M.K. at K32.45).  
(3) Includes value of Chitedze herd merged with Dzalianyama herd with full benefits to Dzalianyama account thereafter. (current closing values used).  
(4) For 1970/71 assumed with complete lack of financial data. 1971/72 to 1978/79 Actual (salaries and depreciation excluded). 1979/80 projected on basis of 1978/79 costs per livestock unit less a non-variable element of K15,000 representing costs of cattle purchasing (discontinued).  
Derivation of Variable Cost element projection based on 1978/79 operating cost results:

<b>Total Operating Cost (April/March)</b>	247,680
<b>Less:</b>	
<b>Non-variable element:</b>	
Salaries : 18,602	
Building maintenance: 536	
Depreciation : 30,120	
	49,258
	198,422
<b>Net variable operating costs:</b>	
<b>Less:</b>	
Variable operating costs on cattle purchasing activity (assumed discontinued)	35,000
	163,422
<b>Average Livestock Units (1978/79)</b>	8,310
<b>Variable Operating costs used for projection = K18.46 per livestock unit</b>	

**Projected Values (1979/80 and Beyond (M.K.))**

<b>Sales</b>			
Cows :	70		
Bulls :	150		
Steers :	80		
Heifers :	50		
<b>Purchases</b>			
Bulls :	200		

**Herd Increments**  
Constant class values held throughout projection.

**Book values used : (M.K.)**

	1970/71	1974/75	1978/79 (and on)
Cows	50	50	70
Bulls	100	120	150
Heifers	20	45	50
Steers	40	50	80
Yearlings	20	25	40
Calves	10	10	20
Quarantine	35	30	60

- (5) For 1970/71 assumed with complete lack of financial data. Thereafter actual and projected cost of salaries and depreciation (replacement).  
(6) Physical data basis from Table (iii).



Table (iv) Dzalanyama Ranch : Phase III, Incremental costs and benefits over Phase II projected without Phase III  
(A pril to March years)(Current prices)

Item	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90 onwards
Incremental sales	-25,443	+89,651	+52,917	+36,472	+68,250	+30,180	+39,090	+41,800	+45,130	+39,930	+34,200	+22,890	+13,080	+6,580	0
Less															
Incremental purchases	109,834	114,454	82,269	74,670	-4,600	800	200	-200	-200	-800	-1,000	-600	0	0	0
Add															
Difference in net incremental values of herds	160,060	-10,010	24,970	49,790	-103,250	1,400	-10,760	-21,410	-23,900	-25,310	-26,130	-17,300	-8,410	-2,430	0
Total Phase III incremental benefits	24,783	-34,813	-4,382	11,592	-30,400	30,780	28,130	20,590	21,430	15,420	9,070	6,190	4,670	4,240	0
Incremental costs	35,002	38,432	46,885	62,806	35,665	35,572	32,453	26,675	20,417	13,790	6,923	2,529	535	0	0
Net result incremental costs to incremental benefits	-10,219	-73,245	-51,267	-51,214	-66,065	-4,792	-4,323	-6,085	+1,017	+1,630	+2,147	+3,661	+4,135	+4,240	0

Notes: The same notes apply as for Tables (i), (ii) and (iii).

Based on differences between Tables (i) and (ii)

ANNEX

Table (v) Dzhalanyama Ranch : herd compositions as at 31st March each year, and ratio comparisons (including Chitedze herd)

Class	Livestock Units	1971	1972	1973	1974	1975	1976	1977	1978	1979	Average
Cows	1.0	28	285	1,038	2,024	2,438	3,008	3,476	3,778	4,607	2,298
Bulls	1.4	14	35	57	118	158	187	198	248	277	145
Heifers	0.8	102	116	242	389	490	1,290	1,096	1,228	1,191	683
Steers	0.8	63	97	215	354	616	1,625	1,356	1,736	1,768	870
Weaners	0.6	0	51	262	563	765	275	0	233	110	251
Calves	0.4	0	96	474	642	1,111	987	1,564	1,405	2,205	943
Quarantine	1.0	0	0	148	106	134	61	348	205	0	111
Total		207	680	2,436	4,195	5,712	7,443	8,038	8,833	10,158	5,300
1. Total livestock units		180	673	1,978	3,434	4,581	6,237	6,688	7,403	8,310	4,282
2. Total acres grazed		60,000	60,000	161,000	161,000	161,000	161,000	161,000	161,000	161,000	139,000
3. Stocking density (acres/LU)		333	105	81	46	35	26	24	22	19	32
4. Cows received Artificial Insemination No.		0	0	205	317	643	213	203	158	270	224
5. Ratio other cows/active bulls	No.	2	8	15	14	11	14	17	15	16	14
6. Calves as % of average cows	%	0	94	97	48	55	46	48	45	55	52
7. Cows and heifers to total herd	%	63	59	53	58	51	58	57	57	57	56
8. Cows culled as % of total cows	%	0	0	5	5	5	5	11	9	2	6
9. Bulls culled as % of total bulls	%	0	0	0	1	1	4	3	2	7	3
10. Total offtake (sales)	%	0	36	25	18	14	18	24	18	7	18
11. Cows purchased as % of cow numbers in same year	%	100	62	74	40	25	18	14	8	8	20
12. Steers purchased as % of steers sold in same year	%	0	39	190	112	74	137	75	71	59	87
13. Mort. lity % of total average herd	%	?	?	?	3	5	4	5	5	5	5
14. Average breeding herd size(at bulling)		?	?	?	146	144	127	137	131	172	143
15. Variable operating costs per LU	(MK)	56	29	21	17	18	18	23	24	20	21
16. Non-variable " " " "	(MK)	28	17	9	9	6	7	7	6	6	7
17. Ratio non-variable/total operating costs	%	33	37	30	35	25	28	23	20	23	23
18. Variable operating costs per LU at 1978 constant prices (see ANNEX IV(h) (vii))	(MK)	144	71	53	39	28	25	28	26	20	29

ANNEX IV(h)

ANNEX IV(h)

Table (vii) A Dzalanyama Ranch Operating Cost Index

From 1st April, 1970, to 31st March 1979, operating costs (after allowance for change in stocks) were:

	<u>MK</u>	<u>%</u>
A. Salaries and wages	321,251	36
B. Feed and Veterinary	249,474	28
C. Vehicles operating and other	<u>317,608</u>	<u>36</u>
	<u>888,333</u>	<u>100</u>

Compounding these weighted with a Cost Index as follows:

- A = Monthly earnings of government employees
- B = All imported items
- C = Petrol, oil and lubricants

derives an index as follows:

1970/71 = 100  
1971/72 = 106  
1972/73 = 103  
1973/74 = 112  
1974/75 = 163  
1975/76 = 185  
1976/77 = 213  
1977/78 = 236  
1978/79 = 258

Source: See Annex VI(c)

Table (vi) Dzalanyara Ranch. Comparisons of Results Against Projections of Appraisal Document for Phase III.

	<u>Appraisal Projection</u>	<u>Actual Result</u>
1. <u>Herd Composition as at 31/3/79</u> <u>(end of Phase III)</u>		
Cows	4,929	4,607
Bulls	241	277
Heifers	986	1,191
Steers	1,542	1,768
Weaners	2,517	110
Calves	2,954	2,205
Total	13,169	10,158
Livestock Units	9,980	8,310
<u>Four-Year Weighted Averages</u>		
2. Stocking Density (Acres per livestock Unit)	20 acres	22 acres
3. Ratio cows/active bulls	25	15
4. Calves % of average cows	68%	49%
5. Cows and Heifers to total herd %	45%	57%
6. Cows culled % of total cows	15%	6%
7. Bulls culled % of total bulls	20%	4%
8. Total offtake (sales) %	15%	16%
9. Cows purchased % of cow numbers in same year	19%	11%
10. Mortality % of total average herd	5%	5%
11. Variable operating cost per livestock unit <sup>1/</sup>	K12	K21
12. Non-variable operating cost per livestock unit <sup>1/</sup>	K 4	K 6
13. Ratio non-variable/Total operating costs %	25%	22%
14. Average Purchase cost of cows: M.K.	K55	K55.87
15. Average Purchase cost of steers: M.K.	K48	K51.33
16. Average selling price of cows: M.K.	K45	K62.30
17. Average selling price of steers: M.K.	K64	K77.37

<sup>1/</sup> Including physical and price contingency allowances. (But contingencies based on deficit financing only).

ANNEX IV(i)

Table (i) Slaughter Grades and Gross Returns on Beefsteers Issued to LBDP Credit Farmers. 1966-1978.

