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Consultant's Report 1

ASSISTANCE TO LAND USE PLANNING

E T H I O P I A

A FRAMEWORK FOR A NATIONAL
LAND USE PLANNING INSTITUTION

UNITED NATIONS DEVELOPMENT PROGRAMME

FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS ADDIS ABABA
JUNE 1980

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A FRAMEWORK FOR A
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FOR ETHIOPIA

Report prepared for
the Government of Ethiopia
by
the Food and Agriculture Organization of the United Nations
acting as executing agency for
the United Nations Development Programme

based on the work of

Robert I. Green
Consultant

UNITED NATIONS DEVELOPMENT PROGRAMME
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ABSTRACT

The Government of Ethiopia, assisted by the United Nations Development Programme and the Food and Agriculture Organization of the United Nations began in 1979 to develop national capabilities in land use studies, land use planning, and land administration to serve the immediate and future needs of an overall programme for the optimal use of land, the country's main natural resource.

This report describes the requirements for land use services in Ethiopia, one of the most important of which is the need for detailed resource surveys to support the Government programme for rural development. Other needs are for the completion of a general land evaluation for the whole Country, the establishment of a data bank of land potential and present use, and the running of a laboratory for routine soil analysis. There is also the need for a training capability in these subjects.

The close links between land use planning and soil and water conservation are demonstrated. It is recommended that the land use services agency takes over responsibility for conservation from the Agricultural Development Department. It should also be responsible for handling environmental issues.

A structural framework is proposed for a land use services agency which incorporates all the above activities. Although a number of other organizations are building up their own capacity for land use work, it is recommended that such duplication be avoided as far as possible. As a considerable part of the agency's programme involves field work it should operate on a regional basis, hopefully as part of the regional agricultural team.

Responsibility for the agricultural sector is now divided up between six different ministries or authorities, which makes a decision on the placing of land use services agency difficult. Arguments are advanced for retaining land use services within the responsibility of the Ministry of Agriculture. However, the present arrangement, whereby a planning and programming, training administration and finance are centrally controlled by the Ministry, would make the operation of the proposed land use agency almost impossible. It is therefore necessary for it to have autonomy in the running of its affairs, thus making it an Authority. The creation of a Land Use and Conservation Authority responsible either directly to the Minister of Agriculture, or to a Board chaired by the Minister is proposed.

PREFACE

This report is the first part of a Consultancy commissioned to make recommendations on the structure and functions of a land use services institution for Ethiopia. The second part on the activities and staffing will be carried out by Prof. Anthony Young.

To some extent the first phase may have exceeded its terms of reference, but it became apparent to the Consultant that clarification was needed on priorities for land use services. The strong orientation of the FAO Assistance Project to the preparation of a 1:1 000 000 scale land evaluation and master land use plan tended to suppress some other important aspects.

The terms of reference specify the preparation of a draft "framework" for the institution, and this is all that has been done. If the proposed framework, or a similar one, is agreed by Government, much work will be needed on the detailed arrangements to bring it into operation. Very little has been said on staffing, administration, regional structures and the many problems brought about by changed responsibilities within ministries and departments. In particular it is recognised that the inter-relationships at regional level need to be defined much more clearly.

In dealing with problems concerning the structure of Government organisations there can seldom be only one correct solution. This is particularly so when dealing with a case as diverse and as complicated as the present agricultural sector in Ethiopia. However, rather than presenting an array of alternatives which would give rise to almost endless discussion both in this report and afterwards, a single solution has been offered. The principles on which it is based have been spelt out and can be used to make any adaptations thought necessary. Most alternatives would involve splitting up the different activities between existing agencies, but the Government has recently created a separate land use agency to carry out these activities and fully intends that it should do so. The Consultant believes that the Government's action was correct, but that it must now be followed-up by very strong support.

A particular advantage of the structural framework proposed is that similar ones have proved effective over many years in a number of African countries. Special considerations have dictated important modifications for Ethiopia, but there is nothing new about the basic concepts.

There are important gaps in this report which it is hoped will be filled in the second part of the consultancy. For example, there has been no contribution on any technical aspects of the proposed work of the land use services agency. In particular, the methodology of resource survey and appraisal and master plan preparation could usefully be reviewed and proposals made for future staffing. There are a number of important issues involving soil survey and the soils laboratory, including staffing, which have not been covered. Only very general comments have been made on training, which is fundamental to the success of the whole programme. No doubt other omissions and errors will come to light which will need correction.

ACKNOWLEDGEMENTS

The Consultant is very grateful to Ato Mekbib Mammo, Head of the Land Use Planning and Regulatory Department, and to all his staff for their help and encouragement. Thanks are due to Mr. John F. Derting and Mr. S.K. Choi and the FAO staff on Project ETH/78/003 for their very considerable help and hospitality, and to the acting FAO Senior Agricultural Advisor and UNDP staff in Ethiopia.

