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AGRICULTURAL SECTOP DEVELOPMENT

ETHIOPIA

663-0181

AGRICULTURAL SECTOR DEVELOPMENT (663-0181)

PROJECT PAPER

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7. Social Soundness Analysis of Ethiopia's Minimum Package Program II - Benedict Stavis, May 1977[1/]

8. Draft Environmental Assessment - MPP II - Edward Francis McGowan, June 1977[1/]

9. Report of the UNEP Mission to Ethiopia on the Establishment of an Environmental Monitoring Service - J. K. Egunjobi, Regional Advisor, UNEP, November 1977

1/ Available AFR/DR
2/ Available IBRD

BEST AVAILABLE DOCUMENT

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER FACESHEET

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8. ESTIMATED FY OF PROJECT COMPLETION: FY 83

9. ESTIMATED DATE OF OBLIGATION: A. INITIAL FY 78; B. QUARTER 4; C. FINAL FY 81 (Enter 1, 2, 3, or 4)

10. ESTIMATED COSTS ($000 OR EQUIVALENT $1 –

A. FUNDING SOURCE	FIRST FY 78 B. FX	C. L/C	D. TOTAL	LIFE OF PROJECT E. FX	F. L/C	G. TOTAL
AID APPROPRIATED TOTAL	–	–	–	7,100	14,040	21,140
(GRANT)	(–)	(–)	(–)	(7,100)	(14,040)	(21,140)
(LOAN)	(–)	(–)	(–)	(–)	(–)	(–)
OTHER U.S. 1.	–	–	–	–	–	–
OTHER U.S. 2.	–	–	–	–	–	–
HOST COUNTRY	–	–	–	–	22,000	22,000
OTHER DONOR(S)	–	–	–	19,000	30,500	49,500
TOTALS	–	–	–	26,100	66,540	92,640

11. PROPOSED BUDGET APPROPRIATED FUNDS ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE C. GRANT	D. LOAN	E. 1ST FY 78 F. GRANT	G. LOAN	H. 2ND FY 79 I. GRANT	J. LOAN	K. 3RD FY 80 L. GRANT	M. LOAN
(1) FN	254	230	–	10,000	–	–	–	5,000	–
(2)									
(3)									
(4)									
TOTALS									

A. APPROPRIATION	N. 4TH FY 81 O. GRANT	P. LOAN	Q. 5TH FY ___ R. GRANT	S. LOAN	LIFE OF PROJECT T. GRANT	U. LOAN
(1) FN	6,140	–	–	–	21,140	–
(2)						
(3)						
(4)						
TOTALS						

12. IN-DEPTH EVALUATION SCHEDULED: MM 7, YY 80

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN THE PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA, BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET.

1 (1 = NO, 2 = YES)

14. ORIGINATING OFFICE CLEARANCE

SIGNATURE: Princeton Lyman

TITLE: Director, USAID/Ethiopia

DATE SIGNED: MM 6, DD 12, YY 78

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II. PROJECT DESCRIPTION

A. Background

1. General

Ethiopia has a total land area of about 1.2 million square kilometers. A high plateau of 1,500 to 3,000 meters above sea level form the Central Highlands in the center of the country, which is surrounded by extensive lowlands largely inhabited by nomadic pastoralists. The extremely rugged terrain is a serious obstacle to internal transportation, communication and economic development.

Ethiopia is recognized as one of the least developed among the developing countries. The annual per capita income is less than US$100. The population of 28 million is increasing at an annual rate of about 2.5 per cent and approximately 90 per cent of the people live in rural areas. The literacy rate is less than 10 percent.

2. Agriculture in the Economy

Agriculture contributes about half of the Gross Domestic Product to the Ethiopian economy. Exports are mainly farm products with coffee alone accounting for more than 60 per cent of the foreign exchange earnings in 1975/76. In that year, the total value of agricultural output was Birr 2.8 million. An estimated 85 per cent of the population depend directly on agriculture for the major part of their income, most of whom are small-scale peasant cultivators engaged in subsistance farming with little marketable surplus.

Agricultural conditions vary considerably in different zones in the country according to topography, climate, soils and natural vegetation. Although Ethiopia is located in the tropics, climatic conditions are largely determined by altitude rather than latitude, which accounts for the wide variation in types of crops, population distribution and the nature of economic activities conducted in different regions. It is estimated that 50 per cent of the land is used for permanent pasture, 10 per cent is cultivated, 20 per cent is barren desert or swamps, 10 per cent rivers and lakes and 10 per cent forests.

3. Agriculture Sector Goals

The 1974 revolution in Ethiopia has given particular emphasis to the needs of small-scale farmers. The agricultural goals of the PMGSE have been oriented toward improving the capability of small-scale farmers to increase production, and improving the services and other benefits for the rural majority. These objectives have been reflected by instituting a national land reform that abolished tenancy and large landholdings held by absentee landlords, while giving peasants usufruct rights to the land they till; decentralizing authority to lower levels of government; encouraging mass participation in decision making by establishing Peasant Associations (PAs) with important local responsibilities and authority; and reorganizing the Ministry of Agriculture and Settlement to better serve the needs of small-scale farmers.

These agriculture sector goals are consistent and in many ways parallel with AID and Mission strategy for assistance to Ethiopia as reflected in the USAID Assistance Strategy for Ethiopia FY 1977/78 prepared in October 1976 and the Country Development Strategy Statement prepared in May 1978. The emphasis on self-reliance, mass participation, equity, benefits for the rural majority and a more service-oriented government are clearly in harmony with AID's overall objectives within the Country.

4. Agricultural Production

There is little or no evidence to suggest that Ethiopian small-scale farmers have been or will be able, without assistance, to increase output at a rate faster than population growth. Although production data are incomplete and somewhat questionable, agricultural output, during the 1961 through 1969 period prior to MPP I, appears to have expanded by 2.1%. The total economy grew by 4.7%. With the population growing at about 2.5%, domestically produced food supplies could not meet the increasing demand. During the seventies Ethiopia has become a net importer of grains due to the severe Ethiopian drought and the resulting disruption in production. Imports of cereals in 1973/74 under the drought relief program reached approximately 120,000 MT. The land reform itself, initially and not entirely unexpectedly, was responsible for disruption in traditional methods of production within the rural sector. There has continued to be a serious shortfall in food grains since the 1973/74 drought. A gradual deterioration in the already low quality of life for Ethiopia's small-scale farmers is almost certain unless agricultural production is increased. The opportunities for agricultural development now available through the redistribution of land and the restructuring of rural society through formation of peasant associations are encouraging and should accelerate efforts to increase food production.

The key to Ethiopia's rural development strategy is an increase in production and income in rural areas. Improvements in the quality of life depend on increased production not only for increased income but to generate revenues necessary for better government services in health care, water supplies, a more adequate diet, basic education, etc. The potential for increased production per farmer in Ethiopia is immense. Soil qualities are guerally good by African standards and the arable land/farmer ratio, although rapidly declining, is still relatively high compared to most developing countries. Major constraints are access to productive areas, the incentive to produce for the market, an effective and extensive input delivery system, and conservation of land and water resources.

B. Minimum Package Program - Phase I

Phase I of the Minimum Package Program (MPP I) was carried out from 1971 to 1977. It followed comprehensive development projects initiated during the late 1960's and early 1970's, such as the Arsi Rural Development Unit (ARDU, formerly CADU), the Wolamo Agricultural Development Unit (WADU), the Ada District Development Project (ADDP) and others. These projects demonstrated that small-scale, semi-subsistance peasant farmers in Ethiopia under the proper circumstances would respond favorably to selected economic incentives and that significant increases in agricultural productivity were possible. However, the capital and trained manpower required made the comprehensive project approach impractical as a development strategy for the entire country. A program was required which was relatively easy to adminster, which would demand a minimum of high level personnel, which was capable of reaching a large proportion of small holders, and which yielded a high, quick pay-off. Fertilizer trials conducted by the comprehensive projects and the Ministry of Agriculture during the latter part of the 1960's demonstrated that crop yields could be considerably increased through proper application of selected fertilizers. Research conducted at the Alemaya College of Agriculture, the Institute of Agricultural Research (IAR), and through the FAO fertilizer program demonstrated the feasibility of a production increasing package based on fertilizer and seed. Largely as a result of the success of this research, EPID was established within the Ministry of Agriculture in 1971 in order to spread the benefits of fertilizer and improved varieties of seed as inexpensively as possible throughout the agricultural sector. MPP I was launched in 1971 under the administration of EPID, reflecting the "package" approach to rural development and the shifting policy of the Ethiopian Government toward directly improving the quality of life of the small-scale farming population.

The development methodology applied during MPP I focused on application of the "package" within basic field units which were established extending 5 km. on both sides of a 75 km. stretch of all-weather road. These Minimum Package Program Areas (MPPA) typically contained approximately 10,000 farm families and were divided into 5 extension areas each with an extension agent. Depending upon local requirements and availability of personnel MPPA's were also staffed with up to 5 marketing assistants. MPPA's were developed through a three stage process consisting of an observational phase, a demonstration phase, and an implementation phase. Each MPPA included a marketing center and a one hectare demonstration field. The marketing center provided a base for the marketing assistants and extension agents, storage for inputs and harvested crops, and served as a focal point for farmers. Although the MPPA approach was useful when the program was first established, it gradually lost its usefulness as the program expanded. Most MPPA's opened during the latter stages of MPP I were located in close proximity to old field areas with the result that there was a decreasing need for the observation and demonstration phases, and inputs could be sold as soon as the MPPA was opened.

About 18 MPPA's were established by FY 1973, 28 by FY 1974, 48 by FY 1975, and by FY 76 a total of 55 MPPA's were operational.

C. Minimum Package Program - Phase II

1. Overview

Since the Ethiopian revolution started in 1974, the government's commitment to development of the rural sector has been strengthened. The land reform of February 1975, which abolished private ownership and, thus, private leasehold of agricultural land, and the mobilization of the rural population through the formation of peasant associations has generated an increase in the demand for agricultural services while at the same time offering a promising channel for the transfer of improved technology to the farmers. Expansion of the Minimum Package Program into Phase II (MPP II) constitutes the major thrust of the Government's nationwide agricultural development policy.

MPP I was successful in establishing a viable national organization, the Extension and Project Implementation Department (EPID) within the Ministry of Agriculture and Settlement, and a program to which small-scale farmers have been responsive in increasing numbers. Although EPID is not without difficulties, the Provisional Military Government of Socialist Ethiopia (PMGSE) and the international donor community recognize that the MPP or a variation thereof will continue to be the principal vehicle for agricultural development in Ethiopia for the forseeable future.

The expansion planned under MPP II is dramatic. The objectives under MPP I were to provide inputs and extension services to approximately 450,000 farmers or about 12% of the total farming population. The current project is expected to provide a variety of inputs and services to 2,242,000 farms or 71% of the farming population. Phase I provided services only to those areas easily accessible by road, while MPP II project activities will be estended to assist farmers living in more remote areas. The MPP field area described above has been discarded in favor of the woreda (sub-district) development area which will serve as the basic unit for extension services and for analysis. MPP II will continue to be administered by EPID; however, project coordination will be decentralized so that it may be adapted to a variety of regional and local needs. The project will establish 12 regional level offices, 80 awraja level offices, and 429 woreda level offices. Of Ethiopia's 560 woredas 125 will not be covered by the project either because they have little settled agriculture, or because they lie in regions which are excluded for security reasons, or lie within areas covered by other intensive agriculture projects. A survey team will visit the new woredas to make initial contact with farmers, determine their needs, and plan appropriate action programs, so that extension services may be introduced with a minimum of delay while the full EPID office is being established.

The development methodology of MPP II is centered around the formulation of extension programs and packages of agricultural inputs and technologies which are applicable to the conditions peculiar to the different farming areas. Ethiopia's farming areas are characterized by wide climatic and ecological diversity; consequently, the response to extension methods and technical inputs varies significantly from one area to the next. As noted above, the previous extension programs relied primarily on the provision of fertilizers and improved seeds. These programs met with only limited success. Fertilizers were not adapted to many areas and improved seeds have been available only for certain crops and often are unsuited for many of the climatic conditions. This experience demonstrated the need for a series of individual programs specifically tailored to the needs of the farmers in a given area. The peasant associations, assisted by project staff would have primary responsibility for the design as well as implementation of the programs and for the monitoring of their effectiveness. Each peasant association would develop a comprehensive extension and input package at the beginning of the crop year. This package would reflect the needs of that area. For example, while soil and water conservation might be designated as a high priority need in one area, another peasant association might choose to emphasize the expanded use of fertilizer and other inputs. In every area, however, special attention would be given to the introduction of those improved farming practices (row planting, weeding, crop density, exact planting dates, etc.) which could increase yields without requiring additional inputs. The overall program set up by the peasant associations would cover: (a) farming method

and input packages recommended for adoption by farmers; (b) extension assistance to be provided by project staff; (c) farmer training programs; (d) credit requirements and sources; and (e) demonstration trials to be carried out on commercial land by specially designated farmers.

2. Overall Program

MPP II will be supported by three international donors - International Development Association (IDA) of the World Bank Group; Swedish International Development Agency (SIDA); and Agency for International Development (AID). A summary of project costs is as follows:

Source of Funds	Ethiopian Birr (Million) Local Costs	Foreign Exchange	Total Costs	(U.S.$ Mil.) Total Costs	Percent of Total
PMGSE	45.2	-	45.2	22.0	24
IDA	45.8	38.0	83.8	40.5	43
SIDA	18.5	-	18.5	9.0	10
AID	28.8	14.6	43.4	21.1	23
Total	138.3	52.6	190.9	92.6	100

(Note: Non-AID costs in the above table will be changed when the revised and up dated IBRD appraisal is received.)