Calendar Year	Grade at Slaughter	Steers Issued	Per cent of Total	Average Issue Price	Average Price at Slaughter	Average Gross Return	Average C.D.M. (1b)
1966	Choice	26	56	42.15	73.48	31.33	
	Price A	11	27	41.07	53.90	24.23	
	Standard	3	7	37.87	42.42	5.75	
		40	100	41.02	69.36	27.54	326
1969	Choice	133	83	39.00	59.19	29.29	
	Price	44	22	43.47	57.26	13.79	
	Standard	17	9	37.22	61.20	3.98	
		194	100	52.23	65.78	23.55	342
1970	Choice	133	65	39.52	58.57	19.05	
	Price	68	34	33.70	47.23	13.53	
	Standard	2	1	40.40	41.25	0.25	
		203	100	37.50	54.00	17.02	357
1971	Choice	130	59	36.90	72.33	35.32	
	Price	72	31	37.39	60.75	22.87	
	Standard	23	10	34.75	44.53	9.78	
	Commercial	1	-	38.40	36.53	1.27	
		332	100	37.05	62.84	28.70	395
1972	Choice	275	73	47.32	55.91	42.30	
	Price	71	19	42.54	76.01	33.47	
	Standard	27	7	43.91	38.31	41.40	
	Commercial	3	1	45.19	47.40	4.21	
		375	100	46.36	70.07	42.71	422
1973	Choice	335	72	58.52	104.78	40.24	
	Price	74	17	55.38	87.12	32.34	
	Standard	21	5	55.95	71.10	15.15	
	Commercial	3	3	50.40	47.52	2.88	
		434	100	57.80	99.73	41.93	434
1974	Choice	500	52	53.52	103.70	44.12	
	Price	397	41	50.34	32.11	22.57	
	Standard	65	7	58.02	66.54	7.62	
		962	100	62.60	95.35	32.75	422
1975	Choice	371	60	73.68	140.04	64.36	
	Price	230	36	67.86	107.06	39.18	
	Standard	38	4	64.54	85.33	20.39	
		639	100	72.20	124.91	52.71	431
1976	Choice	572	61	85.86	142.30	56.44	
	Price	321	35	80.60	119.22	38.60	
	Standard	40	4	78.28	100.98	22.70	
		933	100	81.73	126.40	42.67	445
1977	Choice	1,016	59	90.42	139.57	49.15	
	Price	580	34	77.61	105.04	27.45	
	Standard	109	7	76.54	79.03	2.49	
		1,713	100	85.14	123.26	38.72	403
1978	Choice	707	65	93.42	139.64	46.22	
	Price	327	30	82.06	102.50	20.44	
	Standard	57	5	76.33	77.79	1.44	
		1,091	100	86.02	125.28	39.26	411

ANNEX IV (j)

Dairy Component

1. The criteria for successful application for a two dairy cow unit on credit were as follows:

- (a) three acres of pasture established;
- (b) the paddock for other livestock to be at least 300 yards distant from the dairy paddock;
- (c) the smallholder to be not more than five miles distant from a milk collection point;
- (d) adequately constructed milking parlour and khola;
- (e) an all round proven level of farm management ability.

1.1 However, these criteria do not appear to have been strictly adhered to as was indicated during a field visit to seven dairy farmers in May, 1979. For example, the requisite pasture area was relaxed as it was hoped that the smallholders would later meet the requirements as they became more proficient; night paddocks for the other livestock were not sufficiently distant and dairy cows were in some cases being allowed to graze on communal dambo areas increasing the risk of disease, east coast fever and fluke.

1.2 Pasture management was not good. In most cases pastures were unfenced and pasture grass was not being cut and stored according to a pattern that would retain nutrient value. Groundnut tops were however being gathered and stored for dry season fodder.

1.3 The use of madeya (maize husk) was being replaced by maize germ which was cheap from the local milling company (K 1.50 per 200 lbs) and livestock extension staff were assisting in transporting this to the farmers.

1.4 Factors limiting a successful expansion of the Dairy Component were (i) a lack of stock due to a Contagious Abortion outbreak at Dzalanyama ranch and (ii) a lack of adequate numbers of livestock extension staff to promote the scheme and encourage better management. Generally, it was evident that dairy smallholders were not visited by extension staff specifically to advise on Dairy Management but rather for general arable advice.

ANNEX IV(k)

**Table (i)** Details of the Departmental Warranting and available record of expenditure of Special Development Vote C-5 for NRDP preparation:

<u>Departmental Warrant</u>	<u>Provision</u>	<u>Expenditure</u>	<u>Balance of</u>
<u>Number:</u>	<u>M.K.</u>	<u>as at</u>	<u>unaccounted for</u>
		<u>31/3/76</u>	<u>expenditure:</u>
		<u>M.K.</u>	<u>M.K.</u>
13 (Salaries)	1,311	1,311	0
15 (Office equipment)	1,450	1,450	0
17 (Chief Projects Officer)	5,365	11,658	(-6,293)
101 (Ministry of Works)	26,718	20,485	6,233
105 (Department of Survey)	400	0	400
201 (Makoka Research Station)	6,500	1,761	4,539
261 (Agro-Economic Survey)	75,765	12,130	63,575
264 (Bvumbwe Research Station)	5,400	5,108	292
271 (Principal Land Husbandry Officer)	72,478	25,815	46,262
281 (Land Husbandry, Kasungu)	2,000	865	1,134
287 (Chief Agricultural Research Officer)	2,613	10,609	(-7,996)
298 (Land Husbandry, Zomba)	200	385	(-185)
- No provision	0	955	(-956)
<u>Totals</u>	<u>200,000</u>	<u>92,595</u>	<u>107,405</u>

Source: M.A.N.R. Financial Records.

**Table (ii)** Infrastructure development for NRDP preparation

	<u>Target</u>	<u>Achievement</u>
<u>Housing:</u>		
Class B	1	1
Class D	1	1

Source: MANR, HQ records

ANNEX IV (1)

Health Component (UNCDF Grant Project No. MLW/74/031)

1. The total grant was US\$ 1,600,000 which realized MK 1,401,900. The amount injected into the credit fund was MK 732,000 leaving MK 669,900 for expenditure on the Health Component.

2. Expenditure breakdown on Health Component was as follows:

	MK
Civil Works	521,200
Equipment and Vehicles	104,900
Drugs and Supplies	<u>43,800</u>
Total	<u>669,900</u>

Health Facilities Developed

3.1 Primary Health Center completed at Unit 3, Malingunde, which included the renovation and improvement of one ward and two existing houses. Total cost of all facilities provided in this primary health center amounted to K 83,700.

3.2 At Unit 24, Mitundu, K 45,360 was spent on an agreed construction towards a Full Primary Health Center. Facilities provided consisted of a large modern out-patient department and a large female ward.

3.3 Six sub-centers were provided at Units 12, 15, 26, 30, 32 and 34. The initial agreement made provision for five sub-centers and not six. Owing to the delapidated health structure at Nathenje (Unit 32) it was agreed by all parties that the building be demolished and a Full Sub-Center be built. This has been completed, and fully utilized.

3.4 Twenty-four health posts have been completed in the following units: 1, 2, 6, 7, 10, 11, 13, 14, 16, 17, 23, 25, 28, 29, 33, 40, 41, 42, 43, 44, 45, 46, 47.

3.5 Guardian shelters for sub-centers have been built at Units 15, 26, 30 and 34.

3.6 Additional Health facilities constructed and/or improved as agreed between the Programme, Ministry of Health and UNCDF were:

- (i) Extensive improvements to Kabudula primary health center costing MK 19,000.
- (ii) Upgrading and additional equipment for Malingunde primary health center, MK 80,000.
- (iii) Improvements to Mitunde primary health center MK 60,000



ANNEX IV (1)

- (iv) New dispensary and housing constructed for Unit 29.
- (v) Improvements to District Council maternity units at Units 4, 22, 34 and at Khongoni.
- (vi) Improvements to Chitedze sub-center.

4. With completion of all these civil works, every 2,000 families within the Programme are now served by a health facility, and every 10,000 families have a Health Sub-Center.