It is a pleasure to acknowledge the assistance provided by the senior officers of the very large number of organisations visited by the Consultant. They gave a great deal of their time for discussions.

Finally, special thanks are due to Wz. Shewaye Abraham who typed this report so quickly and accurately.

TERMS OF REFERENCE

To prepare a draft framework for establishment of a National Land Use Planning Institution within the structure of the Ethiopian Government. The framework should give due consideration to technical data generation, legal and administrative aspects, integration of the following and other sectors as appropriate:

- (a) Inventory of physical land and water resources like physiography, soils, geology, vegetation and land use, agro-climate, agro-hydrology, demography etc.
- (b) Inventory of socioeconomic features, institutions, marketing support services etc.
- (c) Collation and evaluation of (a) and (b);
- (d) Formulation of land use alternatives and land development plans;
- (e) Formulation of strategies for selection and implementation of plans, policies, directives and programmes including the legal aspects of national land use planning services for the country.

The consultancy mission will also make recommendations for possible additional multilateral and/or bilateral assistance for the development of soil and water investigation and evaluation services of the country.

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Chapter 1

THE LAND USE PLANNING AND REGULATORY DEPARTMENT: PRESENT SITUATION

1.1 TERMS OF REFERENCE

The Land Use Planning and Regulatory Department (LUPRD) was established in September 1977 within the Ministry of Agriculture with the following terms of reference:

The Department shall be responsible to the Permanent Secretary of the Ministry of Agriculture and shall perform the following duties:

1. In order to carry out land use studies and to regulate land use the Department shall prepare the necessary directives for policy decision and shall apply same when acted upon;
2. Shall carry out detailed studies of soils, hydrology, climate, physiography...etc. and shall classify land for use as farm land, range land, wildlife conservation, settlement sites, mining, forest land, etc., and shall issue the necessary usage directive for same;
3. In accordance with the land use plans and directives that will be issued the Department shall control and regulate land use and land management, and render advisory services;
4. Shall allocate land for government, for cooperatives and peasants and other users;
5. Shall keep a land register by type of land and type of usage;
6. Shall establish and control the necessary services for land use studies and land use regulatory activities;
7. Shall perform all other duties as assigned by the Permanent Secretary.

The above terms of reference place very strong emphasis on regulatory and control functions for the use of land. The other main duties are land registration and land classification, following "detailed" studies on the physical environment.

1.2 ORGANIZATION AND STAFFING

The Department is headed by a senior professional officer and has tentatively been divided into eight sections as follows:

<u>Section</u>	<u>Grade and Number of Staff</u>
Soil Survey	3 Professional 5 Technical
Agroecology	3 Professional 3 Technical
Land Evaluation	1 Professional
Land Use Planning	2 Professional 4 Technical
Agricultural Economics	1 Professional 1 Technical
Remote Sensing & Cartography	1 Professional 6 Technical
Land Administration and Documentation	1 Professional 1 Technical
Soil Laboratory	1 Professional 13 Technical