Details of expenditures for AID supported components are included in the Financial Plan (Section IV).

The PMGSE through EPID will provide local cost inputs for all components of the program. SIDA will provide funds to meet some of the recurrent operational expenses in both headquarters and field offices and expatriate technical assistance. The IDA credit will be used to finance construction of an EPID headquarters building in Addis Ababa, field office buildings, headquarters and field capital and operating expenses, animal husbandry, home economics, cooperative promotion and the incremental cost from MPP I of credit for most farm inputs.

D. Agricultural Sector Development Project

The Agricultural Sector Development Project (ASD) is the AID project to support the overall program of MPP II. The estimated total AID inputs are $21,140,000 of which $7,100,000 will be foreign exchange. The ASD project is planned for 5 years; however, the initial obligation is expected to be in late FY 78 which will preclude any expenditures until FY 79. Therefore, the ASD project is, in effect, a four year project.

In order to meet AID evaluation requirements and help insure that AID funds will closely meet the requirements of the New Directions, AID will fund specific components of the MPP II overall program. These components are soil and water conservation, rural roads, seed multiplication, applied research, and credit for selected farm inputs. Each of these components is described in detail below.

1. Soil and Water Conservation

(a) Background: The Erosion Problem

Land is being used in Ethiopia beyond it's capacity for sustained use. The extent of soil loss due to erosion is probably the most serious problem facing long-term development of agriculture. Appraisals concerning the extent of soil erosion are based on calculations and estimates which are largely unvarifiable emperically through precise measurement. Nevertheless, an indication of the magnitude of the problem has been expressed by soil and water conservation specialist, W.D. Ware-Austin, in 1970 then serving as advisor to the Ethiopian Soil and Water Conservation Division. He postulated that Ethiopia losses one billion tons of soil every year from erosion. Expressed another way, this is equivalent to sixty thousand hectares of soil one meter deep lost to erosion each year. Thus, in the preceding five years Ethiopia has lost three hundred thousand hectares of soil, which would support without difficulty 60,000 families.

Soil erosion has been occurring in Ethiopia for centuries largely as a result of poor land management including use of inappropriate agricultural techniques which result in soil exhaustion and uncontrolled grazing of stock resulting in destruction of the vegetative cover by over-grazing and trampling. These and other practices promote soil erosion, especially in the highlands where steep hillsides are utilized for cultivation and grazing and where heavy rainfall accelerates the demise of soil resources. Despite the fact that soil erosion has been going on for a long time, there are indications that the rate of soil erosion has been increasing more rapidly in the last three or four decades.

Recently, drought conditions in Ethiopia have also increased the rate of erosion. Decreased rainfall and a short rainy season has reduced the rate of growth of vegetative cover exposing large areas of land to erosion by wind and water.

The effect of growing population on the rate of erosion has serious implications regarding attempts to increase or to generate surplus agricultural production. Soil erosion on a large scale combined with increasing population growth obviously decreases arable land per capita. Rough calculations using Mr. Ware-Austin's estimate of the annual soil erosion rate and the current rate of population growth (2.5%) illustrate an interesting inverse relationship: for every hectare of soil lost through erosion each year there are approximately 10 more people added to the population.

Apart from the extreme case where soil rehabilitation is required, conservation measures often mean the difference between maintaining a usable soil cover and being left with bare rock. The benefits from soil and water conservation cannot be overemphasized.

In a recent report prepared under the direction of Dr. Leslie Brown, an authority on agricultural development, it is emphasized that a noticeable impact must be made in solving the problem of soil erosion within the next three years; it is imperative that within the next ten years soil erosion control should be firmly and universally accepted and complete. This report is particularly concerned with the Wollo and Tigre regions, but areas in Eritrea, Hararghe and Shoa regions also have very serious erosion problems. In point of fact, soil erosion can be observed in every region of Ethiopia. Due to the misuse and exploitation of the soils and vegetation, much of the upland plateau is virtually a devastated land. Evidence of erosion is particularly noticeable when traveling from Addis Ababa to Dessie and on to Mekele and Asmara. The forests have been cleared from the mountain slopes; excess grazing has stripped the land bare of brush and grass; virtually all the land is cultivated, including the very steep slopes; and many of the streams are choked with gravel and boulders which have been washed from the hills by excessive runoff. Unfortunately, measures to counter the widespread erosion of arable land are virtually non-existant at present and any attempts to improve productivity which ignore the need for conservation will generate temporarily results, at best.

MPP II is expected to play a central role in establishing the groundwork and launching a comprehensive nationwide conservation effort. The geographic coverage of MPP II and the collaboration at all levels in determining local needs and how they are to be addressed will determine, on a nationwide scale, where and how soil and water conservation corrective measures are to be applied and on the basis of what priority. Eighty awraja level conservation technicians and 150 woreda level conservation agents who will be trained as a primary objective of MPP II will provide the technical expertise required to establish detailed and localized conservation priorities. This network of personnel tasked with the exclusive responsibility of addressing the soil and water conservation problem, will be the foundation administrative structure for establishment of the discrete national long-term effort.

(b) Description of Project Component

In view of the rather urgent requirement to initiate effective measures reversing the present decline in soil and water resources, and the inter-relationship between retention of these fundamental requirements for production and the generation of increased food supplies, soil and water conservation practices will be promoted as one of the primary

objectives of the MPP II. The extensive nature of the problem dictates the need for implementation of corrective measures throughout the country. Application of a comprehensive program effectively addressing conservation problems on a national scale is not possible through MPP II. The needs, therefore, have been divided identifying short term measures for implementation during MPP II, and long term solutions to be conducted under a discrete national soil and water conservation program.

The conservation component of MPP II incorporates four erosion control practices with primary emphasis on promotion of soil bunds and afforestation and secondary emphasis on pond construction and spring development.

Soil Bunds

Utilizing perennial grass varieties common to the geographic area soil bunds 50 cm. high and 50 cm. wide are to be established on contour across a field. Five per cent of the land may be used for such bunds which in turn offer the possibility of generating ancillary returns in the form of forage, building materials, fuel or food. The function of the bunds is to trap silt and over a period of time establish benches or a stair-step pattern to the land. Although this measure alone, in most situations will not reduce soil loss to an acceptable level, it will slow down the process of erosion. In addition, it is a process which is basically uncomplicated, inexpensive, and teaches the farmer to farm on the contour. It provides an effective introduction to soil erosion prevention measures which after successful application may be followed with terraces and other more costly and sophisticated practices.

Afforestation

Among the poor land management practices which promote rapid soil erosion especially in the highland regions is the cultivation of steep hillsides. The destruction of the vegetative cover combined with the prolonged and intensive rainfall which characterizes the season of the heavy rains is among the most rapid and debilitating of the erosion processes. Afforestation of slopes with a gradient of forty degrees or more, which is a practice advocated by both the forest service and the soil and water conservation section of EPID, will be promoted as an initial and primary soil retention measure. Rural populations are to be encouraged to cultivate nurseries and to plant trees on steep lands and all areas that should be converted to woodland. Planting trees will hold down watersheds, prevent soil erosion, and will serve as an effective introduction to farmers on proper land use. Planting stock will be utilized from the forest service and other established nurseries. Establishment of peasant association nurseries will be encouraged in order to produce planting stock suitable for use in the immediate area. Species of trees which may be suitable are: Acacia (especially A. mearnsii), Grevillea (especially G. banksii), upland Casuarina and Leucaena.

Pond Construction

Pond construction as a soil and water conservation measure has been a primary emphasis of the EPID program for several years. Such ponds are particularly attractive to rural populations due to the obvious advantage accruing to the rural population of having, within relatively close proximity, their own water supply. Careful selection of good pond sites in small watershed locations is integral to the development of a program with a large percentage of successful ponds requiring little maintenance. Large watersheds accompanied by streams carrying heavy silt loads should be avoided. Selecting pond sites close to a village or small farm settlement and combining the pond project with a tree planting program using a local nursery, could result in erosion control, afforestation and water development in one package. Well managed ponds may serve the water requirements of livestock as well as domestic water needs. Ponds can be made by constructing earthfills or in some cases by making an excavation. Excavations can trap surface runoff or expose the underground water table.

Spring Development

Spring development should be promoted as water sources for domestic and livestock requirements. Springs can be developed effectively for small-scale irrigation projects. With additional investment spring water can be transported by gravity flow to villages and farm settlements eliminating the necessity for carrying large volumes of water long distances while at the same time providing much higher quality water.

These four basic practices with proper application would result in at least partial erosion control, would provide wood for fuel thereby contributing to the availability of dung for fertilizer, and would provide water for livestock and domestic use. Such practices can have a direct impact improving the life of the farm family and would reduce the heavy burden and work load now shouldered by the women in the farming community. Food-For-Work programs supported by the World Food Programme where operational would be linked with soil and water conservation efforts of MPP II.

The following conservation work is programmed for completion during the project:

Projected Soil and Water Conservation Practices

Year	Soil Bunds	Afforestation Hectares	Ponds Number	Spring Development Number
1	36,000	400	40	5
2	82,800	1,200	140	10
3	180,000	2,400	310	20
4	316,000	4,000	530	25

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(c) Method of Implementation

The primary vehicle for addressing the problem of soil erosion and water conservation is the PA. Using present personnel and in anticipation of a slow increase in staff, which is already responsible for soil and water conservation, EPID would execute the program. EPID currently has approximately 17 regional and awraja staff members with technical training in conservation measures. FAO is planning to assist in the training of 80 awraja level conservation technicians. A total of 150 full time soil and water conservation agents (CA) would be needed at the woreda level to implement the proposed accelerated program. These would be qualified CA's with a minimum of three months specialized soil and water conservation training. Each CA would be assigned to a woreda pre-selected as urgently requiring soil and water conservation measures. In addition, 100 woredas where erosion is less serious, would be staffed with Development Agents (DA) equipped with a minimum of three weeks soil and water conservation training.

The 17 region and awraja level soil and water conservationists, soon to be strengthened by the addition of 80 newly trained FAO technicians, would administer the conservation action program and provide technical expertise in training, planning and execution of the more difficult technical aspects of the program. The awraja level staff would also part of the mobile teams that would carry the overall agricultural package assist in providing in-service training workshops for CA's and PA agents.

Recognizing the need for supervisory personnel, probably the most vital position is the PA agents who are to work directly with the farmers in applying conservation measures on the land. The project would provide training for representatives from PAs who would act as the association's agents and would help farmers' carry out conservation measures. These agents would play a key role in the program as they would be in direct contact with the farmers themselves. They would be recruited from each PA and trained at the same time as the soil and water conservation agents. 4,500 PA agents would be required. Each agent would be responsible for about 800 farmers with the average woreda being served by eleven agents. The training schedule for CA's and PA agents is as follows:

Tentative Accumulative Training Schedule

Year	Conservation Agents	Peasant's Association Agents
1978	40	1,200
1979	80	2,400
1980	120	3,600
1981	150	4,500

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Woreda level CA's specializing in soil and water conservation measures would meet with PAs to discuss conservation problems and select candidates for training. They would design soil and water conservation practices applicable to the condition and addressing the problems peculiar to the area and set up demonstrations with the PAs on individual farms or on land jointly administered by the association. They would be equipped and available to provide on-site assistance to farmers and to assist PA agents formulate plans and goals. The PA agent will contact individual farmers and groups of farmers providing on-site assistance in establishing soil and water conservation practices on the land.

In areas where communications are poor, an alternative method of assisting farmers in applying soil and water conservation practices would be to organize the woreda level CA's and PA agents in mobile teams. These teams could be made up of eleven PA agents, one woreda soil and water conservation CA, and two general DAs. These six people could travel to outlying areas, present the overall agricultural package to groups of farmers and work in specific watersheds or farming communities, applying soil and water conservation practices before moving on to the next location.

2. Rural Roads

(a) Background

Ethiopia has a very limited transport network with roads being by far the most important form. In 1935, when the Italian occupation temporarily ended Ethiopia's centuries-long independence, there were less than 1,000 km. of roads and drivable tracks in existance. The rugged terrain of the Empire had made it next to impossible to construct roads without heavy-duty equipment. After the six year Italian occupation, the road net had been expanded to 6,000 km. mostly in the highlands. These roads, upgraded over the years, still serve as the nucleus of the present system of 8,800 km. of all-weather roads and 31,000 km. of dry-weather trails and tracks.

Beginning in 1951 and continuing to the present, the Ethiopian Government has been expanding and upgrading its basic road net. However, the construction of roads in much of Ethiopia is both costly and difficult because of the rugged terrain and heavy rainy seasons in much of the country. As a result many of the areas of the countryside remain isolated and dependent upon pack animals and human carriers for transport. The fact that only about 25 per cent of the country's total agricultural production is marketed can be attributed in part to this lack of roads in the rural areas. The Ethiopian Roads Authority (ERA) is presently responsible for the 8,800 km. of road in the main network categorized as primary, secondary, and feeder or tertiary.

Since its inception, ERA has concentrated almost entirely on the main road network. Rural roads--all roads lower than feeder road standard--were neglected by the GOE until the early 1970s and although such roads were being built by several entities in Ethiopia, construction was normally haphazard, often unprofessional and uncoordinated. Maintenance was virtually unknown. No central government agency had responsibility for rural roads. The ratio of rural roads to highways in Ethiopia is low even by African standards, which results in highway under-utilization. Large tracts of the country are remote from modern means of communication or transportation. Much reliance is, therefore, placed on pack animals by which the bulk of small-scale agricultural production in Ethiopia is transported. Approximately 75% of rural farm families are more than 20 km. from the nearest dry-season or all-weather road. The absence of a rural roads infrastructure now constitutes a serious bottle-neck to the development of agriculture.