Table (i) A comparison of actual and projected crop production for Phase III

	<u>1975/76</u>		<u>1976/77</u>		<u>1977/78</u>		<u>1978/79</u>	
	<u>Projected</u>	<u>Actual</u>	<u>Projected</u>	<u>Actual</u>	<u>Projected</u>	<u>Actual</u>	<u>Projected</u>	<u>Actual</u>
<u>Maize</u>								
Total maize area (ha)	105,427	99,600	115,000	122,012	130,974	120,930	133,596	123,303
Total production (m. tons)	157,608	147,480	180,007	151,438	218,800	158,827	232,468	180,767
<u>Groundnuts</u>								
Total groundnut area (ha)	37,408	43,491	40,807	41,720	46,473	28,874	48,480	31,741
Total production (m. tons)	20,971	16,110	23,791	14,979	28,137	8,309	31,442	16,552
<u>Tobacco</u>								
Total tobacco area (ha)	21,254	20,369	23,188	21,303	26,405	30,347	27,474	28,949
Total production (m. tons)	9,055	10,185	9,879	12,001	11,250	14,567	11,706	13,986
ADMARC purchases (m. tons) <sup>1/</sup>		6,550		11,837		11,092		10,359

Note: 1/ ADMARC purchases are those estimated from developed areas. Represents ADMARC saleable yields.

Source: LIDP, Evaluation Unit

ANNEX V (a)

ANNEX V (b)/1

A Further Analysis of LLDP Crop Production Data

Before presenting the results of the econometric analysis it is necessary to state some background facts to the LLDP Smallholder situation as reported from Evaluation Surveys conducted in 1977/78. During this cropping season an estimated 41% of the total sampled growers (959) took project credit. It was found that husbandry practices applied to the tobacco crop approximated to extension recommendations (fertilizer and plant population); hybrid maize, which on average approximated to three-quarters of these extension recommendations, received better management than local maize; and groundnuts received relatively less attention with plant populations being on average half the recommended rate. Of the total sample 52% grew tobacco and 8% hybrid maize and there was an even split between hybrid maize growers who were tobacco and non-tobacco growers.

Factors determining crop yields:

Table (i) Correlation coefficients of yield against associated variables:  
LLDP, 1977/78

Correlation Coefficients: Yield : Variable

<u>Variable</u>	<u>Maize</u>		<u>Groundnuts</u>
	<u>Local</u>	<u>Hybrid</u>	
X <sub>1</sub> Time of planting	-0.16*	-0.14	-0.13*
X <sub>2</sub> Number of weedings	0.10	0.06	-0.12*
X <sub>3</sub> Plant populations	0.32***	0.37**	0.41***
X <sub>4</sub> Rate of fertilizer application (kg/ha)	0.15*	0.20	-
X <sub>5</sub> Plot area (ha)	0.06	0.23	0.09
X <sub>6</sub> Total holding area (ha)	0.12	0.42	0.03
X <sub>7</sub> Credit recipience (Yes or No)	0.18*	0.19	0.08
X <sub>8</sub> Extension contact (Yes or No)	0.08	0.30	0.04
X <sub>9</sub> Male grower (Yes or No)	-0.30***	-0.30*	0.00
X <sub>10</sub> Other farm experience (Yes or No)	0.02	0.09	0.03
X <sub>11</sub> Attendance at training course (Yes or No)	0.13	-0.17	0.06
X <sub>12</sub> Level of education	0.13	-0.17	0.06
Degree of Freedom (DF)	690	32	640

Levels of significance: \*\*\* = (P = 0.02)

    \*\* = (P = 0.05)

    \* = (P = 0.10)

Source: LLDP, Evaluation Unit

The major crop management factors associated with crop yields were found to be timeliness of planting, plant spacings and rate of fertilizer application; the correlation between yield and rate of fertilizer application for hybrid maize was not significant - the variance around the mean level of application was small. Groundnuts showed a negative but marginally significant ( $P = 0.20$ ) association between yield and weeding as too many are known to damage pods; the majority of local and hybrid maize plots were weeded two or three times and thus their yields were not expected a priori to have a significant association with weeding.

A multivariate regression analysis for local maize survey data was conducted using the above tabulated variables on yield. The equation line is given below ( $P = 0.005$ ).

$$\text{Yield} = 865.373 - 11.045X_1 + 105.057X_2 + 3.873X_3 + 0.743X_4 + 266.752X_7$$

(2.74)	(2.11)	(11.02)	(3.01)	(4.82)
0.005	0.025	0.005	0.005	0.005

Degree of Freedom = 874;  $R^2 = 0.412$

---

Note -  $11.045X_1 = X_1$  Coefficient  
 (2.74) = t - Statistic  
 0.005 = Significant level

Source: LLDP, Evaluation Unit.

No other variables from the data set were found to be significant. Although the coefficient of determination ( $R^2$ ) appears small, experience has shown that this is a very high degree of causation under Malawi smallholder conditions. Obviously, there is a large proportion of unexplained variation probably the result of stochastic and many sociological parameters.

LLDP was based on an integrated approach to rural development; integrating simultaneously credit, agricultural extension, input supplies and basic infrastructures, and indeed possibly to assess their performance, an examination was made of the inter-relationships between credit recipients, extension contactees and those attending at project training courses and other variables associate with improved crop management.

a. Credit recipients:

Table (ii) Correlation coefficients of credit recipients against yield and associated data: LLDP, 1977/78

<u>Variable</u>	<u>Correlated Coefficients</u>		
	<u>Maize</u>		<u>Groundnuts</u>
	<u>Local</u>	<u>Hybrid</u>	
X Yield	0.18*	0.19	0.08
X <sub>1</sub> Time of planting	-0.09	-0.11	-0.05
X <sub>2</sub> Plant populations	-0.06	-0.04	0.09
X <sub>4</sub> Rate of fertilizer application	0.08	0.10	-
X <sub>6</sub> Total holding area	0.22**	0.32*	0.28***
X <sub>8</sub> Extension contact	0.21**	-0.04	0.15*
X <sub>10</sub> Other farm experience	0.02	0.09	-0.02
X <sub>11</sub> Attended at training course	0.21**	-0.16	0.21**
X <sub>12</sub> Level of education	0.05	-0.04	0.04
Degree of Freedom	690	32	640

Level of significance: \*\*\* = (P = 0.02)

                          \*\* = (P = 0.05)

                          \* = (P = 0.10)

Source: LLDP, Evaluation Unit

It appears that farmers with comparatively large holdings held a greater chance of receiving project credit than those with small farms. Moreover, in the case of local maize and groundnut growers there was a positive association between credit recipients and those who received extension contact; even so there was not a significant correlation between credit recipience and improved crop management. Improved crop management practices were not associated with the LLDP credit system for local and hybrid maize and groundnuts during 1977/78. However, this does not necessarily mean that the credit component of LLDP was not a vehicle for crop improvement - much fertilizer bought on maize packages was used for the tobacco crop. This also explains the high association between credit recipience and local maize yields as a (small) proportion of credit purchased fertilizer was applied to the local maize crop.

b. Extension contactees:

Table (iii) Correlation coefficients of extension contactees against yield and associated data: LLDP, 1977/78

<u>Variable</u>	<u>Correlation Coefficients</u>		
	<u>Maize</u>		<u>Groundnuts</u>
	<u>Local</u>	<u>Hybrid</u>	
X Yield	0.09	0.30*	0.04
X <sub>1</sub> Time of planting	-0.02	0.03	0.00
X <sub>3</sub> Plant populations	0.03	0.14	0.05
X <sub>4</sub> Rate of fertilizer application	0.06	0.43***	-
X <sub>6</sub> Total holding area	0.23***	0.13	0.17*
X <sub>7</sub> Credit recipience	0.21**	-0.04	0.15
X <sub>10</sub> Other farm experience	0.06	-0.15	-0.02
X <sub>11</sub> Attended at training course	0.13	-0.16	0.12
X <sub>12</sub> Level of education	0.03	0.16	0.04
Degree of Freedom	690	32	64

Levels of significance: \*\*\* = (P = 0.02)

    \*\* = (P = 0.05)

    \* = (P = 0.10)

Source: LLDP, Evaluation Unit

An important observation to make from Table (iii) is that for both local maize and groundnuts no significant relationship existed between extension contact and the application of improved crop management. However, hybrid maize growers on the whole were associated with some improved crop management practices, even though they did not receive preferential treatment to project amenities.

c. Attendance at training course:

Table (iv) Correlation coefficients of those attending project training courses against yield and associated data: LLDP, 1977/78

<u>Variables</u>	<u>Correlation Coefficients</u>		
	<u>Local</u>	<u>Maize Hybrid</u>	<u>Groundnuts</u>
X Yield	0.14	0.33*	0.06
X <sub>1</sub> Time of planting	0.01	0.28*	0.05
X <sub>2</sub> Plant population	-0.04	-0.04	0.09
X <sub>4</sub> Rate of fertilizer application	0.06	-0.10	-
X <sub>5</sub> Total holding area	0.23***	0.16	0.30***
X <sub>6</sub> Extension contact	0.13	-0.16	0.12
X <sub>7</sub> Credit recipient	0.21**	-0.19	0.21**
X <sub>8</sub> Other farm experience	0.02	-0.17	0.04
X <sub>12</sub> Level of education	0.19**	-0.04	***
Degree of Freedom	690	32	640

Levels of significance: \*\*\* = (P = 0.02)

    \*\* = (P = 0.05)

    \* = (P = 0.10)

Source: LLDP, Evaluation Unit

The themes developed are further endorsed from the above table. It appears that for local maize and groundnut growers, the project training courses were attended by those farmers with better education, larger holdings and who participated in the project credit scheme but whose standard of crop husbandry for local maize and groundnuts were not significantly better than non-project course attendees.