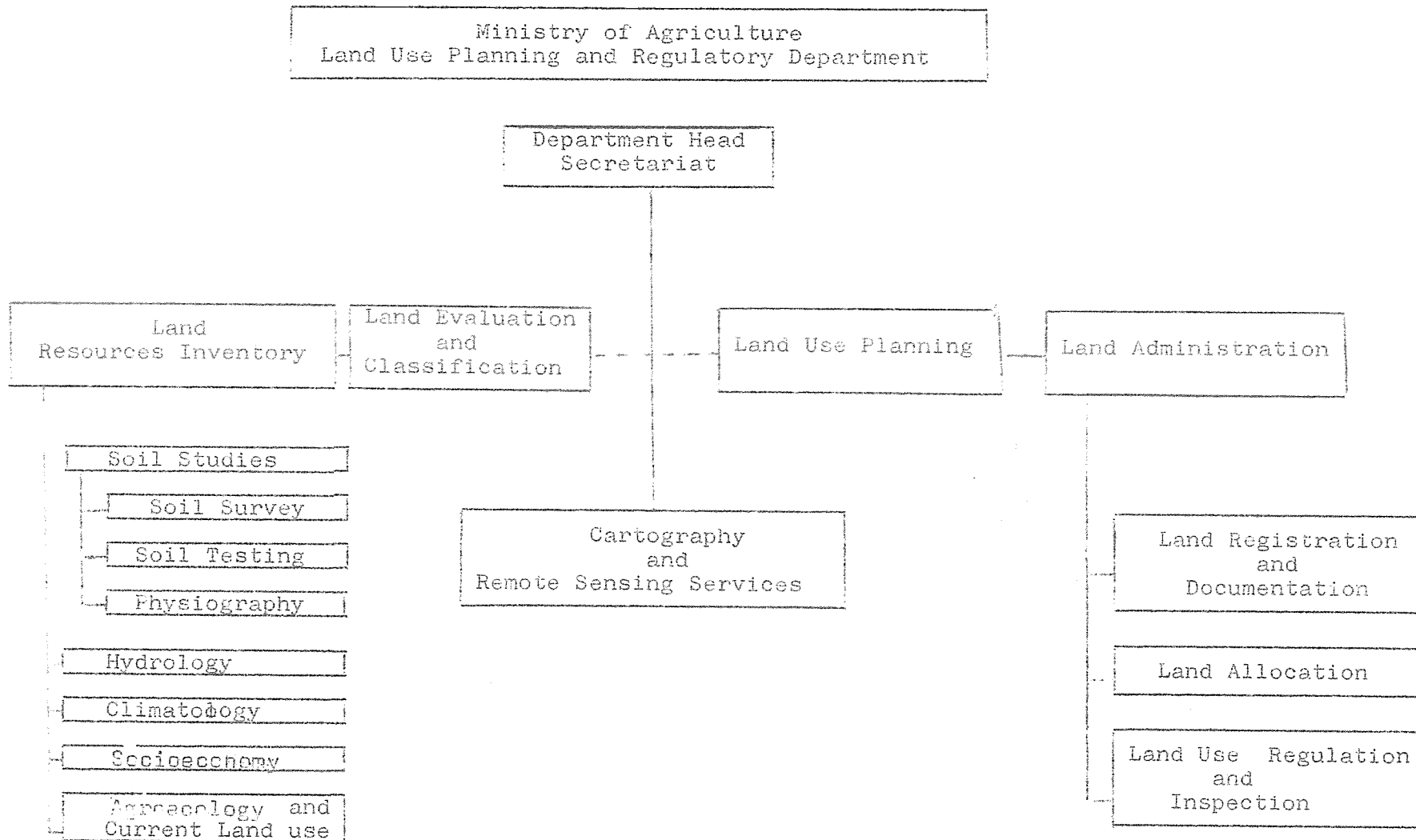
The Professional staff all have university degrees, and some higher degrees, in a variety of subjects including plant science, general agriculture, soil science and geography. A few have had some years of experience relevant to the land evaluation work being carried out, but to most, this type of activity is quite new. The technical staff have attended a two year course in general agriculture and some have a number of years field experience as extension workers.

The present organisational chart is shown in Fig. 1.

Project ETH/78/003 has provided one professional advisor in each of the following disciplines in addition to the Chief Technical Advisor: Land Resources, Land Use Planning and Training, Agricultural Economics, Land Administration and Documentation, Agroecology and Forestry.

The present organisation of the Department into Sections appears to have been determined mainly by the various activities connected with the resource inventory and master land use planning services assisted by the FAO Project.

Fig. 1 PRESENT ORGANISATION OF THE LAND USE PLANNING AND REGULATORY DEPARTMENT



1.3 ACTIVITIES TO DATE

The activities of LUPRD from its inception up to the present have been reported on the detail in the quarterly and semiannual reports of the FAO staff attached to the Project. Very briefly, the Department has participated in semidetained resource surveys and planning on the Sirinka Catchment Project, for which it received financial support from the Relief and Rehabilitation Commission. It has also provided advice to some Government institution on the selection of land for various enterprises and has prepared outline plans for their development. However, the present capacity of LUPRD for this type of work is extremely limited. The main activity has been staff training, work on the resource inventory, and the collection and classification of relevant documents. A start has been made on setting up a laboratory for routine soil analysis.

Although some thought has been given to the possible regulatory role of the Department, as constituted at present, the only significant contribution it is making to land use in Ethiopia is the preparation of a resource inventory leading to the presentation of a general land evaluation at a scale of 1:1 000 000. A master land use plan at the same scale is also to be prepared, but it is not yet clear how this will be done.

1.4 INSTITUTIONAL FRAMEWORK

The Consultant is of the opinion that the activities described above do not justify the existence of a separate Government Department. This opinion is shared by the representative of most other ministries and departments with whom the matter has been discussed. Yet the almost total lack of facilities for land use planning is recognised as one of the greatest constraints to rural development and arresting environmental deterioration in Ethiopia.

Before any proposals can be made for an institutional framework for land use planning activities, it is necessary to examine in some detail the precise nature of the requirements for land use and related services. When these needs have been elaborated the options available for meeting them will become clearer.

Chapter 2

THE NATIONAL REQUIREMENT FOR LAND USE SERVICES

2.1 GENERAL

It is sometimes difficult to draw a clear distinction between the functions of what is generally known as land use planning, plan implementation and subsequent land management. The investigations needed to describe a piece of land, such as soil surveys and climate studies, and the determination of its suitability for various forms of use are not, strictly speaking, planning. A land use plan can only be prepared when the purpose for which the land is to be used is known. Within limits, this may be determined more by socio-economic factors than physical ones. In Ethiopia all land to be used for rainfed agriculture should be planned for erosion control within a framework closely related to topography, and the control measures will have to be laid out on the ground.