In order to coordinate and promote the various rural roads construction activities a Rural Roads Task Force was established under the aegis of the Ethiopian Highways Authority (EHA). It's primary objective was to prepare a 10 year master plan for the construction of rural roads throughout Ethiopia. As part of the study, the task force recommended that the administration of roads construction be reorganized to enable greater emphasis to be placed on rural roads. Two semi-autonomous organizations were established - one responsible for rural roads and the other for main highways. Both the Rural Roads Organization (RRO) and the organization for main highways is under the ERA. On the board of the ERA are representatives of the Ministries of Agriculture and Interior and the Planning Commission in order to coordinate rural road construction and establish priorities. Work has begun on the design of new headquarters facilities for RRO and on construction of six of the proposed 14 provincial offices.

Under MPP II, rural roads would be built to provide low cost access to farming areas and village markets and towns. Specifically, the roads are to facilitate expansion of EPID extension services, the distribution of inputs and marketing of outputs and encourage farmers participation in the program. To date, MPP activities have been limited to areas within approximately 10 km. of all-weather roads. Therefore, the major expansion of MPP services which is envisaged, is partially dependent upon the construction of rural roads to enable wider penetration into the countryside by DAs and to expand input and output marketing activities in rural areas.

(b) Description of Project Component

The Rural Roads Division of ERA, in collaboration with EPID, has begun work on road construction in Gojjam, Harrarghe, Keffa, and Shoa. This work is to continue by four Regional Construction Units (RCU) once the plant and equipment arrives which was financed by IDA Credit 552-ET and ordered under MPP I. The RCUs are to become the nucleus of the RRO. Once the RCUs have been properly equipped, their principal task will be to construct Rural Road Classes A, B, and C and when resources permit, to upgrade to Class A or B according to EPID priorities. EPID will have the responsibility for determining the location and priority of rural road construction intended to promote the objectives of MPP II. EPID will specify the points of origin and destination as well as the places through which the roads should ideally pass. Construction would be carried out by the RCUs under the provincial RRO office. The provincial RRO senior engineer and the EPID roads engineer would jointly inspect the progress of roads construction.

The roads to be constructed will not involve sophisticated engineering design or construction techniques. The center line of the road will be identified and staked out by an experienced roads engineer using available maps, aerial photography and where necessary, aerial reconnaissance. The roads would follow ridges and natural benches whenever possible, and the natural gradient on hilly terrain to reduce excavation and filling to the minimum. The use of basic plant and equipment supplemented by labor-intensive techniques is most appropriate for this type of road, with manual labor for building structures, installations and for finishing work.

Road Construction Standards

Rural Road Class A

These are all-weather roads, which can be used by up to 10 ton trucks for bringing agricultural inputs to the area and taking crops out. The standards for this type of road would be 6 meters wide, crowned and surfaced for 5 meters, to a thickness of 20 cm. with select material material (pit-run or quarry-run) depending on local availability. It would have 0.5 meter shoulder on both sides, simple drainage and/or cement grouted paved fords and side ditches to a depth of 1 meter. The clearing width would be 20 meters with a right-of-way of 40 meters. The maximum gradient would be 13 per cent.

Rural Road Class B

These are either dry-weather or all-weather roads suitable for four-wheel drive vehicles and light vehicles, depending on the season and type of soil. The road would be 6 meters wide with 4 meters surfaced with select material (as in Class A), compacted to a thickness of 10 cm. The road would have all the necessary components similar to Class A (road-way, shoulders, ditches, fords) so that it could be upgraded subsequently to Class A by widening the surface to 5 meters and increasing pavement thickness to 20 cm. On Class B roads, earthworks may be only rough finished to reduce costs, but this could be improved and more permanent drainage structures constructed when it was upgraded.

Rural Road Class C

This is a dry-weather road of 6 meters width, but with only spot surfacing with select materials in the central 4 meters on poor subgrade sections. These roads would be of lower standard than A and B but could be ultimately upgraded. The main construction would consist of clearing and grubbing and grading, using labor and machinery, following the ground profile, with the central crown of the road-way being raised. Heavy vehicles would not be allowed to use these roads during the rains; only four-wheel drive vehicles would be allowed when the road was negotiatable. Fords and drainage systems would require particular care and unsuitable marshy terrain should be avoided. Major rehabilitation and maintenance would be required shortly after the heavy rains, and somewhat less intensive work following the short rains. The standards of road construction are summarized in the following table.

Summary of Rural Road Construction Standards

	Rural Road Class		
	A	B	C
Roadway width (m)	6.0	6.0[a]	6.0[a]
Select material surface width (m)	5.0	4.0	4.0[b]
Surface thickness (m)[c]	0.2	0.1	0.05
Drainage: ditches (m)[d]	1.0	0.75	0.5
crossings[e]	Concrete pipes/ paved fords	Paved fords	Gravel and stone fords
Maximum gradient (%)	10	12	14
Stone-work/mortar[f]	CL/C	CL/C & dry	Dry
Clearing width (m)	20	15	10
Right-of-way width (m)	40	30	20

NOTES:

a/ To enable subsequent upgrading.

b/ Spots only over poor subgrade.

c/ Pit-run or quarry-run.

d/ Depth indicated, but side slopes according to soil type.

e/ Cement-grouted rubble-paved fords; plain concrete pipes 60 cm. diameter encased in Class C concrete.

f/ Class masonry (CL/C) with mortar or dry masonry (dry) retaining walls; hand-laid rock embankments; loose rip rap paved waterways check-dams for control or erosion.

The above features serve only as guide-lines; reasonable adjustments can be made depending on site conditions, terrain and traffic potential.

(c) Method of Implementation

Rural Roads Construction priorities have been set by EPID in accordance with the programmed expansion of MPP II. Cost estimates are based on the experience of MPP I and updated on the basis of estimated price inflation (14 per cent). The Construction capacity (km/year) of an RCU has been estimated as follows:

Road Class	Minimum	Average	Maximum
A	10	15	20
B	15	25	30
C	25	40	50
Total	50	80	100

The combined capacity of the four RCUs would be between 200 and 400 km/year or between 800 and 1,600 km. over the four years of MPP II. By year one of the MPP II it is anticipated that actual construction of the four RCU's will equal 94% of average capacity or 300 km/year. The combined efforts of the RCU's are expected to maintain this level of performance each year until the end of the economic life of the equipment which is 7 years. Any surplus capacity after expiration of the 7 years will be diverted to maintenance.

The projected average construction costs for Road Classes A, B, and C are shown in the following table:

Average Costs per km. of Rural Roads Construction

		Birr
Rural Road Class A		
Clearing and grubbing	(20,000m^2)	2,750
Earthworks (7000m^3) 1/		9,685
Drainage		4,530
Surfacing (1000m^3) 1/		4,470
Miscellaneous		500
	Total	21,940
Rural Road Class B		
Clearing and grubbing	(15,000m^2)	2,065
Earthworks (4500m^3) 1/		6,215
Drainage		3,600
Surfacing (350m^3) 1/		1,570
Miscellaneous		500
	Total	13,950
Rural Road Class C		
Clearing and grubbing	(10,000m^2)	1,375
Earthworks (2500m^3) 1/		3,455
Drainage		2,250
Miscellaneous		500
	Total	7,580

1/ Excluding equipment depreciation costs of 36.2 percent.

Maintenance costs are estimated at Birr 600 per km., based on the recent Crown Agents study. Maintenance would be carried out annually on all stretches constructed. This would normally entail only grading, which would be at government expense after MPP II. All maintenance costs over Birr 600 per km. are to be borne by the beneficiaries, that is, the local PAs. The projected lengths of road to be constructed with cost estimates including depreciation, are also illustrated in the budget table in the Financial Plan (Section IV). Birr 65,000 has been programmed annually for EPID roads division to carry out its own feasibility studies as part of the process of planning its rural roads program.

No road is to be built unless there is a reasonable certainty of regular maintenance. Additional equipment, particularly for maintenance, will be procured under MPP II. Most roads constructed by the RRO would also be maintained by the RRO. However, the method of all rural roads construction and maintenance is to be as far as possible, labor intensive provided that it is technically and economically justifiable. In view of the highly seasonal pattern of labor demand in the rural areas, there are periods of the year when PA members could be organized to carry out construction and maintenance of roads. Non-skilled labor would be recruited from the PA through whose territory the road passes.

Where PA members have become involved in road construction through employment as laborers, and where clearly identifiable stretches of road have been identified as their responsibility, much of the necessary training in simple maintenance techniques would have been achieved. The farmers would thus acquire the knowhow to be able to undertake the maintenance of the rural roads they constructed.

In addition to the 300 km. constructed annually by the RCUs, the self-help concept of rural road construction is to be actively promoted under MPP II by constructing 200 km. of new feeder roads per year without the use of heavy machinery. EPID would support PA self-help activities with materials, tools, grants-in-aid and technical assistance where appropriate. Training in construction and maintenance would be achieved, as noted above, during the construction period and any additional support required would be forthcoming from the DA or Awraja engineer. RRO's mobilization of unskilled labor by contracting with PAs is intended to strengthen the PAs by presenting opportunities for the association to earn income. Even for the higher standard rural roads the share of labor constitutes over 50% of the total cost per km. The associations could utilize the incremental income to help finance their development programs such as the purchase of modern farm implements, establish health services centers, etc. The RRO rural roads effort actively encourages farmers to strengthen their associations. This means that the budget allocated for rural roads construction and maintenance has a multiplying effect on the national income and capital formation.

3, Seed Multiplication

(a) Background

Among the more serious impediments to increased agricultural production is the poor quality of seed which the vast majority of small-scale farmers are forced to use. The seed traditionally used lacks purity, contains weed seeds, has low germination, and is plagued with seed-borne diseases. Despite the fact that plant breeding programs within the research sector have intensified during the last few years generating improved varieties of wheat, barley, maize, and legumes crops, the supplies of superior varieties are not available in quantities sufficient to have a significant nationwide impact on agricultural production. During MPP I, EPID acquired improved seeds for sale to farmers directly from the plant breeding stations. These seed supplies proved to be considerably more expensive than those normally used by the farmers. The breeding stations, in addition, have not been adequately equipped to produce sufficient quantities of improved seed to meet MPP requirements. ARDU's seed farms at Kulumsa and Assassa represent the only facility in the country capable of large-scale seed multiplication. The breeding stations have also been responsible for seed cleaning. The largest operational seed cleaning facility has a capacity of 3.5 MT per hour and is operated also at the Kulumsa farm. Farmers have demonstrated a willingness to purchase improved seeds due to the potential for increased yields and because weed-free seed varieties are quite effective in reducing the need for extensive weeding. Nevertheless, the low adoption rate of improved varieties is due primarily to high prices of improved seeds, deficient production and supply, the absence of quality control, and restricted adaptability.

The problem of seed supply is recognized throughout the sector as one of the most serious technical constraints to increased agricultural production. In addition to commissioning a number of studies on seed multiplication, the PMGSE has assembled a National Seed Council for policy formulation and a National Seed Corporation for coordination and implementation of a National Seed Multiplication Program. During the initial years of MPP II the National Seed Corporation would develop institutionally to assume responsibility for the following nationally coordinated functions.

(i) development and enforcement of National Seed legislation;

(ii) seed quality control;

(iii) provision of advisory and training services;

(iv) research and development in cooperation with existing plant breeding stations;

(v) seed cleaning; and

(vi) establishment of a foundation seed program.

The quality control service would include field inspection, laboratory testing, and operation of trial fields. To the extent that EPID has already developed any of these functions, they would all be transferred to the corporation after it becomes fully operational.

Thus, the MPP II effort to address the seed supply problem would involve a program to operate in the short term emphasizing (if not complete development of all services) prompt impact and aleviating the constraint of inadequate seed within the MPP structure.

(b) Description

Increasing quantities of improved seed are to be produced during the first four years of MPP II by requesting PAs to establish seed multiplication plots of 5 ha. for the cultivation of improved wheat and teff varieties. Improved clean seed purchased from state farms and research stations by EPID would be made available on a grant basis to participating PA's. The PA's would agree to allocate a 5 ha. plot of suitable land, provide the necessary labor, and assume the cost of providing inputs that may be desired, such as fertilizer, which are also available to PA's through MPP II small farmer credit program. Technical assistance will be provided by EPID as needed through the network of DA's assigned at the woreda level.

During Year 1 improved wheat and teff seed was made available to 71 PA's comprising approximately 350 ha. of land devoted to seed multiplication. During Year 2 500 ha. are scheduled to be earmarked for seed production by PA's expanding to 750 ha. in Year 3 and 1,000 ha. in Year 4. The seed generated on the PA 5 ha. plot becomes the property of the PA for use by it's members and surpluses are purchased by EPID which sells it to other farmers.

In order to enable PA's to produce higher quality seed the project will also provide on a grant basis limited amount of equipment to encourage seed production which will include field sprayers, mechanized threshers, seed cleaners, and workshop tools for maintenance. The machinery will be selected on the basis of annual operation, portability, and ease of maintenance in order to enable use of the equipment under a

variety of conditions throughout the PA. Complex larger volume seed cleaning equipment was purchased under MPP I in order to establish three regional seed cleaning/processing facilities, one each, at Makelle, Bahr Dar, and Kombolcha. During the initial stages of MPP II, two additional stations for which equipment has already been ordered, are to be established at Jimma and Harrar, and during Year 3 stations are scheduled to become operational at Awassa and at Gimbi. These regional facilities each with a capacity of 2 MT per hour will constitute the foundation of the seed cleaning/processing capability under MPP II with the PA seed equipment operating in a supplementary role accomodating smaller volume of the PA at the local level.