So far the evidence suggests that: -

- (1) Hybrid maize growers were, in the main, the more progressive of LLDB smallholders during 1977/78, even though they did not receive a disproportionate emphasis of the extension and credit facilities provided by the project.
- (2) As improved maize seed was available to only 8% of LLDP participants it appears that the majority of smallholders opted to increase farm incomes by growing tobacco, using relatively improved management; but they continued to grow local maize and groundnuts under near subsistence conditions (low plant population) of high certainty.

As 52% of the sampled farmers grew tobacco and as both local maize and groundnuts were associated with credit recipience and extension contacts, and if hypothesis 2 above holds, then it may be assumed that:

- (3) LLDP gave credit to tobacco growers over non-tobacco growers as the former were associated with criteria of credit-worthiness.

In order to test these hypotheses, further analyses were conducted on the 1977/78 data. Due to incomplete data and a lack of adequate data and a lack of adequate facilities it was not possible to isolate in full the characteristics of both progressive and non-progressive types for both tobacco and non-tobacco farmers. However, the analysis and results which follow are indicative of certain characteristics being associated with these four farmer types.

Firstly, it was found that tobacco growers were privileged to project inputs over and above non-tobacco growers. For example, correlation coefficients were calculated from a random sub-sample of the full 1977/78 data set to see what project bias, if any, favored tobacco growers.

Hypothesis: Dependent variable as a function of tobacco growing.

<u>Dependent Variable</u>	<u>Correlation Coefficients</u>	<u>Degrees of Freedom</u>	<u>Significance Level</u>
	r	(n-2)	(P)
Credit recipience	0.31	78	0.01
Extension contact	0.32	78	0.01
Attendance at training course	0.40	78	0.001
Total holding size	*0.39	78	0.001

Source: LLDP, Evaluation Unit

Clearly tobacco growers were significantly associated with project activities which appear to be linked with a credit-worthiness criterion of large holding size. This result supports the trend of favored opportunity for tobacco growers, as indicated from a survey of credit borrowers conducted by the Evaluation Unit in May 1979.

However, except in the case of hybrid maize growers, the crop management practices applied to cash and staple crops by individual growers were not associated; a dense stand of tobacco (which was the norm) was not associated with high plant populations for local maize and groundnuts. Further,



the plant population of the latter two crops did not significantly alter between tobacco and non-tobacco growers. However, for hybrid maize growers it was significant that improved management for hybrid maize was strongly associated with improved management of local maize and groundnuts.

<u>Variables</u>	<u>Correlation Coefficients</u> (r)	<u>Degrees of Freedom</u> (n-2)	<u>Significance Level</u> (P)
<u>Plant populations:</u>			
L. maize: groundnuts	-0.06	31	not
L. maize: tobacco	0.05	36	not
Tobacco: groundnuts	0.15	30	not
H. maize: L. maize	0.34	31	0.05
H. maize: groundnuts	0.31	29	0.10

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Source: LLDP, Evaluation Unit

80% of the 1977/78 sampled growers grew tobacco in 1976/77. There was no significant difference in tobacco crop management between previous and new tobacco growers in 1977/78 which is indicative of credit going to tobacco growers and not necessarily credit making a tobacco grower.

Conclusion

Although being comparatively basic the analysis presented shows that:

1. Hybrid maize growers appear to be the more progressive of the LLDP population adopting major extension recommendations for most crops.
2. Tobacco growers in the main followed extension recommendations for tobacco cultivation even though for subsistence crops no significant crop management improvements were recorded.
3. The provision of essential inputs and services by LLDP favoured tobacco growers who fulfilled a basic criterion of credit-worthiness by being associated with relatively large farm areas.

Recommendations

It is recommended that policies should be geared to: (a) implementing criteria to reduce the bias of credit disbursements in favour of tobacco growers; and (b) wean farmers off the credit scheme after several seasons participation.

**Table (1)      LLDP Phase III : Comparison on Fertilizer Sales in Central Region of Malawi and LLDP**

	<u>1970/71</u>	<u>1971/72</u>	<u>1972/73</u>	<u>1973/74</u>	<u>1974/75</u>	<u>1975/76</u>	<u>1976/77</u>	<u>1977/78</u>	<u>1978/79</u>
Total fertilizer sales for Central Region (K)	n.a.	n.a.	n.a.	14,446	7,624	10,854	16,950	25,151	25,387
Total fertilizer sales LLDP (K)	877	3,936	3,942	7,055	4,286	5,365	6,160	9,485	10,223
LLDP fertilizer sales as % of Central Region's	-	-	-	48.8	56.2	49.2	39.3	37.7	40.0
LLDP cash sales as % of total sales	9.5	1.5	1.3	17.7	13.0	28.7	20.3	28.2	15.7
Tobacco bonus payments (% of guaranteed min. price)	-	1.5	-	-	40.0	40.0	60.0	15.0	-

Source: LLDP, Marketing Section

ANNEX V(e)

Table (i) LLDP, Phase III : Estimated cropping patterns and imputed arable incomes (1978/79 ADMARC prices)

	<u>1975/76</u>	<u>1976/77</u>	<u>1977/78</u>	<u>1978/79</u>
	(ha)	(ha)	(ha)	(ha)
Maize	1.21	1.20	1.14	1.17
Groundnuts	0.52	0.40	0.27	0.26
Tobacco	0.24	0.21	0.29	0.28
Others	0.13	0.10	0.08	0.05
Total	2.10	1.91	1.78	1.76
S.D.	(1.15)	(1.05)	(1.20)	(1.03)
Imputed arable incomes (K)	136.89	107.01	90.51	136.22

Table 11 - COMPARISON OF IMPROVED AND UNIMPROVED CROP

GROSS MARGINS LIDP, 1978/79 AT ADMARC FARMGATE PRICES

<u>Local maize</u>	<u>Unimproved</u>	<u>Improved</u>
<u>Returns</u>		
Area (ha)	1.0	1.0
Yield (Kg/ha)	1,100	1,352
Farmgate price (t/kg)	<u>4.96</u>	<u>4.96</u>
Gross revenue (K)	54.56	66.07
<u>Variable Costs</u>		
Seeds (K)	1.24	1.24
Fertilizers (t)	-	20.39
Hired Labor (K)	-	3.00
Transport (K)	<u>-</u>	<u>-</u>
Total V.C. (K)	<u>1.24</u>	<u>24.63</u>
Gross Margin (K/ha)	53.32	41.44
Gross Margin per Man-day (K/md)	<u>0.44</u>	<u>0.35</u>
<u>Improved Maize</u>	<u>Composite</u>	<u>Hybrid</u>
<u>Returns</u>		
Area (ha)	1.0	1.0
Yield (kg/ha)	1,948	3,779
Farm-gate Price (t/kg)	<u>4.96</u>	<u>4.96</u>
Gross Revenue (K)	<u>96.62</u>	<u>182.04</u>
<u>Variable Costs</u>		
Seeds (K)	2.72	17.30
Fertilizers (K)	27.18	48.19
Hired Labor (K)	14.83	14.83
Transport (K)	<u>3.00</u>	<u>4.94</u>
Total V. C. (K)	<u>47.61</u>	<u>85.26</u>
Gross Margin (K/ha)	49.01	101.78
Gross Margin per Man-day (K/md)	<u>n.a.</u>	<u>n.a</u>
<u>Groundnuts</u>	<u>Unimproved</u>	<u>Improved</u>
<u>Returns</u>		
Area (ha)	1.0	1.0
Yield (Kg/ha)	315	494
Farm-gate Price (t/kg)	<u>33</u>	<u>33</u>
Gross Revenue (t)	<u>103.95</u>	<u>175.23</u>