It is impossible to make a rigid division between the functions of a land use services agency and other institutions involved in using land: in practice it would be undesirable to do so as close co-operation with the various institutions is essential. In general terms, the Consultant sees the functions of a land use services agency as: describing and classifying land; preparing physical plans for its development at appropriate scales; where necessary laying out on the ground the physical conservation framework of the plan; advising Government on the suitability of land for any particular purpose; maintaining a comprehensive data bank on the Country's land resources and their present use, and advising Government on environmental issues.

In the context of project preparation a land use services agency provides information on the land resources available, the extent of their present use and a soil conservation framework for their development. It is not seen as including a project planning service: which details the production systems to be applied and their economic appraisal. Neither is it seen as providing a management nor an extension service.

2.2 PRESENT AND PROPOSED RURAL DEVELOPMENT PROGRAMME

In order to determine the most urgent needs for land use services in the Country over, say, the next 10 years an attempt has been made to ascertain the programme of the main agencies concerned with rural development. Only the very broad outlines will be discussed. As a number of ministries are at present being reorganised some of the departments and agencies may have changed before this report is completed. However, the overall programme is unlikely to alter significantly.

2.2.1 Ministry of Agriculture

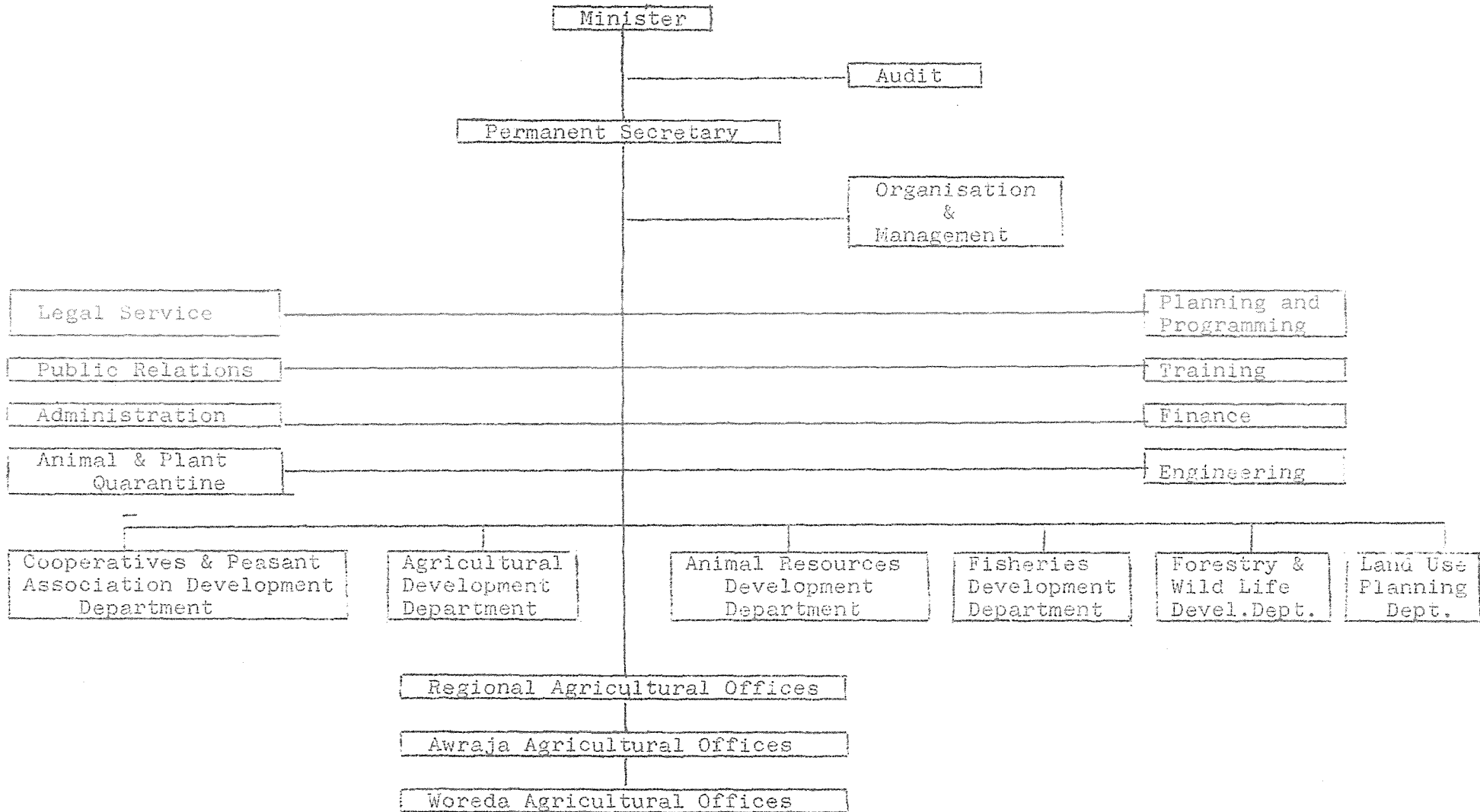
The organisation of the Ministry of Agriculture is shown in Fig. 2. The Ministry has a strong regional organisation and the officer in charge of each region is responsible directly to the Permanent Secretary, and may be selected from any of the departments represented at regional level. The activities of the various departments are described very briefly below, with particular reference to their requirements for land use services.