Despite the need throughout the agricultural sector for superior seed varieties of all the major cereal, legume, and oil seed crops, the seed component during the initial stages of MPP II will be limited to providing improved varieties of wheat and teff. Due to regional climatic conditions, traditional farming practices and the time-honored proclivities of the farming population, approximately 60% of the aggregated hectarage of the PA seed production plots will be devoted to growing wheat varieties while the remaining 40% will produce teff. Budgetary calculations are based on a seeding rate of 1.5 quintals (220 lbs.) per ha. for wheat and 0.33 to 0.50 quintals per ha. for teff.

4. Applied Agricultural Research

(a) Background

An agricultural research effort which is able to deliver practical results to the farmer in such a way that he can translate them into increased production or profit, is prerequisite to an effective agricultural development strategy. Within Ethiopia there is a need for a greatly expanded program of coordinated applied research to be disseminated through the extension program. The varying ecological conditions in often inaccessable areas constitute a difficult research problem. The improved crop varieties which have been developed are not adapted to the many varied environmental and climatic conditions which characterize Ethiopian agriculture. Despite the considerable agricultural research underway the coordination of research strategy requires strengthening, and research priorities must be adjusted to accomodate urgent national needs.

Under MPP I a joint IAR and EPID research program was established consisting of the development of seven 5 ha. sites, selected in different ecological zones. The initial objectives were to identify the specific problems of each area and to carryout adaptive research leading to corrective measures. This program was supplemented by the establishment of 15 additional one-hectare sites, operated jointly by EPID and IAR, which had more limited objectives related to the specific conditions peculiar to

the area. At three of the five-hectare sites the basic research has progressed to such a stage that it is possible to integrate the results into a multi-disciplinary farming systems research program.

A renewed effort is required during the course of the second phase of the MPP to improve the research-extension linkage and to direct the research program more toward system oriented production and problem solving. This requires a greater degree of contacts between IAR, EPID and the farmers themselves at the field level, more testing of innovations on farmer's fields and more refinement of recommendations to suit local conditions.

(b) Description of Project Component

The applied research program under MPP II will consist of the following four sub-components:

(i) Continuation of the joint IAR/EPID research program - this program was initiated during MPP I under which IAR, on EPID's behalf, administers seven 5 ha. sites in ecologically different parts of the country. The sites selected were Kobbo, Jijiga, Gambella, Endebir, Nedjo, Chencha, and Woretta. As the capability for research developes at these areas increasingly sophisticated programs carefully selected in terms of regional priorities will be introduced. The three sites scheduled for multi-disciplinary farm systems research are Endiber (Year 1), Gambella (Year 2), and Nedjo (Year 3).

(ii) Integrated Farming Systems Research Program - This program is intended to carry the on-going research activities initiated under Phase I one stage further into multi-disciplinary farms systems research. The primary objective would be to bring together existing adaptive research results relating to specific crops, implements, cultural practices, etc. in order to develop new, or perhaps modifications to existing farming systems, which could be effectively used by extension agents.

The staff of IAR would draw up a detailed program of research activities at each site, taking into consideration the availability of staff and equipment and making an a priori assessment of the likely social and economic viability of the various alternative available. Specifically the program would include:

(1) identifying the principal constraints in the local farming system and the problems to be encountered in the innovations which might be introduced;

(2) compiling existing research data for the area and making a technical and economic evaluation of it;

(3) where insufficient data are available, initiating new lines of investigation;

(4) constructing theoretical models of the farming systems studied and attempting to assign values to the various parameters; and

(5) testing the models on land holdings typical of the area (1-5 hectares) on which detailed farm management records would be kept.

The work program at each site would be carried out by three Technical Assistants of 12th grade or higher, under the supervision of IAR staff. One would be trained in crops and crop protection, one in livestock and animal feeds, and the third would be responsible for ox-drawn implements. The team would also carry out the task of collecting the meteorological data and keeping precise farm records. The Technical Assistants would use a local farmer and his family as hired labor in order to test innovations and to observe their results in the farming system in realistic conditions. Two guards per site would also be employed.

The program of developing systems and testing results would be carried out at five sites. At three of the sites, this would involve upgrading existing facilities and revising work programs which had been initiated in under MPP I. In addition, two new sites, one identified in each of the first two years, would have to be selected on the basis of being ecologically distinct from the other sites and bearing in mind the availability of adaptive research results and research personnel to undertake the program. Sites of approximately 10 hectares, representative of the general extension area would be required. The sites would be fenced and a detailed base-line study of climate and vegetation and soils carried out. Sites for this activity would be developed at the rate of two per year in Years 1 and 2, (i.e. 1977-78 and 1978-79) and one in Year 3 (1979-80).

(iii) Development of Intermediate Technology for Application on Small Farm Units - Development work has been undertaken in the field of intermediate technology over the last two decades, but it has been on a scattered and uncoordinated basis. Recently, emphasis by CADU and other development projects on small farm implements and tools has resulted in useful innovations. An Ethiopian Agricultural Engineering Institute has been proposed to expand and coordinate work in this discipline.

A recent report on the development and introduction of improved agricultural machinery[1/] recommends the establishment of Implement Development Units (IDUs) which would include the identification, design, evaluation and production of machinery and training of personnel. The proposed program is in three stages, leading to the creation of an Agricultural Engineering Centre which would coordinate the work of IDU outstations. It is recommended that the Centre should be administered by EPID but with links, on a sub-contract basis, with IAR and the University.

The most suitable location for the project would be at Bako. It already has considerable facilities which could be expanded to accommodate a design and development workshop, blacksmithing and carpentry workshops to carry out limited manufacture of prototypes, and a small workshop for training instructors of local artisans and extension agents. Efforts to develop intermediate technology at Bako would be coordinated with the workshop at Holetta Research Station, the Small-Scale Industries Bureau as well as with specific projects, e.g. CADU. The manufacture of prototypes for testing in-field conditions and for demonstration, would probably require collaboration with the Small Tools Manufacturing Company in Addis Ababa.

An expatriate Agricultural Engineer, supported by an Assistant Workshop Manager, would form the nucleus of the team at Bako. They would have technicians, artisans and a demonstrator to assist in the research, construction, testing and demonstration of machinery. Initially the Agricultural Engineer, in collaboration with EPID, CADU and IAR, would be tasked with drawing up a work program outlining the scope and nature of machinery development to be undertaken.

Equipment for the project would include one four-wheel drive vehicle, additional workshop tools and machinery for Bako and the import of farm implements and machinery from abroad for testing under local conditions.

1/ Sir John Palmer (1976) A Strategic Plan for the Development and Introduction of Improved Agricultural Machinery in Ethiopia, a report to the Ministry of Agriculture, by Intermediate Technology Services Ltd. (ITSL).

(iv) Training of Research Technicians - The major constraint to expansion of the agricultural research program in Ethiopia is undoubtedly the shortage of trained and experienced personnel. The Institute of Agricultural Research and other agencies have program support for the training of graduate level personnel abroad but no funds which could be used to train lower level technicians. In view of the existing shortage of suitably trained technicians which would be required to carry out the MPP II research program, it is necessary to plan on the basis of using (12th grade) high school graduates wherever possible and to provide them with specialized short-term training in the appropriate fields. Initially, the technicians would receive on-the-job training. Those who proved themselves most capable after this initial period would be selected for short-term, intensive training courses in the appropriate fields.

This program component would provide 12 junior-level scholarships for staff in the appropriate fields. Each scholarship would be for up to 5 months at suitable institutions abroad. The scholarships would be phased over the four years of the research project and be allocated as specific needs arise.

5. Farm Inputs

(a) Background

The agricultural inputs provided during MPP I included fertilizers, improved seeds, insecticides and farm implements. These inputs were procured and distributed to EPID's marketing centers by the Agricultural Inputs Marketing Service (AIMS), a subsidiary of the Agricultural and Industrial Development Bank (AIDB). The EPID marketing centers were, in turn, responsible for distribution of inputs to farmers in the project areas. In 1977 the Agricultural Marketing Corporation (AMC) was established as a public authority under the Ministry of Agriculture and Settlement with responsibility for both input and output marketing. AMC absorbed the staff, assets and commercial liabilities of AIMS. The responsibilities of the Ethiopian Grain Corporation which included purchasing domestic grain and importation of foreign grain to achieve price stabilization were also absorbed by AMC. Thus, AMC has acquired responsibility for procurement and distribution of farm inputs as well as for the marketing of farm products.

(b) Description and Improvement of Project Component

During MPP II, AMC will have the responsibility for procurement and distribution of farm inputs from the supplier to the EPID marketing center and gradually, over a period of time to cooperative stores. AMC would secure loans from commercial banks to purchase inputs from overseas and domestic suppliers. Since AMC does not have direct contact with the farmers, EPID would provide AMC with an estimate of the quantities of agricultural inputs required for each season. AMC would receive similar estimates from the state farms and other users of agricultural inputs, and would order in bulk from the suppliers.

Upon receipt of the commodities AMC will deliver them to its own branches whereupon EPID will ensure the distribution from that point to the farmers associations. During the project EPID would gradually withdraw from its marketing centers and transfer the functions to cooperative societies. AIDB and AMC would then deal directly with cooperatives for supplying credit and for marketing inputs and grain.

The farm inputs to be distributed by AMC would be made available to the farmers on cash and credit terms. In the last three years less than 10% of all inputs sales were on a cash basis and the proportion appears to be decreasing. Under the more favorable credit arrangements of MPP II, with longer terms and lower doen payments, it is expected that in the future nearly all seasonal inputs will be sold on credit.

The AID contribution to the MPP II small farmer credit component consists of financial support through the AIDB for procurement of seeds: teff, barley, wheat, maize, sorghum, and livestock (see Budget Tables in Financial Plan, Section IV). Farm input credit is to be issued in-kind to peasant associations based on credit applications which in turn reflect the aggregate needs of the PA membership. Credit will not be available to individuals. Once a level of credit is approved the PA leadership is notified that 95% of the credit must be repaid on schedule if the PA is to be eligible for credit next year. Other credit inputs provided under MPP II will be funded by the IDA credit.

III. PROJECT SPECIFIC ANALYSIS

A. Economic Feasibility

The analysis of economic benefits has been conducted only on the project activities and time frame of the second phase of the Minimum Package Program; the analysis does not include either the costs or the benefits that should be attributable to the first MPP. The primary benefit of the project will be incremental production of food crops, especially cereals and pulses. The average net-farm income, including subsistance is estimated over the whole project area to be U.S.$114.00 per farm family without the project, and is expected to rise to U.S.$172.00 per farm family (in 1977 constant dollars) after adoption of all innovations, an increase of 51%. The absolute poverty level for the country is a per capita GNP of U.S.$60.00 and the relative poverty level is U.S.$34.00.

Six farm budget models provide the basis for estimating the economic benefits of MPP II. The farm budget models have been established to represent the varying cropping patterns and farm sizes in the six main ecological zones of the project area. These are, in descending order of farm population, the central highlands (Shoa and Gojjam Regions), the Western Highlands (Wollega, Illubabor, Kaffa, and Gemu Gofa Regions), Northern Highlands (Tigre, Wollo, and Gondar Regions) and three smaller southeastern highland zones: Sidamo, Harrarghe and Bale. The calculations were made both for farmers adopting an improved technology package excluding fertilizer and for farmers using the fertilizer based innovation. The analysis assumes that 80% of the adopting farmers in the Central, Western, Sidamo and Bale zones, as well as 50% in Harrarghe and 20% in the northern zone would adopt the fertilizer based innovation and the remainder would adopt the package excluding fertilizer. Farm gate prices are used for both production and inputs. The input price assumes that the input is purchased on credit terms so the cost of the credit is included in the price. It is also assumed that due to soil erosion, yields would decline without the project at the rate of 1% per year in all zones except the northern zone and Harrarghe where it would be 2% per year. In all zones except Sidamo the assumed increase in farm incomes both with and without the use of fertilizer exceeds 50% and in Harrarghe exceeds 70% with fertilizer. In Sidamo the increase is 20%. 1/

1/ IBRD Appraisal of Second Minimum Package Project (MPP II), October 20, 1977 Annex 1, Farm Budget Tables.

The internal rate of return (IRR) for the project is calculated at 54% over 15 years. The IRR of the first phase of the MPP was 15%. It is expected that the economic benefits accruing during the second phase would be higher since subsequent project activities will benefit at no incremental cost from the institutional groundwork established in the first project. Domestic market prices for traded goods have been converted to border prices to reflect more closely the economic efficiency of foreign exchange, and for non-traded goods and services they have been converted by a standard conversion factor of 0.77[1/]. For teff, a major product in the project area which is not traded outside Ethiopia, a price was used that reflects the difference between domestic Ethiopian grain prices and international market grain prices. In the absence of a market for hired agricultural labor, family farm labor was valued in terms of product foregone. Only 60% of the costs of the road component were included to reflect the proportion of the benefits from the road development that are due to the project. The benefits of the livestock program have not been included in the calculation because of the difficulty of quantifying them.

In a program of this size the possible risks are very many, but the single effect of any one of them is not likely to have a significantly detrimental bearing on the overall program. The most probable risk is that the program will not be implemented as fast as proposed. To calculate the possible effect of this risk the economic analysis was re-calculated with a delay of two years in the build-up of the benefit stream and a reduction of the benefits by 20%. This result is a reduction of the rate of return to 20%. The sensitivity was also tested by reducing the duration of the cost and benefit streams to 10 years to reflect the possibility that extension services are not maintained for as far into the future as presently envisaged. The rate of return for MPP II under those conditions would be 47%.

B. Social Soundness Analysis[2/]

1. Socio-Cultural Feasibility

The application of improved agricultural innovations and inputs has been demonstrated through MPP I to be consistent with the socio-cultural characteristics of the small scale farming sector. The project methodology has been to disrupt or alter the existing traditional foundation of peasant agricultural as little as possible

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1/ Ibid. Annex 9 for details concerning the derivation of this factor.