<u>Variable Costs</u>	<u>Unimproved</u>	<u>Improved</u>
Seeds (K)	22.22	22.22
Hired Labor (K)	-	5.00
Transport (K)	-	1.75
<b>Total V.C. (K)</b>	<b>22.22</b>	<b>28.95</b>
Gross Margin (K/ha)	81.73	146.28
Gross Margin Per man-day (K/md)	0.38	0.68
<u>Tobacco</u>		
<u>Returns</u>		
Area (ha)	1.0	1.0
Yield (kg/ha)	380	500
Farm-gate Price (t/kg)	44.08	44.08
Gross Reve		
Gross Revenue	167.50	220.40
<u>Variable Costs</u>		
Seeds (K)	-	-
Fertilizers (K)	34.60	59.19
Hired Labor (K)	13.00	15.00
Wood (K)	3.00	4.00
Transport (K)	1.25	1.75
<b>Total V. C. (K)</b>	<b>51.85</b>	<b>98.94</b>
Gross Margin (K/ha)	115.65	130.46
Gross Margin Per Man-day (K/md)	0.22	0.24

- 
- 1/ Yields: Composite - improved 1977/78 estimate;  
Other yields see crop production estimates for 1978/79
- 2/ Seeds rates: Maize - 25 kg/ha at 7.7t/kg (ADMARC selling price)  
Groundnuts - 67 kg/ha at Farm-gate Price.
- 3/ Fertilizer rates: Local improved 185 kg/ha  
Composite 250 kg/ha (S/a), hybrid 370 kg  
Tobacco 500 kg/ha, improved; 250 kg/ha unimproved.
- 4/ Labor data see (5).

Table (iii) Comparison of Farm Budgets:LIDP,1978/79  
(Constant Prices)

1.80 Hectare non-tobacco Farm

	<u>Area</u>	<u>Margins</u>	
	<u>(ha)</u>	<u>Unimproved</u>	<u>Improved</u>
		<u>(K)</u>	<u>(K)</u>
Maize	1.41	75.18	57.85
Groundnuts	0.40	<u>32.69</u>	<u>58.51</u>
Total Budget		<u>107.87</u>	<u>116.36</u>

1.80 Hectare Tobacco Farm

Maize	1.01	53.85	53.85
Groundnuts	0.40	32.69	58.51
Tobacco	0.40	<u>46.26</u>	<u>52.18</u>
Total Budget		<u>132.80</u>	<u>164.54</u>

3.0 Hectare Tobacco Farm

Maize	1.60	85.31	85.31
Groundnuts	0.81	66.20	118.47
Tobacco	0.81	<u>93.68</u>	<u>131.27</u>
Total Budget		<u>245.19</u>	<u>335.05</u>

1.0 Hectare Non-tobacco Farm

Maize	0.81	43.19	41.48
Groundnuts	0.20	<u>16.35</u>	<u>29.25</u>
Total Budget		<u>59.54</u>	<u>70.74</u>

Source: LIDP, Evaluation Unit

Table (i) An Average Stallfeeder Budget  
(Based on 1978 Average results)

	MK
Average Price at Slaughter .....	125.28
, (from Annex IV(i))	
<u>Less</u> Issue Price	
(from Annex IV (i))	86.02
Insurance (1½%)	1.08
Feed Costs (sss below)	<u>12.77</u>
	<u>99.87</u>
Gross Margin:	<u>25.41</u>

Calculation of Feed Costs:

Live weight at Slaughter 804 lbs (4 ll c.d.w. at 51%).  
 " " " " 573 lbs  
 gain 231 lbs

Feed Cost = K25.22 x  $\frac{231}{420}$  = K 12.77 (based on gain ratio with measured feed cost results in Table (ii) below)

Note: Costs of Madeya, crop residues and labor input have been excluded from this Gross Margin calculation.

Table (ii). Comparison with a "demonstration" result achieved at training centre in 1978.

Days fattened	234
Slaughter weight (LW kgs)	499
LWG from purchase	191
Cold dressed weight	264
Killing out %	53
Grade at Slaughter	<u>Choice</u>
Total receipts (K)	<u>184.62</u>
<u>Variable Costs</u>	
1,800 kgs bran	19.60
82 kgs salt	3.62
Steer price at issue	106.08
Insurance (134%)	<u>1.33</u>
	<u>129.30</u>
Margin over costs (K)	<u>55.32</u>

Note: Crop residues and Madeya have not been included as these foods are available at little or no cost to the farmer.

Source: LIDP, Nsaru Training Centre. (actual results).



ANNEX V (g)

Annual Budget for a 2-cow Dairy Herd

<u>Revenue</u>	<u>2 Cow Herd</u>
Milk (1.406 kgs/animal/lactation at 9.38 t/lotre)	264.12
Calves (X2)	<u>94.16</u>
	396.18
 <u>Variable Costs</u>	
Interest on capital (average over 5 years ) <u>1/</u>	14.00
Depreciation of stock (spread over 5 years ) <u>2/</u>	24.00
Toxaphene	18.34
Salt	22.65
Madeya	5.23
Fertilizer	3.28
Hired Labor	31.83
Miscellaneous	8.22
Insurance	<u>5.54</u>
	<u>133.09</u>
 Margin over costs (K)	<u><u>263.09</u></u>

1/ K260 for two-cow unit at 10% per annum

2/ Slaughter value of stock taken at K70 each cow.

Source:   FAO/UNDP Livestock Project Malawi: Survey conducted  
December 1977 - November 1978 in the Lilongwe milkshed area.

LLDP Phase III : Standard Poultry Enterprise Budget  
(1978/1979 Constant Prices)

<u>Revenues</u>		<u>K</u>
Egg returns (17 doz. eggs/bird at 12-1/2 bird mortality/cycle at 55.5 t/doz. eggs)		990.68
Sales of culled birds (at K1.50 each)		157.50
		<u>1,148.18</u>
<u>Costs</u>		
<u>Capital Costs</u>		
<u>Credit:</u> (a) cages for 120 birds		280.00
(b) 20 m of 3.8 cm wire mesh at 78 t/m		15.60
(c) 13 bags feed (for 2 months at K8.78/bag)		114.14
(d) transport Blantyre/Lilongwe, 200 miles at 58 t/mile shared between 10 cages		11.60
		<u>421.34</u>
<u>Repayment</u>		
Annuity accounting 10% interest over 5 years gives an <u>annual</u> repayment of		111.15
<u>Working Capital</u>		
Feed - 6.5 bags/month for 10 months at K8.78/bag		570.70
Birds - 120 birds <u>at point of lay</u> at K1.80 each		216.00
<u>Fixed capital cash flow (5 year repayment period)</u>		
<u>Year</u>	<u>Item</u>	
1	Repayment of capital and interest	111.15
	Interest on birds	21.60
	Housing	30.00
	Insurance at K1.00/month	12.00
		<u>174.75</u>
2	Repayment of capital and interest	111.15
	Interest on birds	21.60
	Insurance	12.00
		<u>144.75</u>
3	Repayment of capital and interest	144.75
4	Repayment of capital & interest + K10.00 maintenance	154.75
5	Repayment of capital and interest+ K10.00 maintenance	154.75
6	Repayment of capital and interest	-

Complete budget for 5 years with 'point of lay' issues

<u>Year</u>	<u>Costs</u> (Working + capital) (K)	<u>Profit</u> (K)
1	961.45	186.73
2	931.45	216.73
3	931.45	216.73
4	941.45	206.73
5	941.45	206.73
6	796.70	351.48

Smallholders' Cattle Herd Ratios at Twelve <sup>1/</sup> Dip Tanks Wholly Within LLDP Programme Area: 1975 to 1978

<u>Year</u>	<u>Bulls and other 'whole' males</u>		<u>Castrated males</u>	<u>Cows &amp; heifers</u>	<u>Calves</u>	<u>Total</u>
	<u>Cows to males ratio</u>	<u>% of herd</u>				
			<u>% of herd</u>	<u>% of herd</u>	<u>% of cows/heifers</u>	<u>Absolute number</u>
1975	17	3	17	50	59	38,902
1976	15	3	17	51	57	39,619
1977	14	4	18	50	56	38,689
1978	9	5	16	48	65	37,458

1/ The twelve dip tanks chosen were: Chad , Chilinda, Likuni, Libvuwadzi, Malimbwa, Manchichi, Masula, Mbabzi, Mchoka, Namaguya, Sinyala and Tanga.

Source: Derived from Veterinary Department annual dip tank census.