(a) Department of Agricultural Development

This Department has sections for home economics, farm management agronomy, and soil and water conservation, and its main function is the provision of a comprehensive agricultural extension service. At the regional level (14 regions) there are professional staff in each of the main subject matter specialities. There is an average of six technical staff (2 year agricultural high school) in each of the 80 awrajas, and in the 440 woredas the Department is represented by about 2,200 Development Agents. The latter have had 6 to 12 months training.

The Department of Agricultural Development is now concentrating its activities on the development of Agricultural Producers Cooperatives. A condition for the registration of such a cooperative is that all individually held land (except a small garden) and animals should be pooled and activities run on a communal basis under a management board. There are said to be about 25 cooperatives registered at present, new ones are being formed while some previously in existence have become deregistered.

Fig. 2 ORGANISATIONAL CHART OF THE MINISTRY OF AGRICULTURE



The area covered by a particular cooperative is considered by the Department as a unit of planning. A rough boundary map, land suitability and a farm plan are produced, for the most part by staff of the Soil and Water Conservation Section as part of a mobile team. In densely populated regions such as Wollo the area involved might be about 300-400 ha, but will be larger in other regions.

It is inevitable that there must be many difficulties associated with the formation and running of the above type of cooperative farms, and the rate at which they increase is a matter of conjecture at this stage. However, if there is significant expansion it will have important implications for land use planning.

In view of its key role in matters of land use and arresting land degradation the Soil and Water Conservation Section of the Agricultural Development Department will be reviewed separately. In addition to the Head of the Section there are four professional officers in head offices and also one professional officer in each of seven regions, responsible to the regional agricultural coordinator. There are conservation specialists (technical grade) in 35 awrajas. General advisory work on conservation to farmers is provided by the Development Agents mentioned above, most of whom have had some training in soil conservation. FAO has provided assistance to the section in the form of an expert to help with staff training.

One of the main activities of the Conservation Section is carrying out conservation measures under the "food for work" scheme of the World Food Programme. Although this is now being organized within defined catchment areas as part of a total agricultural package, much of the conservation work being done is on an ad hoc basis without any prior planning. For example, an extensive part of the north east escarpment has been chosen, but there are no facilities for land use planning in this area. The LUPRD is producing a slope classification map at a scale of 1:250 000 which, although perhaps of some initial help, is quite deficient as a planning tool.

The almost complete lack of any capability within the Ministry of Agriculture for land use services has forced the Conservation Section to consider setting up its own land use planning units. Multi-disciplinary teams consisting of land use planners, agronomists, animal husbandry specialists, etc. are proposed for six zones in order to provide the basis for planning rational land use. It is hoped that this proposal will be reviewed in the light of recommendations made later in this report.

It is significant to note that only half of the regions in Ethiopia have a subject matter specialist in soil and water conservation, and technical staff in less than half of the awrajas.

(b) Cooperative and Peasants' Association Development Department

This Department is responsible for assistance to the Peasants Associations which were set up to implement land reform following the Revolution. At head office level the Department is divided into three teams: Peasant Association Promotion; Cooperatives Promotion; and Marketing and Credit. These teams are also represented at regional level and the Department aims to have two specialists in each of the three subjects, in addition to an officer in charge, in each region. The specialists are graduates in such subjects as community development, agricultural economics, rural development and sociology. It is also intended to have two technically trained staff in each awraja and two in each woreda, but due to staff shortages these targets have not yet been met. The Department attempts to ensure that the Associations are conducting their affairs according to the relevant Government proclamations.

The Peasants Associations each occupy an areas of about 800 ha (40 gashas), but this varies somewhat; boundaries are not normally surveyed but are well known to the members of the Associations. The Producers Cooperatives mentioned under (a) above often constitute only part of a Peasants' Association, and it appears that the Associations will form individual units for land planning purposes for some time to come.

(c) Forestry and Wild Life Development Department

The Forestry Section is responsible for the protection and exploitation of existing forest areas and for re-forestation denuded areas and within Peasants Association land. In the next year or two about 40,000 ha are scheduled to be planted, more or less equally divided between denuded areas and Peasant Associations or individual farmers. The eventual aim is to plant about 250,000 ha a year. A limited amount of work is also being done on forest inventory and boundary demarcations for existing forests and plantations. Some research work is being carried out and there is a training institute. The Department has a forestry team in each region directly responsible to the Regional Agricultural Coordinator.