2/ See Social Soundness Analysis of Ethiopia's MPP II, Benedict Stavis, May 1977.

while at the same time introducing modifications consistent with the existing structure, yet designed to achieve increments in productivity and net incomes. MPP II, because of its interaction with the restructures social system, enjoys a higher probability of success than it's predecessor, i.e., MPP I. With the revolution of 1974-75, land reform was finally initiated, leading to vast changes in the land tenure system and proportionate increases in farmer incentives. Central to Ethiopia's rural strategy is the building of a new set of social organizations, including peasant associations and cooperatives, both of which will play a vital role for agricultural extension under MPP II.

2. Diffusion of Innovation

The project will provide improvements directly to the target population through PAs. PA committees work in direct liaison with the DA to receive special training, test locally promising innovations, and to teach all members of the association what they have learned.

The PA serves to organize the recovery of credit and payment of taxes and to supervise the equitable distribution of input and credit. The PA plays an active role in monitoring the pattern of development and insuring that benefits are available to all member families. The association makes sure that the larger or formerly elite families do not monopolize the input and credit and hence the benefits of agricultural development. The project does not emphasize any one group or geographic area at the expense of another. Inputs and services are expected to be made available to 2,242,000 farms or 71% of the farming population. The project will establish regional offices in 12 of the 14 administrative regions in Ethiopia, 80 awraja offices, 429 woreda offices and 12 mobile teams. Of Ethiopia's 560 woredas 125 will not be covered by the project either because they have little settled agriculture, agriculture projects are already established, or they lie in Eritrea which is excluded for security reasons.

3. Social Consequence and Benefit Incidence

Because of land reform, the new political economy of rural Ethiopia, and because MPP II has been designed to provide development benefits through interaction with the target beneficiaries the impact of MPP II is expected to be widespread. Given the intent to formulate development programs applicable to local and regional conditions peculiar to the different farming areas the benefits will not be uniform and some locals will benefit more rapidly than others. Some technology, such as fertilizer usage will have immediate results. However, the important work of reducing the effects of erosion, improving access to water, improving animal husbandry, developing new crops and cropping patterns will require considerably more time. One

of the attractions of MPP II is that it begins a process that will continue to provide benefits virtually indefinitely.

The major institutional changes in the countryside tend to assure that the small farmer can retain his share of the benefits. Benefits will not be lost through payments for rent or for interest payments to a village money lender. Unlike the first phase, MPP II is not contingent upon the availability of a road network. Decentralization of authority to the awraja and woreda level and the formation of mobile teams will help to minimize discrimination in regional development opportunities and insure that areas are not discounted due to relative inaccessability.

4. Changes in Power and Participation

The social assessment has been based on existing political orientation and values. The revolution and the emerging governing structure has a strong foundation in a socialist concept of equity. Given the retention of the prevailing political order it is very unlikely that any particular group or class will be permitted to dominate PAs or cooperatives or to control inputs and credit and eventually monopolize the benefits.

C. Technical Feasibility

The technology proposed for achieving the project objectives has been selected using, in part, the experience gained during the six preceeding years of MPP I. The project's first stage was intended to increase farm incomes by promoting a relatively simple high yielding innovation for a limited range of crops through the provision of a well supervised and integrated minimum of services in well defined, high potential areas along existing roads. The areas covered by the program now comprise about 18% of the total farmer population. The government intends to extend program activities to a much larger proportion of the farm population, diversifying the innovations offered and decentralizing it's organization so that increasing administrative responsibilities are delegated to local levels, while PAs assume an important if not critical role in distribution of knowledge and innovations. The following analysis which serves as the basis for the recommended technology has been extracted from the IBRD Appraisal of the Second MPP.

Adoption Rates

Among the factors most important in determining the feasibility of extending technical innovations is the adoption rate within the farming sector. The assumptions about rates of adoption are based on empirical evidence from MPP I. Two rates are considered: the rate at which EPID will contact new farmers once it begins its operations in a new area (the "contact rate"), and the rate at which an individual farmer will adopt innovations once contacted by EPID (the "adoption rate"). The contact rate assumes that 50% of the farmers in the

operating area will be reached by EPID over a 9 year period, following a logistic curve that builds up slowly at an increasing rate to a peak in the years 5-7, and falls away at a decreasing rate thereafter. It is assumed that once a farmer has been contacted, he will, as a result of adopting the innovations extended to him, increase his yields over a 5 year period for those adopting the fertilizer-based innovation and over a 4 year period for these adopting the other innovations; in both cases the greatest increase is in the first year. These assumptions mean that the last farmers to be contacted in the new areas opened in the fourth and final year of the Project would not be reached for another 9 years (i.e. 12 years after the beginning of the Project) and, in the case of the fifth year thereafter, i.e, 1993.

Related to general problems of small scale farmer adoption is the more difficult issue of effectively reaching the smallest scale subsistance farmers who are habitually reluctant to participate in extension programs. Experience has shown that there is a close correlation between the size of a farmer's holding and his willingness to adopt innovations. This can be traced directly to farmers' reluctance to purchase inputs on credit, as they often have difficulty in obtaining the required downpayment, and fear that they will be unable to put aside the surplus cash necessary to repay the loans. This situation is illustrated in the finding below:

Distribution of Holdings and Use of Fertilizers

Hectare	Statistically Corrected %	% Using Fertilizers
less than 0.10	1.3	0.7
0.11-0.50	24.4	6.0
0.51-1.00	26.5	7.6
1.01-2.00	23.7	10.1
2.01-5.00	20.1	10.5
5.01-10.00	3.8	23.0
more than 10.00	0.2	50.0
Total	100.0	8.3

Source: Crop Production Survey, 1975-76

In order to overcome this reluctance, special efforts would be made to ensure the participation of farmers cultivating less than one hectare (over 50% of all farmers). This problem would be brought to the attention of the Farmers' Associations by the Development Agents so that they could organize the special credit procedures and farmer training programs necessary to ensure the involvement of the small farmers in the ongoing programs.

Yields, Production

Because of the large area and varied conditions covered by the Project, it is not possible to make precise estimates of possible yield increases, but an order of magnitude has been assumed as a base for calculating the benefits of the Project. These are as follows:

	Teff	Sorghum	Barley	Wheat	Maize
	quintal/ha.				
Base Yield (Year 0)	6.6	12.9	9.3	9.2	20.3
Fertilizer Innovations (Year 5)	10.9	22.2	18.4	14.3	37.1
Other Innovations (Year 4)	9.2	18.1	13.0	12.9	28.4

It is assumed that the fertilizer innovations, i.e. innovations that include the use of fertilizer, will be adopted in these areas when soils and accessibility permit, and that other innovations would be adopted in areas where conditions are not suitable for chemical fertilizers.

It is assumed that there would be no increase in the area under the main crops resulting from the Project, though it is possible that the use of fertilizers would allow a reduction in fallow periods and an increase in the area under crops. For the same reasons mentioned above, it is not possible to give a precise estimate of the increased production due to the Project but the order of magnitude of the incremental yields from the Project are as follows:

	Teff	Sorghum	Barley	Wheat	Maize	Pulses
	thousand metric tons					
End of Project Period (1981)	10	6	8	3	21	1
Full Adoption (1989)	141	163	123	44	292	15
Full Development (1993)	156	182	133	48	317	0

An increase of about 40,000 tons of other crops by 1993 is also expected. The value of production of cereals and pulses in the Project area is expected to increase from the present value at the farm gate of Birr 501 million (U.S.$242 million) to Birr 708 million(U.S.$342 million) in 1977 constant prices at full production in 1993.

Markets and Prices

A proportion of the increased production, which may be as high as 70%, would be consumed on the farm. The remainder would be sold in traditional markets, or marketed by the Agricultural Marketing Corporation (AMC). AMC would use the marketing centers that EPID has been setting up since the first Minimum Package Project, and it is assumed that to an increasing extent during the Project period these marketing centers will be taken over by cooperatives who would sell their produce directly to the AMC, thus eliminating EPID's marketing activities entirely, which is the ultimate goal. EPID has already constructed a number of stores for marketing of both inputs and production. The operations of these stores will be taken over by the cooperatives as they develop the capability to assume this responsibility, and will then either buy or rent the store.

Within the context of the revision of the grain marketing system that resulted in the creation of the AMC, the Government has made satisfactory arrangements to ensure that price levels are reviewed periodically with respect to farmer incentives and consumer needs. Since the Government recognizes that it would not be able to enforce fixed prices, it allows AMC to fix its own prices within certain pre-determined levels and guarantees to reimburse AMC for losses that might be incurred in maintaining prices within these limits. Domestic prices in Ethiopia have in recent years been considerably below world market prices, and since Ethiopia is currently importing grain to meet domestic requirements it is likely that prices will rise during the next few years. Because of the varying distances between production areas and the main markets, prices paid to purchasers vary slightly according to region, but the average minimum producer prices would be Birr 32 per quintal of teff, Birr 24 per quintal of wheat, Birr 16 per quintal of maize, and Birr 21 per quintal of sorghum. Prices for fertilizer have been calculated according to IBRD forecasts of international prices; and for 1978 would be Birr 642 per ton urea and Birr 678 per ton DA. delivered to the farmer, excluding the present subsidy which is 20-25% of the cost price. The Government intends to abolish subsidies on fertilizers and insecticides and an assurance will be sought at negotiations that these would beabolished by 6 July 1980.

D. Administrative Feasibility

MPP Phase II as with Phase I will be conducted under the overall jurisdiction of EPID with the exception of the rural roads and research components. The research activities will be jointly conducted by EPID and the Institute of Agricultural Research (IAR) which, under the jurisdiction of the Ministry of Agriculture and Settlement is responsible for research in the following fields: Animal Science, Pasture and Forage, Field Crops, Soils, Horticulture, Plant Protection, Coffee and Diversification, Socio-Economic Studies, Agricultural Engineering, Home Science and Food Technology. Under

the rural roads component, EPID's responsibility will be limited to determining the priority and location of roads to be constructed by the Rural Roads Organization of the Ethiopian Highway Authority.

Heretofore, EPID's administrative functions have been conducted from its headquarters in Addis Ababa with little autonomy in the field offices. During MPP II the programs' administration is to be decentralized so that it can be adapted to a variety of local needs and eventually reach a much larger proportion of the farm population. Twelve regional field offices will be established and assume responsibility for project activities in districts and sub-districts. During the project the regional offices will gradually take over (from headquarters) responsibility for the detailed design of field activities, budget preparation, administration and accounting, local procurement, staff recruiting and in-service training.

Directly below the regional offices 80 awraja offices are to be established with the responsibility of providing technical support and supervision to the woreda level offices. In addition to supervisory responsibilities the awraja level would assist in the design of trials and demonstrations, disburse petty cash, assist in training course at the Farmers Training College (FTC), and assure effective liaison with EPID headquarters.

The basic administrative unit will be the woreda office. These will replace the extension MPPA Offices which constituted the field units under MPP I. The extension area would cover the whole woreda and not just a part of it as was the case during Phase I. A woreda office will be established in 429 woredas and conduct extension activities related to agronomy and plant husbandry, animal husbandry, soil and water conservation, cooperative promotion, and home economics.

Staff would be provided under the project at both the woreda and awraja level to assist the peasants' associations in carrying out their programs. The agent/farmer ratio would be relatively low (1/2,400 farmers) as compared with other African countries (1/300 or 1/500); however, as the agents will be working with the PAs and should not have to contact the farmers individually, this level of staff is expected to be sufficient.

The degree to which project objectives will be achieved depends partially upon the extent to which decentralization of the administrative function can be effectively instituted. The extensive expansion which is planned for the project required an outreach of the administrative structure simply (although not exclusively) because of the rather vast territory involved. Fortunately, the regional, awraja, and woreda project offices which will be established as the foundation of the administrative network coincides with the existing traditional rural administrative structure. The rural population which compose the membership of the PAs will work with project field offices

functioning under an organizational hierarchy which is traditionally both familiar and acceptable.

The most critical administrative issue influencing the feasibility of MPP II is that of manpower. The project will require a substantial increase in the number of staff if decentralization as planned is to take place. In recognition of the importance of the manpower issue a careful assessment has been conducted of the availability of suitably qualified personnel. The shortage of technically qualified manpower, inherent in Ethiopia, was exacerbated by the closing of educational institutions in the wake of the 1974 revolution. EPID will recruit graduates of the College of Agriculture for positions at headquarters, at the regional offices and as awraja heads. The agricultural institutes at Ambo and Jimma reopened in November 1976, but with the shortage of teaching staff they are likely to operate at less than full capacity. Graduates from those and two new institutions at Awassa and Debre Zeit will be recruited by EPID for positions as awraja specialists, extension agents and woreda heads.

The relatively few number of graduates expected for the next two years from Alemaya Agricultural College means that EPID will be able to recruit a limited number of new staff members in 1978 and 1979 and will have to expand recruitment in the following year. The same considerations apply to intermediate level staff to be recruited from the Agricultural Junior Colleges and Institutes. There are several vacancies and a large number of personnel at this level would be needed as awraja specialists and woreda heads during the expansion period, and it will not be possible to recruit sufficient numbers until graduates are generated from the Junior Colleges of Awassa in 1978 and Debre Zeit in 1979. In order to be able to recruit personnel for new positions and train new staff, EPID will have to defer filling some existing vacancies in 1978 until 1979 and 1980, but it should be possible to have all positions filled by the end of 1980. The annual phasing of EPID's requirements will be determined in the annual work plans taking into consideration the actual recruitment possibilities at that time. As far as can be determined at present EPID will be able to meet all its personnel requirements for the project. 1/

During MPP I activities EPID experienced several additional administrative problem which hampered progress. Accounting inefficiencies and budgetary shortages for a period of about four months greatly reduced EPID functions and had perhaps a more enduring impact in loss of morale and some qualified staff. Secondly, as the revolution gained momentum a sizable number of EPID personnel had chosen to be non-supportive of the new governing order. This resulted in a polarization of loyalties which detracted rather significantly from the business of promoting agricultural development and in the process diluted administrative capability. Thirdly, EPID came to be viewed with a

1/ IBRD Appraisal, Annex 3

certain amount of suspicion that the department was unwilling to seriously address the real agricultural problems of the Ethiopian farmer. Such suspicion was based on EPID's policy of confining its activities to the few easily accessible areas in the countryside and applying uniform and rather simplistic solutions to a wide range of problems in very disparate circumstances. A fourth problem area appeared to develop from the lack of an effective information feedback system which would allow for periodic adjustment in the project as problems were identified.