ANNEX VI (a)

Table (i): WITHDRAWAL OF IDA CREDIT PROCEEDS (PHASE III:550-MAI

Category	<u>Credit Agreement Plan</u>		<u>Actual Result</u>
	<u>US\$</u>	<u>Equivalent MK</u>	<u>MK</u>
I. <u>Civil Works</u> (ADMARC, Health and NRDP preparation excluded):	1,200,000	996,000	982,862
II. <u>Vehicles, equipment, machinery and Livestock:</u> (NRDP preparation and credit administration excluded):	1,000,000	830,000	929,705
III. (a) <u>Personnel</u>	2,600,000	2,158,000	2,760,297
(b) <u>Administration, operating, and Maintenance:</u> (Dzalanyama Ranch excluded)	2,300,000	1,909,000	2,462,079
IV. <u>NRDP Preparation:</u>	250,000	207,500	173,081
V. <u>Unallocated:</u> (Contingencies)	<u>1,150,000</u>	<u>954,500</u>	<u>0</u>
TOTAL:	<u>8,500,000</u>	<u>7,055,000</u>	<u>7,308,024</u>
Rate of Exchange \$/MK	-	0.83	0.86

Table (ii): WITHDRAWAL OF U.N.C.D.F. PROCEDURE (MLW/74/031)

Category:	<u>Credit Agreement Plan</u>		<u>Actual Result</u>
	<u>US\$</u>	<u>Equivalent MK</u>	<u>MK MK</u>
I. Civil Works	420,000	318,000	521,200
II. Equipment, vehicles and Materials:	70,000	58,100	104,900
III. Drugs and Supplies:	90,000	74,700	43,800
IV. Credit Fund:	600,000	498,000	732,000
V. Unallocated:	<u>420,000</u>	<u>348,600</u>	<u>0</u>
TOTAL:	<u>1,600,000</u>	<u>1,328,000</u>	<u>1,401,900</u>
Rate of exchange \$/MK	-	0.83	0.88

ANNEX VI (b)

PHASE III SUMMARY OF OPERATING COSTS BY COMPONENT:  
ACTUAL COMPARED TO APPRAISAL PLAN (CONTINGENCIES ADDED)  
MK'000 (1ST APRIL 1975 TO 31ST MARCH 1979)

<u>Component</u>	<u>Planned</u>	<u>Cost Actual</u>	<u>Difference</u>
Management, Administration and			
Financial Control	496	463	-33
Building and Construction	545	813	+268
Earthworks	812	524	-288
Surveys	414	318	-96
Land Use and Layout	335	293	-42
Land Allocation	336	232	-104
Field Development Services	33	30	-3
Extension	961	892	-69
Training	229	247	+18
Livestock	278	208	-70
Ranch	397	531	+134
Credit Administration	451	395	-56
Marketing	41	41	0
Rural Development	50	56	+6
Health	307	117	-190
Evaluation	179	146	-33
TOTAL	<u>5,864</u>	<u>5,306</u>	<u>-558</u>

Source: Financial Control Records

SCHEDULE OF FIXED ASSETS AND EQUIPMENT: (MK'000)

PROGRAMME ASSETS:

<u>Item:</u>	<u>At Cost</u>		<u>Appreciated Value</u>
	<u>as at</u> <u>30/9/74</u>	<u>additions 1/10/74</u> <u>to 3/9/78</u>	<u>as at</u> <u>30/9/78</u>
Construction Works total:	<u>3,617</u>	<u>3,156</u>	<u>4,329</u>
<u>of which:</u>			
Roads	385	397	782
Bridges	259	345	532
Dambo crossings and culverts	<u>94</u>	<u>12</u>	<u>37</u>
<u>Sub-Total Road</u> <u>Facilities</u>	<u>738</u>	<u>754</u>	<u>1,401</u>
Boreholes	401	359	112
Borehole aprons	<u>17</u>	<u>31</u>	<u>15</u>
<u>Sub-total Borehole</u> <u>facilities</u>	<u>448</u>	<u>390</u>	<u>128</u>
Diversion ditches	662	595	188
Waterways	277	273	410
Spillways + drifts	<u>9</u>	<u>2</u>	<u>1</u>
<u>Sub-total conservation</u> <u>works</u>	<u>948</u>	<u>875</u>	<u>599</u>
Training centres	23	91	103
H.W. Offices and Stores	66	17	61
Domestic houses, HQ	903	52	765
Domestic houses offices and stores at Units	497	464	793
Egg gradin, station	0	36	33
Dips	<u>24</u>	<u>0</u>	<u>15</u>
Sub-total buildings	<u>1,513</u>	<u>660</u>	<u>1,770</u>
Health buildings	<u>0</u>	<u>477</u>	<u>431</u>
<u>then:</u>			
<u>Dzalanyama ranch</u> <u>development</u> (excluding livestock)	237	131	244
Motor Vehicles	823	544	496
Plant and Machinery	570	(-37)	27
General Equipment	<u>344</u>	<u>121</u>	<u>130</u>
<u>TOTAL</u>	<u>5,591</u>	<u>3,915</u>	<u>5,226</u>

Sources Financial Accounts of ILDP. Note that although the period does not exactly coincide with the life of Phase III these figures do provide a close approximation of Phase III addition.

PHASE III (CREDIT 550-MAI) SCHEDULE OF REIMBURSEMENT

IDA Fiscal Year Quarter ended	<u>(Drawdown of Loan)</u>		<u>(US\$'000)</u>	
	Appraisal Plan Reimbursement In Quarter	Cumulative	Actual Result Reimbursement In Quarter	Cumulative
<u>1973/76</u>				
September	-	-	-	-
December	-	-	-	-
March	-	-	967	967
June	870	870	474	1,441
<u>1976/77</u>				
September	870	1,740	567	2,008
December	870	2,610	555	2,563
March	870	3,480	722	3,285
June	660	4,140	736	4,021
<u>1977/78</u>				
September	660	4,800	508	4,529
December	660	5,460	615	5,144
March	660	6,120	588	5,732
June	600	6,700	805	6,537
<u>1978/79</u>				
September	600	7,300	810	7,338
December	600	7,920	566	7,904
March	580	8,500	596	8,500

Source: ILDP, Financial control

ANNEX VI (e)

COMPARISON OF PRICE CONTINGENCIES ALLOWED <sup>1/</sup> WITH ACTUAL PRICE INDICES <sup>2/</sup>

<u>Year</u>	<u>Building Materials</u>		<u>Vehicles, Machinery and Equipment</u>		<u>Petrol, oil and Lubricants</u>		<u>Salaries and Wages</u>		<u>3/</u>
	<u>Contingency Price Allowed</u>	<u>Index</u>	<u>Contingency Price Allowed</u>	<u>Index</u>	<u>Contingency Price Allowed</u>	<u>Index</u>	<u>Contingency Price Allowed</u>	<u>Index</u>	
1974/75	1001	100	100	100	100	100	100	100	
1975/76	115	109	111	132	111	116	115	98	
1976/77	129	142	119	150	119	136	129	109	
1977/78	144	163	128	156	128	159	144	102	
1978/79	162	158	138	164	138	168	162	143	

Notes:

1/ Price contingencies compounded with 1974 as base year.

2/ Source: National Statistical Office. An additional price index for "All imported items" was as follows: 1974/75 = 100;  
1975/76 = 122;  
1976/77 = 140;  
1977/78 = 155;  
1978/79 = 156.

3/ Based on average monthly earnings of all (national) government employees.



Table (i)

PROJECT COMPONENTS BY DIVISION

Division	I	- <u>Management</u>
		1. Evaluation
		2. Land Allocation
		3. Surveys
Division	II	- <u>Building &amp; Construction</u>
		1. Construction and Earthworks
		2. Land Use and Layout
		3. Building
Division	III	- <u>Finance</u>
		1. Financial Controller
		2. Credit
		3. Marketing
Division	IV	- <u>Field Development Services</u>
		1. Extension and Field Services
		2. Research and Trials
		3. Livestock
		4. Ranch
		5. Forestry
		6. Training
Division	V	- <u>Institutional &amp; Administrative</u>
		1. Administration and Personnel
		2. Rural Development
		3. Transport

Table (ii) LLDP PHASE III: Comparison of Projected, Established and Filled Staff Posts

<u>Division</u>	<u>Senior</u>			<u>Junior</u>		
	<u>E/A</u>	<u>E/A</u>	<u>E/A</u>	<u>E/A</u>	<u>E/A</u>	<u>E/A</u>
I	61	41	70	50	38	75
II	63	37	75	41	19	48
III	92	51	54	97	103	89
IV	119	82	68	94	81	86
Total	83	57	73	76	67	75

Note: E/A = Established/Appraisal  
 F/A = Filled/Appraisal  
 F/E = Filled/Established

Source: LLDP, Personnel Section

ANNEX VII(b)