The Wildlife Section is responsible for the various game reserves, parks and controlled hunting areas and for protecting crops from damage by wild animals. Many areas designated as game reserves are rather heavily grazed by domestic stock. There are proposals to improve the management of game reserves and possibly expand some if the land is considered unsuitable for other purposes.

It is obvious that the programme of the Department has important implications for land use services, particularly for land selection for reforestation in both denuded areas and for community woodlots. Such areas should be selected on the basis of a proper land resources appraisal, which also takes account of agricultural development possibilities. The effectiveness of certain types of plantations as a conservation measure needs very careful study, as in some cases the erosion hazard can even be increased by plantations. Important headwater areas need to be identified for complete protection. Land requirements for game reserves often conflict with the needs of domestic animals.

(d) Animal Resources Development Department

This Department is responsible for animal health, production, nutrition and tsetse control services. It operates laboratories for diagnostic work, provides improved breeding stock and carries out a limited amount of pasture improvement.

There is also an artificial insemination service. Regional teams carry out extension in cooperation with other field staff in the Ministry of Agriculture. There are two important livestock development projects financed from international sources which operate under the general direction of the Animal Resources Development Department. The head of the Department is chairman of the National Animal Development Research Committee.

Overstocking and mismanagement of domestic animals are usually a more serious cause of land degradation than arable farming. The need for land use planning to intergrate crops and stock is so apparent that it does not need emphasis. In the present drive to expand crop production and to settle people, rangeland is being cultivated in areas marginal or unsuited for arable use.

(e) Fisheries Development Department

This Department was formed in 1979 and is responsible for both marine and inland water fisheries development. It operates a research station near Addis Ababa. There are 7 graduates and about 20 technicians in addition to the head of the Department.

Inland fisheries work concerns the improved harvesting of fish from lakes, rivers and dams, the provision of transport and cold storage facilities and fishing gear. A campaign is being mounted to persuade people to eat more fish, and processing methods are being investigated. The European Development Fund is providing assistance for fisheries development activities.

There is a programme for stocking small dams being constructed by the Soil and Water Conservation Section and by the Third Livestock Project.

2.2.2 Institute of Agricultural Research

The Institute has recently been transferred from the Ministry of Agriculture to the Science and Technology Commission. It is responsible for research into all aspects of agriculture. Links with the extension service are said to be rather weak in spite of the existence of a Socioeconomic, Farm Management and Extension Liaison Department.

The responsibility for providing a routine soil analysis service for the country has now been transferred to LUPRD, together with limited staff and equipment. The Institute of Agricultural Research will, however, maintain soil laboratories for research purposes and for analytical work in connection with its experimental programme.

The relationship between the Institute and LUPRD regarding soils work needs further clarification, and will be investigated in the second part of this consultancy.

2.2.3 Ministry of State Farms Development

After the Revolution the State Farms Development Authority was set up within the Ministry of Agriculture. In April 1979 State Farms Development was made a separate Ministry. It is now organised into the following seven corporations: Northern, Western, Southern, Awash, Horticultural, Livestock and Agricultural Engineering. The function of the Ministry is to develop rapidly large areas of land for food and cash crop production.

Up to the first economic campaign (1979/80) about 72,000 ha of land, which had been taken over from existing commercial enterprises, were cropped. During 1979/80 a further 82,000 ha were cultivated, and in the present season an additional 134,000 ha are being developed, giving an overall total of about 287,000 ha. The main crops now being grown are wheat, maize, sesame, cotton and sorghum (in order of extent). About 40,000 ha are under irrigation. Most of the area being developed is said to be unoccupied land, but in some cases it is necessary to resettle people who are being displaced.

The Supreme Council has set a target of 80,000 ha of new land to be brought under cultivation each year for the next 10 years. With the land already developed this will give a total of about one million ha.

Both from the points of view of production and land degradations it is most unfortunate that over 250,000 ha have been developed, in most cases, without correct land selection, land use planning or conservation. As yet no adequate provision has been made to carry out this essential work for the additional 750,000 ha to be developed over the next 10 years.

2.2.4. Ministry of Coffee and Tea Development

This Ministry was created in May 1979. Previously activities related to coffee and tea had been the responsibility of the Coffee Board under the Ministry of Agriculture.

The work of the Ministry is divided into the Peasant Sector and the State Sector. The Peasant Sector is mainly concerned with extension work concentrated in about 30 awrajas out of the 160 where a significant amount of coffee is grown. Intensive extension is carried out in about 10 awrajas. It is estimated that there are about 500,000 ha in coffee production by small farmers. The State Sector has developed about 7-8000 ha and planning is said to have been completed for a further 10,000 ha.

Over the next 10 years the aim is to bring an additional 100,000 ha under coffee production and 2,000 ha under tea.