Corrective measures have or are being applied to these administrative difficulties. EPID overhauled its accounting procedures and satisfied the Ministry of Finance's accounting requirements. Also EPID has recognized the need to be flexible and more responsive to the myriad problems attending Ethiopian peasant agriculture and will be far less restrained by the absence of a road infrastructure under MPP II than it was during MPP I. MPP II is designed to be able to provide full coverage to woredas, not just the areas adjacent to a road. Although the problems of political affiliation and its concomitant disruption was largely beyond the control of EPID many of the dissidents have departed leaving the organization in a position to refocus attention on the problems of development.

EPID's decentralization described above will provide the two-way exchange of information. Planning will be initiated at the local level to insure that MPP II activities are responsive to local needs while at the same time the program incorporates the feedback mechanism necessary for making needed adjustments in the system.

These problems notwithstanding, EPID managed to establish and operate a large scale agricultural development program which surpassed originally programmed targets in several important areas including numbers of participating farmers and crop yield increases. Thus, the refinements in EPID's basic procedures and the administrative structural innovations presently being incorporated have combined to alleviate the more serious problems identified during MPP I and are strengthening EPID's present effectiveness and future implementation capacity.

E. Environmental Concerns

The project review paper was completed in November 1975 prior to the establishment of the present environmental regulations. Therefore, during the initial period of preparation of the project paper a threshold decision with respect to environmental concerns had not been reached nor an IEE prepared. Nevertheless, the comprehensive nature of the project with it's multi-faceted elements and the geographic area involved suggested many areas for inquiry concerning the impact of the project on the environment. In order to properly address the environmental concerns USAID commissioned the firm of Pacific Consultants to conduct an in-depth study of the impact on the environment of MPP Phase II. The assessment was

completed in June 1977 and is listed as an annex to this project paper. The consultant's report, which is too extensive to summarize in detail here, generally finds that the gains expected to be achieved by the project far outweigh the disbenefits, all of which can be satisfactorily controlled or eliminated by education and monitoring. These safeguards are described in detail in the consultant's assessment.

One of the major recommendations of the study is that a national environmental monitoring system within Ethiopia be established which will observe the use and effects of certain possible environmental pollutants, especially pesticides. This suggestion has been accepted by the Minister of Agriculture and Settlement. Subsequently, the regional office of UNEP in Nairobi was requested by the UNDP Regional Representative in Addis Ababa on behalf of the Ethiopian Government to send a consultant to explore the requirements necessary to establish the monitoring system. The UNEP consultant's report has been submitted and is presently undergoing review by various agencies of the host government.

IV. FINANCIAL PLAN

The overall costs of MPP II are summarized in Section II.C.2. AID inputs are shown in the following Budget Tables. The tables show the estimated expenditures for each component by year and the amount of foreign exchange required. In addition, a summary Budget Table is provided to present an overview of AID support to the program.

SOIL AND WATER CONSERVATION (UNIT: BIRR 1,000)

	Unit Cost (Birr)	Year 1 (FY 78)	Year 2 (FY 79) No.	Year 2 (FY 79) Amount	Year 3 (FY 80) No.	Year 3 (FY 80) Amount	Year 4 (FY 81) No.	Year 4 (FY 81) Amount	Year 5 (FY 82) No.	Year 5 (FY 82) Amount	Total Cost	FX %	FX Amount
Capital Costs													
Vehicles - 4WD	32000	-	46	1472.0	46	1472.0	-	-	-	-	2944.0	52	1509.9
Motorcycles	3800	-	40	152.0	40	152.0	40	152.0	40	152.0	608.0	54	328.3
Horses, Mules, Bicycles	320	-	40	12.8	40	12.8	20	6.4	20	6.4	38.4	34	13.1
Theodolites w/tripod	11100	-	4	44.4	8	88.8	-	-	-	-	133.2	80	106.6
Dumpy Levels w/tripod	2600	-	40	104.0	40	104.0	-	-	-	-	208.0	80	166.4
Abney Hand Levels	340	-	40	13.6	40	13.6	-	-	-	-	27.2	80	21.8
Misc. Hand Tools	115	-	80	9.2	80	9.2	60	6.9	60	6.9	32.2	60	19.3
Sub-Total		-		1808.0		1852.4		165.3		165.3	3991.0		
Operating Costs													
Salaries													
Regional CA	8200	-	12	98.4	12	98.4	12	98.4	12	98.4	393.6		-
Awraja CA	5700	-	40	228.0	80	456.0	80	456.0	80	456.0	1596.0		-
Woreda CA	4300	-	40	172.0	80	344.0	120	516.0	150	645.0	1677.0		-
Social Benefits	8%	-		39.9		71.9		85.6		96.0	293.4		-
Travel & Per Diem		-		90.0		180.0		225.0		254.0	749.0		-
Vehicle Maintenance				539.1		1078.3		1130.3		1243.3	3991.0	50	1991.5
Horse, Mule & Cycle Maint.		-		5.0		10.0		12.5		15.0	42.5		-
Training PA Reps.		-		80.0		80.0		80.0		80.0	320.0		-
Miscellaneous		-		10.0		10.0		10.0		10.0	40.0	25	10.0
Sub-Total				1262.4		2328.6		2613.8		2897.7	9102.5		
Tech.Svcs.-S/W.Cons.Spec.	180,000/yr	-	0.5yr	90.0	1.0yr	180.0	1.0yr	180.0	0.5yr	90.0	540.0	90	486.0
Total Costs		-		3160.4		4361.0		2959.1		3153.0	13633.5	34	4652.9
Contingencies	5%	-		158.0		218.0		148.0		157.7	681.7	34	231.8
Inflation		-	9%	298.6	12%	549.5	17%	528.2	24%	794.6	2170.9	20	434.2
Total				3617.0		5128.5		3635.3		4105.3	16486.1	32	5318.9

BEST AVAILABLE DOCUMENT

RURAL ROADS

	Unit Cost (Birr)	Year 1 (FY 78)	Year 2 No.	(FY 79) Amount	Year 3 No.	(FY 80) Amount	Year 4 No.	(FY 81) Amount	Yea No
Capital Costs									
Construction 1/	9670/km 2/	-	300km	2901.4	300km	2901.4	300km	2901.4	300k
Operating Costs									
Maintenance		-		180.0		360.0		540.0	
Self-help Program	2000/km 3/		200km	400.0	200km	400.0	200km	400.0	200k
Feasibility Studies		-		65.0		65.0		65.0	
Sub-Total		-		645.0		825.0		1005.0	
Total Costs		-		3546.4		3726.4		3836.4	
Contingencies	5%	-		177.3		186.3		191.8	
Inflation		-	9%	335.1	12%	469.5	17%	684.8	24%
Total				4058.8		4382.2		4713.0	

1/ Does not include Birr 2,723,600 provided by IDA Credit 552-ET for purchase of vehicles and equipm

2/ Average cost per kilometer based on assumption road construction will consist of 12% Class A, 33% i.e. - Annual construction of 300 KM. will consist of 40 KM. of Class A, 100 KM. of Class B, and

3/ Represents only project costs that include technical assistance and materials. All other constru

SEED MULTIPLICATION

(Unit: Birr 1,000)

	Unit Cost (Birr)	Year 1 (FY-78)	Year 2 (FY-79)		Year 3 (FY-80)		Year 4 (FY-81)		Year 5 (FY-82)		Total Costs	FX	
			No.	Amount	No.	Amount	No.	Amount	No.	Amount		%	Amount
Capital Costs													
Field Sprayers	200	-	40	8.0	80	16.0	80	16.0	-	-	40.0	100	40.0
Mechanical Threshers	1500	-	40	60.0	80	120.0	80	120.0		-	300.0	100	300.0
Seed Cleaners	1200	-	40	48.0	80	96.0	80	96.0		-	240.0	100	240.0
Workshop; Tools	300	-	40	12.0	80	24.0	80	24.0		-	60.0	80	48.0
Sub-Total		-		128.0		256.0		256.0		-	640.0		
Operating Costs													
Teff Seed	60/qt	-	67qt	4.0	100qt	6.0	133qt	8.0		-	18.0		-
Wheat Seed	30/qt	-	450qt	27.0	675qt	41.0	900qt	54.0		-	122.0		-
Jute Sacks	3	-	650	2.0	800	2.4	1200	3.6		-	8.0		-
Sub-Total		-		33.0		49.4		65.6		-	148.0		
Technical Services													
Agronomist	180,000/yr	-	0.5yr	90.0	1.0yr	180.0	1.0yr	180.0	0.5yr	90.0	540.0	90	486.0
Seed Multi. Spec.	180,000/yr	-	0.5yr	90.0	1.0yr	180.0	1.0yr	180.0	0.5yr	90.0	540.0	90	486.0
Sub-Total		-		180.0		360.0		360.0		180.0	1080.0		
Training		-		25.0		25.0		25.0		25.0	100	50	50.0
Total Costs		-		366.0		690.4		706.6		205.0	1968.0	86	1700.0
Contingencies	5%	-		18.3		34.5		35.3		10.3	98.4	86	84.6
Inflation		-	9%	34.6	12%	87.0	17%	126.1	24%	51.7	299.4	75	224.5
Total		-		418.9		811.9		868.0		267.0	2365.8	85	2009.1

APPLIED RESEARCH

(UNIT: 1,000 Birr)

	Unit Cost Birr	Year 1 (FY 78)	Year 2 (FY 79)		Year 3 (FY 80)		Year 4 (FY 81)		Year 5 (FY 82)		Total Costs	FX	
			No.	Amount	No.	Amount	No.	Amount	No.	Amount		%	Amount
Capital Costs													
Integrated Farming Sys.		-		36.2		36.2		36.2		36.2	144.8	44	63.7
Dvlp. Intermediate Tech.		-		63.8		25.3		19.2		19.2	127.5	57	72.7
Sub-Total				100.0		61.5		55.4		55.4	272.3		
Operating Costs													
Joint IAR-EPIL Research		-		152.0		83.0		58.0		58.0	351.0	10	35.1
Integrated Farming Sys.		-		80.0		160.0		160.0		160.0	560.0	12	67.2
Dvlp. Intermediate Tech.		-		85.0		85.0		85.0		85.0	340.0	27	91.8
Training Technicians		-		26.0		26.0		26.0		26.0	104.0	100	104.0
Sub-Total		-		343.0		354.0		329.0		329.0	1355.0		
Total Costs		-		443.0		415.5		384.4		384.4	1627.3	27	434.5
Contingencies	5%	-		22.2		20.8		19.2		19.2	81.4	27	22.0
Inflation		-	9%	41.9	12%	52.4	17%	68.6	24%	96.9	259.8	20	52.0
TOTAL		-		507.1		488.7		472.2		500.5	1968.5	26	508.5

CREDIT FOR FARM INPUTS

(UNIT: Birr 1,000)

	Unit Cost (Birr)	Year 1 (FY 78)	Year 2 (FY 79)		Year 3 (FY 80)		Year 4 (FY 81)		Year 5 (FY 82)		Total Costs	FX	
			No.	Amount	No.	Amount	No.	Amount	No.	Amount		%	Amount
Seeds													
Teff		-		72.8		127.4		233.5		-	433.7		-
Barley		-		138.0		269.9		507.2		-	915.1		-
Wheat		-		136.1		257.7		491.3		-	885.1		-
Maize		-		36.8		59.4		109.0		-	205.2		-
Sorghum		-		9.8		10.0		16.9		-	36.7		-
Sub-Total				393.5		724.4		1357.9		-	2475.8		
Livestock		-		309.2		271.9		252.4		-	833.5	20	166.7
Total Costs		-		702.7		996.3		1610.3		-	3309.3	5	166.7
Contingencies	5%	-		35.1		49.8		80.5		-	165.4	5	8.3
Inflation		-	9%	66.4	12%	125.5	17%	287.4		-	479.3	5	24.0
TOTAL		-		804.2		1171.6		1978.2		-	3954.0	5	199.0

SUMMARY OF AID INPUTS BY COMPONENT

(UNIT: Birr 1,000)

	Year 1 1/ (FY 78)	Year 2 (FY 79)	Year 3 (FY 80)	Year 4 FY 81)	Year 5 (FY 82)	Total AID	Foreign Exchange %	Foreign Exchange Amount
Soil & Water Conservation	-	3160.4	4361.0	2959.1	3153.0	13633.5	34	4652.9
Rural Roads	-	3546.4	3726.4	3836.4	4226.4	15335.6	35	5392.0
Seed Multiplication	-	366.0	690.4	706.6	205.0	1968.0	86	1700.0
Applied Research	-	443.0	415.5	384.4	384.4	1627.3	27	434.5
Credit for Farm Inputs	-	702.7	996.3	1610.3	-	3309.3	5	166.7
Sub-Total	-	8218.5	10189.6	9436.8	7968.8	35873.7	34	12346.1
Contingencies 2/	-	410.9	509.4	474.8	398.5	1793.6	34	615.1
Inflation 2/	-	776.6	1283.9	1695.1	2008.3	5763.9	28	1628.8
Total Expenditures	-	9406.0	11982.9	11666.7	10375.6	43431.2	33.6	14590.0
Total Expenditures (US$1,000)	-	4580.0	5830.0	5680.0	5050.0	21140.0	33.6	7100.0
Planned Obligations (US$1,000)	10000.0	-0-	5000.0	6140.0	-0-	21140.0		

1/ EPID commenced project in July 1977, which is beginning of Project Year 1. Grant Agreement expected to be signed fourth quarter FY 78. Expenditures will begin in FY 79.