Procurement of Vehicles during Phase III

<u>Class of Vehicle</u>	Tender No.: 1516		Tender No.: 1781	
	1976		1977	
	<u>No.</u>	<u>Ave. Cost (MK)</u>	<u>No.</u>	<u>Ave. Cost (MK)</u>
(i) Four-wheel drive	16	7,275	19	8,848
(ii) Passenger cars	18	3,213	8	4,348
(iii) Back-up trucks	12	4,053	2	5,600
(iv) Motor cycles	10	690	12	660
(v) 5-ton trucks	3	10,494	2	10,150
(vi) 7-ton trucks	3	13,706	4	13,740
(vii) Personnel carriers	2	12,000	-	---
(viii) Microbus	1	6,200	-	---

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Assumptions and sources of data for calculation of incremental crop production summarised

- (1) For years 1968/69 to 1974/75 inclusive, incremental production based on hecarage of crops in areas being developed multiplied by differences in yields per hectare between Developed and Undeveloped areas (see Table 5.5 of text). In the case of 'tobacco' where no objective yield statistic was available, then taken as straight difference between Developed area yields (500 kg/ha) and Undeveloped area yields (380 kg/ha). For 'Other crops' yield taken as 400 kg/ha in all cases. Sources Evaluation Unit Survey Reports.
- (2) For years 1977/78 and 1978/79 based on Projected hectarages (for without Project situation) compared with actual crop hectarages reported by Evaluation Unit and Yield data as in (1) above.
- (3) Hectarage Projections (for without Project situation) using 1971/72 survey baseline with maize area increasing by 2 per cent per annum, groundnut and tobacco area decreasing by 2 per cent per annum. 'Other crops' area increasing by 2 per cent per annum.
- (4) Crop yield projections (for without Project situation) using base yield as average of 1969/70 to 1971/72 Evaluation Survey results in Undeveloped areas (see Table 5.5 of text) for Maize and Groundnuts, with Tobacco at 380 kg/ha and 'Other crops' at 400 kg/ha. Maize and groundnut yields then decreased by 2 per cent per annum and yields for Tobacco and 'Other crops' held constant.
- (5) Hectarage projection (following Phase III from 1979/80) based on 1979/80 results with maize increased by 2 per cent per annum, tobacco decreased by 1 per cent per annum, and groundnuts and other crops held constant.
- (6) Crop yield projection (following Phase III from 1979/80) based on average results for period 1975/76 to 1978/79 (Developed areas) with maize and tobacco yields projected to increase by 1 per cent per annum and groundnut and 'Other crops' yields to remain constant.

(7) Abattoir costs and beef import parity

Cold Storage Company

Accounts for year ended 31/12/78

Total Abattoir expenses = K567,616

Total meat slaughtered = 2,271,461 lbs c.d.w.

Cost per lb c.d.w. = 25 tambala

Value of offals and hides = K418,618

i.e. 74% of cost of slaughter

Net cost of slaughter per lb. c.d.w. = 7 tambala per lb.

Imports 1978

'Miscellaneous' beef 48,450 lbs. at K36,139 = 75t per lb.

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Total hectares of crops in areas being developed and  
already developed (LLDP Phases I to III) 1968/69-1976/77

no	Maize	Groundnuts	Tobacco	Other crops <sup>#</sup>
1	5,000	1,000	300	4,000
2	9,400	3,100	800	10,400
3	27,700	9,500	2,600	2,700
4	40,500	13,900	6,400	3,800
5	54,300	17,200	5,600	2,100
6	70,900	22,900	10,800	3,400
7	78,300	26,100	14,000	5,800
8	99,600	43,500	20,400	10,300
9	122,000	41,700	21,300	8,300

# includes maize mixes.

- 1) Total hectares of crops for entire Programme area projected for a 'without project' situation from a 1971/72 data baseline

no	Maize	Groundnuts	Tobacco	Other crops
1	115,000	42,400	26,100	7,800
2	...	...	...	...
3	120,500	37,600	23,100	8,800
4	132,100	36,800	22,700	9,000
5	134,700	36,700	22,200	9,100
6	137,400	35,400	21,800	9,300
7	140,200	34,600	21,300	9,500
8	143,000	34,000	20,900	9,700
9	145,200	33,300	20,500	10,000
10	148,800	32,600	20,100	10,100
11	151,700	32,000	19,700	10,300
12	154,800	31,300	19,300	10,500
13	157,900	30,700	18,900	10,700
14	161,000	30,100	18,500	10,900
15	164,200	29,500	18,100	11,100
16	167,500	28,900	17,800	11,400
17	170,900	28,300	17,400	11,600
18	174,300	27,700	17,100	11,800
19	177,800	27,200	16,700	12,100
20	181,300	26,600	16,400	12,300
21	185,000	26,100	16,100	12,500
22	188,700	25,600	15,800	12,800
23	190,000	25,100	15,400	13,000
24	192,000	24,000	15,000	13,000

Total hectares = 244,000

Table (iii) Total hectares of crops for entire Programme area in 1977/78 and 1978/79 and Projected from 1979/80 to 1998/99 following Phase III

<u>Crop season</u>	<u>Maize</u>	<u>Groundnuts</u>	<u>Tobacco</u>	<u>Other crops</u>
1978/79	128,100	28,500	30,600	5,500
. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
1979/80	131,000	"	30,000	"
80/81	133,000	"	30,000	"
81/82	136,000	"	29,700	"
82/83	139,000	"	29,400	"
83/84	142,200	"	29,100	"
84/85	145,000	"	28,800	"
85/86	148,000	"	28,500	"
86/87	150,000	"	28,200	"
87/88	153,000	"	28,000	"
88/89	157,000	"	27,700	"
89/90	160,000	"	27,400	"
90/91	163,000	"	27,100	"
91/92	166,000	"	26,900	"
92/93	169,000	"	26,600	"
93/94	173,000	"	26,300	"
94/95	176,000	"	26,100	"
95/96	180,000	"	25,800	"
96/97	183,000	"	25,500	"
97/98	187,000	23,000	25,300	5,000
98/99	187,000	28,000	25,000	5,000

1998/99 Total hectares = 245,000

and III combined.

<u>Crop season</u>	<u>Maize</u>	<u>Groundnuts</u>	<u>Tobacco</u>	<u>Other crops</u>
1968/69	0	0	0	0
69/70	658	(229)	96	1,040
70/71	4,571	(532)	312	(2,040)
71/72	33,089	528	768	(1,600)
72/73	8,199	327	672	(2,280)
73/74	12,195	916	1,296	(1,840)
74/75	31,946	(104)	1,680	(1,000)
75/76	23,207	957	2,445	760
76/77	27,938	2,836	3,944	(120)
77/78	29,327	(10,491)	3,034	20
78/79	31,283	(3,924)	3,060	(1,200)
79/80	52,100	(2,800)	6,400	(1,300)
80/81	55,700	(2,100)	6,600	(1,400)
81/82	55,700	(1,400)	6,800	(1,500)
82/83	60,700	(800)	7,000	(1,600)
83/84	79,800	(200)	7,200	(1,700)
84/85	91,000	500	7,400	(1,800)
85/86	93,100	1,100	7,600	(1,900)
86/87	97,300	1,700	7,800	(2,000)
87/88	99,200	2,200	8,000	(2,100)
88/89	106,700	2,500	8,100	(2,200)
89/90	127,900	3,000	8,200	(2,300)
90/91	133,500	3,500	8,300	(2,400)
91/92	139,100	4,000	8,400	(2,500)
92/93	144,900	4,300	8,500	(2,600)
93/94	148,800	4,700	8,600	(2,700)
94/95	154,700	5,200	8,700	(2,800)
95/96	180,200	5,600	8,800	(2,900)
96/97	186,600	5,800	8,900	(3,000)
97/98	194,800	6,200	9,000	(3,100)
98/99	203,000	6,600	9,100	(3,200)

Note: Figures in brackets are negatives.