Although those parts of the Country which are suitable for coffee and tea have been identified, there is no capability within the Ministry for detailed resource surveys to select suitable land for cropping and no land use planning or soil conservation expertise. As coffee and tea are perennial crops the mistakes made in land layout for planting are difficult to rectify afterwards. Both the Ethiopian Mapping Agency and the Department of Physical Planning have had some involvement in helping the Ministry in its planning work.

2.2.5. Relief and Rehabilitation Commission

Under the Chief Commissioner there is a Deputy Commissioner responsible for administration and planning and another in-charge of the technical programme. The main operations departments are as follows: Land Reclamation, Settlement Administration and Cooperative Development, Agricultural Technology Service, and Engineering Technology Service.

The Reclamation Department is attempting to rehabilitate and improve land which has become degraded by soil erosion brought about by misuse in the so-called disaster areas. Of the six million ha classified as degraded in the central and northern parts of Ethiopia it is hoped to rehabilitate up to one million ha in the next 10 years. There is an urgent need to identify priority catchments for treatment. The Commission has had substantial amounts of finance from both multilateral and bilateral aid agencies, and future aid programmes have been approved.

LUPRD has been closely associated with the Sirinka Catchment planning work and now the Commission is continuing with expatriate assistance. Responsibilities are somewhat confused at the moment, as the implementation of project works is being carried out by the Soil and Water Conservation Section of the Department of Agricultural Development. It is the intention of the Commission to take over responsibility for implementation from Agriculture, and to expand the capabilities of the Sirinka planning unit to undertake surveys and planning for other reclamation projects in the area. Further expatriate assistance is being obtained. If this proposal is accepted by Government both the planning and implementation of reclamation projects will be outside the Ministry of Agriculture.

The emphasis on reclamation work has been on reforestation and the construction of physical conservation works. Up to the present little attention has been given to general agricultural improvement through extension and the provision of the necessary inputs.

Responsibility for major settlement projects previously with the Ministry of Agriculture, is now with the Relief and Rehabilitation Commission. The programme is designed to settle people from over-populated areas or from areas where the land is required for other purposes, for example state farms. The urban unemployed are also encouraged to join settlement schemes. Areas selected for settlement are either unoccupied or only sparsely populated.

Much of the settlement done up to the present took place without proper planning, but when external finance is being sought adequate feasibility studies have had to be carried out. These studies have been undertaken by the Commission (previously Settlement Authority) with help from consulting firms and FAO assistance attached to the Commission. This type of work is continuing and the number of FAO staff has been increased, but where settlement schemes are being undertaken with internal financial resources the level of resource survey and planning is quite inadequate.

For both its rehabilitation and settlement activities the Relief and Rehabilitation Commission has established its own land use services, and at present has a very greater capacity for land use work at the semidetached and detailed levels than LUPRD.

It may possibly be the only institution in the country with this capability. The Commission would like to make use of services from LUPRD if these were available, but is concerned that if it gave up its own land use activities it might not be given sufficient priority for services and so would not get the work done.

2.2.6. Ministry of Mines, Energy and Water Resources

This Ministry now contains the Ethiopian Water Resources Authority and the Valleys Agricultural Development Authority (VADA) which were previously within the Ministry of Agriculture. Reorganization of the responsibilities for water resource development is now taking place and the final structure has not yet been agreed by Government. It seems likely, however that there will be the following three main divisions:

- Land and Water Resources Authority
- Water Supply Authority
- Water Construction Authority

Land and Water Resources will probably combine the present Land and Water Studies Agency and the VADA. The Water Supply Authority will be mainly responsible for domestic water supply, and the Water Construction Authority for the construction of civil engineering works, both for domestic supplies and for irrigation. Once irrigation schemes have been constructed they will likely be handed over to a management agency such as the Ministry of State Farms.

In the past both the Land and Water Studies Agency and VADA have undertaken studies on climate, hydrology, soils, etc. in the major river valleys where there is considered to be a potential for irrigation. With assistance from FAO, VADA has reviewed about 50 possible irrigation projects with a potential for irrigation of up to 800,000 ha. Priority projects have been identified and a programme has been prepared for development over the next 15 years. In these studies VADA has used consultants and some projects have been taken to full feasibility level, and implementation is underway. Construction of irrigation projects up to and including tertiary channels is being coordinated by VADA.

The Land and Water Studies Agency has been concerned mainly with the collection of meteorological and hydrological data and flood control studies. There are only a very few qualified Ethiopian staff at present, but there are about 45 expatriates assisting the agency in different regions. The local staff is said to include soil surveyors and agronomists. There is a small soils laboratory which can undertake mechanical analysis, pH determinations, etc., but does not as yet carry out chemical analysis for fertility investigations.

With UN assistance the Land and Water Studies Agency is carrying out investigations for the building of small dams in the highland areas. These would be used for the irrigation of, from 10 to 100 ha during the dry season, and it is expected that a construction programme will start soon. There will need to be close cooperation with agricultural research and extension.