2/ For computation of contingencies and inflation, refer to individual component budget tables.

7. IMPLEMENTATION PLAN

The implementation of project activities under MPP II involves design of technical packages at the woreda level. As noted earlier these packages in order to be effective include participation in the design process of the PA assisting in the determination of measures applicable to the specific developmental constraints peculiar to that area. Given the magnitude of MPP II both in terms of geography and developmental methodology it is not feasible to attempt a detailed plan describing in advance the precise location and timing of all project components. Indeed, although the woredas themselves have been identified the individually tailored developmental approach for each has not been finalized. To do so would be contrary to the concept of self-help at the local level and participation of the target population in the development process which is an inherent characteristic of MPP II.

Alternatively, an annual schedule of work is presented below for USAID supported project components.

Soil and Water Conservation

Projected Soil and Water Conservation Practices

Year	Soil Bunds	Afforestation Hectares	Ponds Number	Spring Development Number
1	36,000	400	40	5
2	82,800	1,200	140	10
3	180,000	2,400	310	20
4	316,000	4,000	530	25

Tentative Accumulative Training Schedule

Year	Conservation Agents	Peasant Association Agents
1978	40	1,200
1979	80	2,400
1980	120	3,600
1981	150	4,500

Rural Roads

Year	Kms. Constructed by RCUs	Kms. Constructed Self-Help	Total Kms.
1	-	-	-
2	300	200	500
3	300	200	500
4	300	200	500
5	300	200	500

Seed Multiplication

Year	Participating PAs	Ha. Producing Improved Seed	Qt. of Seed Multiplication
1	71	350	
2	100	500	
3	150	750	
4	200	1,000	

Applied Agricultural Research

See description of Project Component p.23.

Farm Inputs

See description of Project Component p. 27.

VI. EVALUATION ARRANGEMENTS FOR THE PROJECT

Given the extensive and complex nature of MPP II, effective monitoring and evaluation of project performance and feedback are essential in order to insure achievement of objectives and that program adjustments, as necessary, will be made. Within EPID this function will be the responsibility of the Planning and Evaluation Unit. Measuring project performance will be achieved principally through the annual crop survey which is concerned with estimating the impact of adoption of the technical packages. Under varying conditions the actual yield of farmer's fields is measured while data collection of numbers of adopters indicates the degree and rate of progress. The crop survey will also be used as an instrument for identifying problems and making adjustments. Actual crop survey results when compared to those obtained from trials, demonstrations and experimentation will indicate which components are being used correctly and which components require further promotion and explanation. It will be the responsibility of the EPID Planning and Evaluation Unit to identify shortfalls in performance and, in conjunction with the appropriate technical staff of EPID and other governmental agencies, determine why targets are not being met and suggest alternative solutions.

The project will strengthen the existing capacity of the Planning and Evaluation Unit by the addition of a senior economist, an economist and a statistician.

The information and recommendations obtained through the annual crop survey will become a major evaluation tool used during the semi-annual visit by the IBRD supervisory mission. Every six month period an IBRD team will visit Ethiopia to assess the degree of achievement of project components and review with the host government and other donors progress, problems, and any changes required. The USAID project officer and evaluation officer will participate as members of the semi-annual IBRD MPP II evaluation. The data as well as the determinations reached during these joint project assessments will serve as the basis for annual performance evaluations.

Central to the evaluation methodology is the EPID Annual Budget and Work Schedule. This projection of project targets provides a detailed description of planned field activities and budgetary requirements for each awraja. Included is a current staffing pattern and proposed project adjustments as dictated by changing circumstances and data provided through the feedback system. The Annual Budget and Work Schedule quantifies the project targets established by EPID for the forth-coming fiscal year. The targets therein are projected on the basis of individual surveys conducted one year prior to implementation on the background, status, and development problems of each woreda selected to be opened to MPP development activities. Thus, the Annual Budget and Work Schedule, utilizing detailed information from the woreda surveys functions as the base line data against which the evaluation process measures achievement. In addition to serving as an evaluation and planning tool the annual schedule is somewhat innovative in the flexibility it introduces to project planning/ management and the opportunity it offers to respond swiftly to the feedback mechanism and incorporate project modifications in a timely fashion.

VII. CONDITIONS, COVENANTS, AND NEGOTIATING STATUS

The present status of negotiation between the various donors and the Host Government has surfaced no formal proposals for actions to be carried out prior to the signing of the project grant agreement. As a condition precedent to disbursement, however, it has been agreed that there will be a cross-effective arrangement between AID and IBRD which will specify that the availability of support to be provided by one donor shall be contingent upon the approval and agreement of project support of the other. Other than the terms, conditions, covenants, to be included in the project grant agreement as specified in HB 3, Chapter 9 no other special covenants or conditions are envisaged.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 1978 to FY 1981
Total U.S. Funding $21,140
Date Prepared: June 12, 1978
PAGE 1

Project Title & Number: Agriculture Sector Development - 663-0181

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes: (A-1)	Measures of Goal Achievement: (A-2)	(A-3)	Assumption for Achieving Goal Targets: (A-4)
To increase agricultural production and farm income, achieve a more equitable distribution of income and improve the quality of life of the rural poor.	1. Increased average disposable farm income for participating farmers from $117 per year in 1976 to $172 per year after adoption of all innovations.	Joint IBRD/USAID semi-annual project assessment	Adequate security conditions will prevail in countryside to permit planned expansion of program to achieve anticipated farmer participation and agricultural production levels.
	2. Farmer participation in program increased from 12 per cent of all farmers in 1976 to 71 per cent in 1982.	Joint IBRD/USAID semi-annual project assessment; EPID annual crop survey.	PMGSE policies will be supportive of program, particularly the following: - price and tax policies provide production incentive - effective functioning of EPID - effective functioning of PAs in relation to program - implementation of environmental monitoring system - greatly increased priority given to Soil/Water Conservation measures
	3. Increased cereal yields:	PPD annual crop production survey; EPID annual crop survey.	

	Base Yield (Year 0)	Fertilizer Innovations (Year 5)	Other Innovations (Year 4)
	Quintals/ha.		
T*	6.6	10.9	9.2
S*	12.9	22.2	18.1
B*	9.3	18.4	13.0
W*	9.2	14.3	12.9
M*	20.3	37.1	28.4

4. Measurable improvement in perceived quality of life by farmer participants by 1982

* T = Teff; S = Sorghum; B = Barley; W = Wheat; M = Maize

BEST AVAILABLE DOCUMENT

MICROFILMED
AVAILABLE

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 1978 to FY 1981
Total U.S. Funding $21,140
Date Prepared: June 12, 1978

ANNEX 2
Page 2 of 4

Project Title & Number: Agriculture Sector Development - 663-0181

PAGE 2

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Purpose: (B-1)	Conditions that will indicate purpose has been achieved: End-of-Project status: (B-2)	(B-3)	Assumptions for achieving purpose: (B-4)
Expand farmer participation in production programs from 450,000 in 1976 to 2,242,000 in 1982 and increase production of major food crops from 119,000 MT in 1976 to 628,000 MT in 1982.	Expanded organizational structure and management system enabling effective use and application of improved agricultural inputs and services as evidenced by: 1976 / 1982 Woredas served 55 / 429 PAs established 1,200 / 25,000 Increased total production of major food crops as evidenced by: 1976 MT / 1982 MT Barley 14,779 / 84,942 Maize 52,530 / 254,132 Sorghum 22,379 / 132,379 Teff 15,605 / 87,007 Wheat 13,281 / 69,508	Annual crop production survey by PPD: Joint IBRD/USAID semi-annual program assessment.	Farmers are willing to participate in program through medium of PAs. Adequate markets exist for surplus agricultural production.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 1978 to FY 1981
Total U.S. Funding $21,140
Date Prepared: June 12, 1978

Project Title & Number: Agriculture Sector Development - 663-0181

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Outputs: (C-1)	Magnitude of Outputs: (C-2)	(C-3)	Assumptions for Achieving Outputs: (C-4)
Soil/Water Conservation program in operation	1982 Soil bunds 316,000 ha. Ponds 530 ea. Spring Development 25 ea. Afforestation 4,000 ha. Trained CAs 150 Trained PA Agents 4,500	Observation; annual EPID reports; Joint IBRD/USAID semi-annual program assessment.	Sufficient manpower available and assigned to meet staff requirements for expanded program.
Rural Access Road construction	Constructed: RCUs 1,200 kms. Self-help 800 kms.	Observation; periodic reports from RRO and EPID.	Improved technology is socio-economically acceptable to farmers and adaptable to local farming systems.
Seed Multiplication	Participating PAs 200 Area producing improved seed 1,000 ha.	Observation; EPID reports; Joint IBRD/USAID semi-annual assessment.	
Applied research	Joint IAR/EPID research program	EPID and IAR reports.	
Credit for farm inputs	Credit for: Improved seed 18,000 ha. Draft oxen 2,500 head	Records of AIDB and AMC	
Planning/evaluation system in operation	Annual work plans and budget prepared	Annual work plans and budgets provided to USAID and IBRD	

PROJECT DESIGN SUMMARY

Life of Project:
From FY 1978 to FY 1981
Total U.S. Funding $21,140
Date Prepared: June 12, 1978

Project Title & Number: Agriculture Sector Development - 663-0181

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS					MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Inputs: (D-1)	Implementation Target (Type & Quantity)					(D-3)	Assumption for Providing Inputs: (D-4)
	Year 2 2/ (FY-79)	Year 3 (FY-80)	Year 4 (FY-81)	Year 5 (FY-82)	Total		
Soil & Water Conservation						USAID Controller documents; financial reports IBRD, SIDA; administrative and project accounting of EPID, IAR, RRO.	EPID will receive adequate PMGSE financial resources on a timely basis.
a) Capital Costs	880.0	901.6	80.5	80.5	1,942.6		
b) Operating Costs	614.5	1,133.4	1,272.3	1,410.4	4,430.6		
c) Technical Assistance	44.0	87.6	87.6	44.0	262.8		Other donors will provide assistance as noted in Part II, Section C-2.
Total 1/	1,760.6	2,496.3	1,769.5	1,998.0	8,024.5		
Rural Roads							
a) Capital Costs	1,412.2	1,412.2	1,412.2	1,412.2	5,649.0		Required expatriate personnel can be recruited and adequately supported.
b) Operating Costs	313.9	401.6	489.2	644.9	1,849.6		
Total 1/	1,975.6	2,133.0	2,294.0	2,678.5	9,081.1		
Seed Multiplication							Relevant PMGSE agencies (in addition to EPID) provide necessary support to program on a timely basis (i.e. AMC, RRO, IAR).
a) Capital Costs	62.3	124.6	124.6	-0-	311.5		
b) Operating Costs	16.1	24.0	31.9	-0-	72.0		
c) Technical Services	87.6	175.2	175.2	87.6	525.7		
d) Training	12.2	12.2	12.2	12.2	48.7		
Total 1/	203.9	395.2	422.5	130.0	1,151.5		
Applied Research							
a) Capital Costs	48.7	30.0	27.0	27.0	132.5		
b) Operating Costs	167.0	172.3	160.1	160.1	659.5		
Total 1/	246.8	237.9	229.8	244.0	958.2		
Credit For Farm Inputs							
a) Seeds	191.5	352.6	660.9	-0-	1,205.1		
b) Livestock	150.5	132.4	122.9	-0-	405.7		
Total 1/	391.4	570.3	962.9	-0-	1,924.6		

1/ Includes inflation and contingencies.
2/ Initial obligation is expected to be made late FY-78 which will preclude any expenditures until FY-79.

ANNEX 2
Page 4 of 4

PMGSE Request for Project

The host government has been notified that an official written request for the project must be received before funding can be authorized. Formal application for project support is expected prior to August 15, 1978.

CERTIFICATION PURSUANT TO

Section 611(e) of the

FOREIGN ASSISTANCE ACT

as Amended

I, Jesse L. Snyder, the acting principal officer of the Agency for International Development in Ethiopia, do herewith certify that in my judgement, Ethiopia has both the financial capability and human resources to maintain and utilize effectively goods and services procured under the assistance project entitled Agricultural Sector Development.

This judgement is based upon the record of implementation of AID-financed projects in Ethiopia and the results of the consultations undertaken during intensive review of this project.

For

Jesse L. Snyder
Acting Director
USAID/Ethiopia

July 13, 1978
Date

Report of Mission to Ethiopia on the Establishment of an Environmental Monitoring Service

J. K. Egunjobi (Regional Adviser - UNEP)

1. Background to Mission:

The UNDP Resident Representative in Addis Ababa in a letter Ref. 2694/77/ORG 130/1/19 - UNEP dated June 16, 1977, addressed to Mr. M. Dina-Lobe, Director of the Regional Office for Africa, requested on behalf of the Government of Ethiopia, a brief consultant visit from a UNEP official to advise on what steps should be taken in the establishment of an environmental monitoring system in the country.

The background to this request can be traced to the implementation of the phase II of a massive agricultural programme of the Extension and Project Implementation Department (EPID) of the Ministry of Agriculture and Land Settlement, termed minimum package programme (MPP). One of the components of MPP phase II is the provision of selected farm inputs such as fertilizers and pesticides.