Table (v) Incremental wood production projected from Forestry component implementation

<u>Year</u>	<u>Wood</u> (cu.m)
1979/80	11,923
80/81	19,531
81/82	17,221
82/83	38,438
83/84	-
84/85	11,923
85/86	19,531
86/87	17,221
87/88	38,438
88/89	-
89/90	11,923
90/91	19,531
91/92	17,221
92/93	38,438
93/94	-
94/95	11,923
95/96	19,531
96/97	17,221
97/98	38,438
98/99	-

Note: It was estimated for the above that the 420 hectares of smallholder woodlots established in Phase III would produce a total of 360,380 cubic metres of wood (including regrowth) over a 25 period. This was calculated using the following take-off estimates: (after 5 to 6 years and every subsequent 5 years):

Eucalypts sps.	62.26	cu.m/ha
Gmelina	"	84.90
Cassia	"	62.26

Notes on the Cost/Benefit Analysis Table

1. Figures are historical up to and including the 1978/79 season.
2. Calculation is at constant average prices prevailing for 1978/79.
3. Crop incremental benefits based on Tables (i) to (iv) and the notes on assumptions and data sources. Export parity prices have been used in the case of tobacco and groundnuts and a blend of import/export parity have been used for maize valuations (on same basis as in reference 12). Other crops valued as for maize.
4. Crop incremental costs based on actual inputs recorded up to 1978/79 and projected thereafter on basis of input/output ratios for maize and tobacco developed in Annex 8 of LLDP Phase IV proposals (reference 11). It was assumed that there would be no sulphur dust application to groundnuts.
5. Incremental costs for tobacco production include firewood allowed at one cubic metre (solid) per 50kgs incremental cured leaf costed at K3 per cubic metre.
6. Smallholders labour input has been costed at zero.
7. Net poultry enterprise benefits taken as 60 per cent of theoretical Gross margin calculations at Annex V (h). All benefits ceasing after 1977/78.
8. Net dairy enterprise benefits taken on basis of maintaining herds by replacement and average milk yields of 350 gallons per lactation period and on similar basis to Report 2075-MAI, Volume III, Working Paper 22, Table 3 (reference 12).
9. Dzalanyama net costs included on basis of results and projects given at Annex IV (h) converted to constant average 1978/79 prices.
10. Forestry benefits calculated on basis of projections at Annex VII, Table (v), at K3 for cubic metre.
11. Stallfeeder net benefits calculated on basis of beef import parity prices (see Report 2075-MAI selected working papers, Volume III, Paper 26, Table 10 - reference 12) projections of Dzalanyama feeder output, smallholder input costs as at Annex V (f) Table (i), and abattoir processing costs as at Annex VIII (a).
12. No incremental benefit from traditional livestock holdings included (see 5.6.5 of text).
13. On-going project (or government) services required to maintain the incremental benefits projected have been calculated as the average annual operating cost in Phase III of each of the following components: Extension, Training, Livestock, Credit Administration, Marketing, Rural Development and Evaluation;



plus the average cost of drugs used in the Health component; plus an allowance for maintenance at 2-1/2 per cent of total fixed assets (at cost); plus a cost of Management, Administration and Financial Control calculated as a ratio of the foregoing costs totalled, compared to actual average for Phase III.

Costs and benefits in the Economic Analysis, MK'000 (1978 prices)

Year	Crops:			Forestry net Benefit	Livestock Net Benefit				Total All Incremental Benefits	Total Incremental Project Costs	Net Benefits to Costs
	Incremental:				Dzalanyama Ranch	Stall- feeders	Dairy & Poultry	Total Livestock			
	Benefits	Costs	Net								
1968/69	0	26	(26)	0	0	8	0	8	(18)	1815	(1832)
69/70	190	37	153	0	0	39	0	39	192	2904	(2712)
70/71	509	273	236	0	(27)	43	0	16	252	2662	(2410)
71/72	3119	925	2194	0	(38)	55	0	17	2211	4265	(2057)
72/73	1905	942	563	0	(31)	95	0	64	627	3047	(2420)
73/74	2918	1286	1632	0	(88)	112	0	24	1656	2354	( 693)
74/75	4410	932	3478	0	(124)	243	0	119	3597	2629	968
75/76	5547	1264	4283	0	(123)	165	2	44	4327	1362	2965
76/77	8688	1958	7130	0	(160)	250	7	97	7227	1305	5922
77/78	3826	2014	1812	0	(142)	420	4	282	2094	1252	842
78/79	6282	2122	4160	0	(118)	209	6	197	4317	1154	3163
79/80	14118	3561	10557	36	(126)	244	5	123	10630	833	9847
80/81	14860	3710	11150	59	(63)	254	4	196	11346	833	10513
81/82	15709	3834	11825	52	(63)	292	2	231	12056	833	11223
82/83	17625	4323	13302	115	(65)	312	4	251	13553	833	12720
83/84	18502	4509	13993	0	(59)	334	6	281	14274	833	13441
84/85	19398	4694	14704	36	(59)	334	6	281	15021	833	14138
85/86	21851	4814	17067	59	(59)	318	6	265	17391	833	16558
86/87	22738	4973	17765	52	(59)	318	6	265	18082	833	17249
87/88	23391	5090	18301	115	(59)	318	5	264	18680	833	17847
88/89	24232	5270	18962	0	(59)	318	4	263	19225	833	18392
89/90	26180	5708	20472	36	(59)	318	2	261	20769	833	19936
90/91	26926	5853	21073	59	(59)	318	4	263	21395	833	20562
91/92	27673	5999	21674	52	(59)	318	6	265	21991	833	21158
92/93	28383	6143	22235	115	(59)	318	6	265	22615	833	21782
93/94	28972	6362	22710	0	(59)	318	6	265	22795	833	22142
94/95	29742	6412	23330	36	(59)	318	6	265	23631	833	22798
95/96	31995	6829	25066	59	(59)	318	5	264	25389	833	24556
96/97	32724	7090	25634	52	(59)	318	4	263	25949	833	25116
97/98	33645	7284	26361	115	(59)	318	2	261	26737	833	25904
98/99	34565	7477	27088	0	(59)	318	4	263	27351	833	26518

ERN = 25% to 98/99

24% to 88/89

ANNEX VII(C)

Costs and benefits in the Economic Analysis, MK'000 (1978 prices)

Year	Crops: Incremental:			Forestry net Benefit	Livestock Net Benefit				Total All Incremental Benefits	Total Incremental Project Costs	Net Benefits to Costs
	Benefits	Costs	Net		Dzalanyama Ranch	Stall- feeders	Dairy & Poultry	Total Livestock			
1968/69	0	26	(26)	0	0	8	0	8	(18)	1815	(1832)
69/70	190	37	153	0	0	39	0	39	192	2904	(2712)
70/71	509	273	236	0	(27)	43	0	16	252	2662	(2410)
71/72	3119	925	2194	0	(38)	55	0	17	2211	4265	(2052)
72/73	1505	942	563	0	(41)	95	0	64	627	3047	(2420)
73/74	2918	1286	1632	0	(85)	112	0	24	1656	2354	(698)
74/75	4410	932	3478	0	(124)	243	0	119	3597	2629	968
75/76	5547	1264	4283	0	(123)	165	2	44	4327	1362	2965
76/77	8688	1958	7130	0	(160)	250	7	97	7227	1305	5922
77/78	3826	2614	1212	0	(142)	420	4	282	2094	1252	842
78/79	6282	2122	4160	0	(118)	269	6	197	4317	1154	3163
79/80	14118	3561	10557	36	(126)	244	5	123	10650	833	9817
80/81	14860	3710	11150	59	(63)	254	4	196	11346	833	10513
81/82	15709	3834	11875	52	(63)	292	2	291	12056	833	11223
82/83	17625	4223	13402	115	(65)	312	4	291	13553	833	12720
83/84	18502	4509	13993	0	(59)	334	6	281	14274	833	13441
84/85	19398	4694	14704	36	(59)	334	6	281	15021	833	14188
85/86	21851	4814	17037	59	(59)	318	6	265	17391	833	16558
86/87	22738	4973	17765	52	(59)	318	6	265	18682	833	17849
87/88	23391	5090	18301	115	(59)	318	5	264	18680	833	17847
88/89	24232	5270	18962	0	(59)	318	4	263	19225	833	18392
89/90	26180	5708	20472	36	(59)	318	2	261	20769	833	19936
90/91	26926	5853	21073	59	(59)	318	4	263	21395	833	20562
91/92	27673	5999	21674	52	(59)	318	6	265	21991	833	21158
92/93	28383	6143	22240	115	(59)	318	6	265	22615	833	21782
93/94	28972	6262	22710	0	(59)	318	6	265	22795	833	22142
94/95	29742	6412	23330	36	(59)	318	6	265	23631	833	22798
95/96	31995	6529	25466	59	(59)	318	5	264	25389	833	24556
96/97	32724	7090	25634	52	(59)	318	4	263	25949	833	25116
97/98	33645	7284	26361	115	(59)	318	2	261	26737	833	25904
98/99	34565	7477	27088	0	(59)	318	4	263	27351	833	26518

ERR = 25% to 98/99

24% to 88/89

ANNEX VII(5)