Alongside with World Bank officials and donor agencies who evaluated the programme, USAID hired an environmental consultant to evaluate the pesticide aspect of the programme, including aspects such as institutional arrangement within the Ministry of Agriculture and Land Settlement for pesticide usage, and the likely consequences of a massive pesticide usage on water quality, livestock and game animals.

The consultant reported that:-

i. there was a considerable lack of coordination between and among Governmental bodies and levels dealing with pesticide usage;

ii. the EPID crop protection service was chronically short of trained personnel who would teach the peasant farmers on safe techniques of pesticide usage;

iii. there was no uniform coordinated or reliable collection of data on pesticide usage.

The consultant observed that the present situation is capable of leading to misuse of pesticides with untold consequences on the integrity of the ecosystems. He therefore recommended among other things, the establishment of a national environmental monitoring system within the country which will observe the use and effects of certain possible environmental polutants, especially pesticides.

The suggestion for such a system was accepted by the Minister for Agriculture. As a follow up to this recommendation, UNEP was approached to send a consultant to explore the requirements necessary to establish such a national environment monitoring system.

2. Fielding of Mission:

UNEP agreed to field a mission of two, comprising a Regional Adviser and a Programme Officer. Unfortunately the Programme Officer pulled out at the last moment. I subsequently kept one week (November 16 - 23) at Addis Ababa, looking specifically at the problems of pesticides.

3. Persons and Organizations Met in Addis Ababa:

Mr. P. Denys - UNDP
Mr. Kenneth H. Sherper - USAID
Mr. Ephrem Hagos - USAID
Mr. Hadera Gebremedhin - Extension Project Implementation Department (EPID) Ministry of Agriculture and Land Settlement (MOAS)
Mr. Tekleab Kebreab - Plant Protection and Regulatory Department (PPRD) Ministry of Agriculture and Land Settlement
Mr. McCuaig - (Insect Toxicologist) - Desert Locust Control Organization for Eastern Africa (DLCO/EA)
Dr. Mohamed Osman Nurein - (Chief Scientist) - DLCO/EA
Mr. Zemedkun - State Farms Authority
The Director,- Tea and Coffee Development Agency
Mr. Begashaw Abebe - General Manager - Ethiopest Control
Mr. Carlos A. Munoz - Ethiopian Water Resources Authority
Mr. Wondwossen Salile - Head - Land and Water Study Agency
Dr. Fesseha Haile Maskel - Director - Central Laboratory & Research Institute
Mr. Stephenson - Head - Forest and Wildlife Authroity
Mr. Tadesse Gebremedhin (Entomologist) - Institute of Agricultural Research
Dr. Princeton Lyman - Director - USAID

4. Major Pesticide Users in the Country:

The following organizations were identified as major pesticide users in the country:

Plant Protection and Regulatory Department (PPRD), Ministry of Agriculture and Land Settlement;

Extension Project Implementation Department (EPID), Ministry of Agriculture and Land Settlement;

State Farms Authority;

Tea and Coffee Development and Marketing Authority;

Ethiopest Control;

Desert Locust Control Organization for Eastern Africa (DLCO/EA);

Ministry of Public Health - Malaria Control Programme.

Each of these organizations except the last were visited and discussions held with relevant officers to determine:-

(a) sources of pesticides;

(b) types of pesticides;

(c) methods of procurement;

(d) methods of disbursement.

(i) Plant Protection and Regulatory Department (PPRD):

This is a department of the Ministry of Agriculture and Land Settlement. The main functions of this department are:-

(a) to survey for outbreak of pests on cereals and legumes; and

(b) to help peasant farmers in major pest outbreaks at times of emergency.

For its operations the PPRD buys pesticides from the open market through tenders. Pesticides are stored in Addis, and from there distributed to the provinces. The Department maintains a staff of three and a driver in each province. PPRD is empowered to give permission to importers to clear pesticides from customs.

It was not clear to me whether this procedure has any legal backing and whether it was rigourously observed. It appeared to me that the clearance was just a routine, as there were no definite guide lines for issuance of permission.

(ii) Extension Project Implementation Department (EPID):

This is the extension arm of the Ministry of Agriculture and Land Settlement. The Department is implementing the minimum package programme. The main function of the Department is extension services to peasant farmers; training the farmers in the use of pesticides and methods of crop storage. To effect this, regional and divisional offices exist. These offices collect information on pest outbreaks and help farmers to control pests when the outbreak is on a small scale. However, when it is a major outbreak, exceeding 200 acres the control is left to PPRD.

The technical staff of the Department presently comprise:

3 Entomologists
1 Weed Scientist
1 Plant Pathologist
1 Crop Protection Supervisor
1 Rodent Specialist
1 Spray Maintenance Technician

As it is obvious from this list the Department is chronically short of trained personnel and cannot effectively execute its extension programmes.

EPID obtains its pesticides through donor agencies or through marketing and credit department directly to peasant farmers. My observation is that this is the nearest organization to farmers. However, it has no control on how pesticide reaches them or how the pesticides are used. It often happens that EPID may be by-passed in the distribution of pesticides to farmers.

(iii) State Farms Authority:

The State Farms Authority is perhaps the most important user of pesticide in the country. Its main targets are pests of cotton, maize and coffee on state owned farms. The authority buys its chemicals from the open market through tenders. It makes sure that FAO standards are adhered to. The authority keeps a good record of its annual consumption of pesticides. For example, for the year 1975/76, the record shows the following quantities of pesticides were used.

Phosphel	110,000	litres
Endosulphan	120,000	"
D.D.T. 25%	95,000	"
Ferin	49,000	"
Sevirnol	33,000	"
Rogor	28,000	"
Folmat	17,000	"
Azodrin	15,000	"
Ethion	14,000	"
Malathion	10,000	"
Nurocron	8,000	"
FAC	5,000	"

This list represents a fair range of chemicals employed by other users.

(iv) Ethiopest Control:

This is a private firm concerned with pest control throughout Ethiopia. Its client are: private organizations; the Government of Ethiopia and corporations.

The firm controls household pest such as cockroaches, bugs, housefly and rodents; and crop pests on both small and large scales. It sometimes uses aircraft to spray pesticide against pest outbreaks in cotton, maize and coffee. The firm also offers free advisory services to individuals.

It represents a number of oversea pesticide manufacturers in the country, and obtains its pesticide through this source or by tender. The manager of the firm, Mr. Begashaw Abebe has had many years of experience in pest control working with FAO and the Desert Locust Control Organization of which he was at one time its Executive Secretary.

(v) Tea and Coffee Development and Marketing Authority:

This authority uses some amount of pesticide on coffee. Spraying is usually undertaken by specially trained staff and not by the peasants. Except in major outbreaks of pests, the authority does not recommend pesticide usage. Spraying pesticides is usually based on the recommendation of the scientific officer.

(vi) Desert Locust Control Organization for Eastern Africa:

This international organization controls desert locust in Ethiopia, Somalia, Kenya, Sudan and Tanzania. The main chemicals used include: Dieldrin, Pheniltothion, and BHC solution applied from low flying aircraft. When requested the organization also helps plant protection services in member countries with control of quela birds and army worms.

The principal functions of this organization is the control of desert locusts. However, it also undertakes some research. Its major current research activity is in finding alternatives to Dieldrin and on ascertaining levels of Dieldrin, BHC, D.D.T. in blood samples of selected staff of the DLCO/EA and plant protection departments in Ethiopia, Kenya and Somalia.

5. Organizations Likely to be Connected with Pesticide Monitoring and Residue Analysis:

a. Forestry and Wildlife Authority:

The Forestry and Wildlife Authority is much concerned about uncontrolled use of pesticides. Mr. Stephenson, scientific head of the authority and his staff expressed deep concern about the Awash Valley where the State Farm Authority has been doing a lot of spraying with D.D.T. and allied chemicals.

The staff of the authority confirmed that beehives have declined as a result of D.D.T. usage in recent years.

Uncontrolled use of pesticides on farms around the Rift Valley area could also lead to pollution of the inland lakes such as the Abaya and Arasa. The Wildlife Authority expresses desire to participate in any monitoring scheme.

b. Ethiopian Water Resources Authority:

This authority has responsibility for water quality throughout Ethiopia. Although the authority does not undertake water analysis for pesticide residues, the infrastructure for collecting data on water is available.

c. Central Laboratory and Research Institute:

This is a multipurpose laboratory conducting research into areas of public health and industrial quality control. It comprises the following departments: Bacteriology, parasitology, chemistry, haematology and serology, immunology, toxicology, medical entomology and veterinary public health.

The Chemistry Department conducts research into quality control of goods, drug control and toxicology for which it is moderately equipped. It has no facilities at the moment for pesticide residue analysis. It can, however, be equipped to perform such functions on a routine basis.

d. Institute of Veterinary Research:

I was unable to visit the Research Institute. I was, however, informed that facilities exist there for pesticide residue analysis.

e. Institute of Agricultural Research:

I was unable to visit the Institute. However, arrangement was made for one of the scientists at the Institute - Mr. Tadesse Gebremedhin to talk to me. The Institute is involved with some pesticide usage, especially at its Cotton Research Station in the Awash Valley, where it is spraying D.D.T. and Endosulphan against American Boleworm and spider worms. The Institute does not monitor pesticide residue.

6. Observation on the Present Arrangement for Obtaining Pesticides:

a. Ministry of Agriculture and Land Settlement:

Within the Ministry of Agriculture and Land Settlement, there are two major users of pesticides, namely the Plant Protection and Regulatory Department (PPRD) and the Extension Project Implementation Department (EPID). These two major users overlap in their functions, with regard to pest control. However, their requirements for effective performance of this duty are not well coordinated. For example, PPRD obtains its supply of pesticides from the open market through tenders and customarily demands manufacturers certificate according to FAO specifications. It further checks quality through the services of DICO/EA. EPID does not purchase pesticides directly, but obtains its supply from donor agencies. These pesticides are made available directly to farmers. In addition EPID Marketing and Credit Section supplies pesticides directly to farmers. Furthermore PPRD distributes pesticide to peasant farmers during major outbreaks of pest. Thus, the EPID has no control whatsoever on what chemicals reaches the farmers, since the farmers can obtain pesticides through several sources.

b. Other Major Users of Pesticides:

The other major users of pesticides e.g. corporations, valley authorities, state farm authorities, Coffee and Tea Development Corporation, purchase their pesticides requirement by tender through the Agricultural Marketing Corporation. The Marketing Corporation uses the services of an independent superintendent to determine the quality of the pesticides it purchases.

7. Recommendations:

a. Ministry of Agriculture and Land Settlement:

There is need to coordinate pesticide usage by the two Departments withi the Ministry of Agriculture and Land Settlement. To effect this, I recommend that:

i. All pesticide purchased by PPRD together with those donated to EPID by agencies should be kept in a central pool, from which both Departments can draw for use as necessary. Such a central pool will enable the Ministry to keep a record of all pesticides received by categories and document how they have been disbursed.

ii. All pesticides distributed freely to farmers should be done through EPID officials. Such officials should be plant protection technicians who should be in position to demonstrate effective and safe use of pesticides to peasant farmers.

iii. For an effective implementation of (ii) above, there is need to increase EPID plant protection staff.

iv. EPID credit and marketing should be strengthened with staff knowledgeable in the field of pesticide usage. Such a staff should liaison with EPID plant protection and PPRD, so that the right types of pesticides are purchased and made available to the farmers.

b. Pesticide Control and Monitoring:

I have found it necessary to recommend two levels of monitoring. One, a pesticide control council backed by proclamation of Government and a pesticide residue monitoring service.

i. Pesticide Control Council:

The functions of this council will be to regulate the use of pesticides in the country, determining the types, specifications and regulations for use. This is a technical council and should, therefore, be composed of individuals with technical training in the pesticide technology. The pesticide control council should be constituted as follows:

1. Ministry of Agriculture and Land Settlement - 2
   1 from PPRD
   1 from EPID
2. Ministry of Health (Malaria Control) - 1
3. State Farm Authority - 1
4. Institute of Agriculture Research - 1
5. Ministry of Commerce - 1
6. Faculty of Agriculture, University of Addis Ababa - 1
7. Agricultural Marketing Corporation - 1
8. Central Laboratory and Research Institute - 1
9. One representative of pesticide manufacturers in the country.

ii. The Pesticide Monitoring Service:

The function of this service is to continuously monitor the effect of pesticides on ecosystems, especially on inland water systems and lakes. It should also provide pesticide residue monitoring service in components of the ecosystem. Such a monitoring should provide base line and threshhold values for pesticide content in the sensitive components of the ecosystem e.g. water bodies, fish and crop predators. The pesticide monitoring service should be constituted as follows:

1. Central Laboratory and Research Institute
2. Forestry and Wildlife Authority
3. Water Resources Authority
4. Veterinary Research Institute
5. Desert Locust Control Organization - E.A.
6. Ministry of Agriculture
7. Institute of Agricultural Research

8. Except at the Desert Locust Control Laboratory none of the laboratories visited has the capacity to monitor level of pesticides in ecosystem components. It was, however, indicated that the Veterinary Institute has equipment for gas chromotography. In spite of this, however, it appears to me that the appropriate laboratory to use for a routine analysis of pesticides is the Central Laboratories and Research Institute. I, therefore, recommend that the Institute be equipped to allow it to perform such duties. There may also be need to recruit suitable staff or train some existing staff in methods of residue analysis.

Acknowledgement:

I will like to express my gratitude to Mr. P. Denys, UNDP, who provided me with transport and to Messrs. Kabreab (PPRD) and Kenneth Sherper (USAID) who arranged my visits. Mr. Sherper provided me with a copy of the report of the environmental consultant, for this I am very grateful.