Whatever the final organisation of the Water Resources Authority, it is clear that it intends to develop its own facilities (including laboratory facilities) for the study of land and water development for irrigation. Until the reorganisation is complete its future programme is unclear, but it has been suggested that 3,000 to 4,000 ha may be brought under irrigation each year for the next few years. The Authority will be the custodian of Ethiopia's water resources and intends to introduce legislation to deal with such matters as water rights. Responsibility for minor irrigation works may be delegated to the Ministry of Agriculture, but final plans will have to be approved by the Authority.

Hydrological studies and overall responsibility for water resources seem appropriately placed in a separate authority, but when it comes to the assessment of land potential for irrigation and plans for its subsequent development, there are bound to be problems when these activities take place outside the Ministry of Agriculture. There will also be duplication in those staff disciplines concerned with land evaluation, agronomy and agricultural planning. Nevertheless, for the foreseeable future most of the feasibility studies required for irrigation development are likely to be done by consultants, whatever Government Agency has overall control.

2.2.7. Ethiopian Mapping Agency

The Ethiopian Mapping Agency is within the Central Planning Supreme Council and provides a service to land users and others rather than having any requirement for land use services itself.

The Agency has three divisions: Survey, Mapping and Geography. It is responsible for all types of mapping and aerial photography, and attempts as far as possible to meet the requirement of user agencies for specialised mapping at a variety of scales. For example, it has prepared maps for irrigation projects, state farms, settlement schemes and coffee development which have included assessments of existing land use. This type of mapping is generally at scales of 1:50 000 or 1:25 000. Requests have also been made for land classification. Maps are prepared on a repayment basis between agencies. Cadastral surveys are carried out to determine land areas under various projects, and in some regions Peasant Association boundaries have been surveyed.

The main national mapping activity is the systematic coverage of the Country at a scale of 1:50 000, but this work is proceeding very slowly at present, for diversion of resources described above. Less than 10 percent of Ethiopia is mapped at a scale of 1:50 000 or less and this must be considered as a very great constraint to rural development.

The Geography division has 8 graduate staff whose main task is the completion of a National Atlas at a scale of 1:4 000 000. When this is completed regional atlases at larger scales will then be prepared.

It is obvious that some of the activities of the Ethiopia Mapping Agency are very closely related to, and probably overlap, with what is usually considered as land use planning. There must also be considerable duplication between the activities of the Geography Division and the work being done by LUPRD on the resources inventory and land evaluation. These questions will be discussed again later in this report.

2.2.8. Physical Planning Unit

This Unit operates within the Central Planning Supreme Council. Its function is to apply the macro-planning carried out by the Department of Planning to the more detailed regional situation. Such planning has a strong economic base.

The Physical Planning Unit has also become engaged in the detailed planning of projects for coffee and tea, state farms and settlement. This work is done in cooperation with the mapping agency and involves survey for map production, present land use assessments, and certain aspects of land classification that can be obtained from maps. Planning of infrastructure and project layout are then undertaken and a number of development options are offered to the client.

The United Nations Environmental Programme is centered on the Physical Planning Unit, which is said to be the focal point for environmental activities for Ethiopia.

There are various interpretations of what the functions of a national physical planning institution should be. If detailed planning of agricultural projects is to be continued, and if it is to be of an acceptable standard, it will be necessary to establish a full range of agricultural, forestry, land use and conservation disciplines within the Physical Planning Unit. It is considered that this is a duplication of activities, among others, that Ethiopia cannot afford.

2.3. National Land Use Needs

Following discussions with the various agencies concerned with rural land use, and based on experience in other developing countries, it is possible to present a fairly clear picture of the requirements for land use services in Ethiopia. In determining priorities there are two factors which take precedence over all others. The first is the improvement of production from the land, and the second is the conservation of natural resources for sustained use. The aim of land use planners, and those concerned with land development, management and extension, must be to promote production without prejudice to posterity. In view of the tremendous importance

of the conservation of land resources in Ethiopia it is considered essential at this stage to briefly discuss these aspects. This will clarify the role of resource surveys, land use plans, land development and land management toward increased production, and at the same time conserving natural resources.

2.3.1. Conservation and Production

There are still many people who adhere to the old fashioned explanation of soil erosion by water, believing the fundamental cause to be the washing away of soil by surface flow. This is not the most important part of the process. Before soil can be removed in surface flow it has first to be detached and this by raindrop impact, about 90 percent of soil erosion in the tropics is due to this process of splash erosion. The remainder is due to scour erosion which can normally only happen when surface flow has become concentrated in channels.

The only way in which splash erosion can be prevented is by keeping the soil covered at or near ground level. Under natural conditions this is achieved by vegetation in combination with litter, but under arable cropping the amount of soil cover is related to the type of crop and more particularly to its management. On land used for grazing the amount of cover, either live or dead grass, is also an important function of management. Severe splash erosion occurs under trees, unless there is an adequate litter cover, as drops falling from a high canopy are often able to reach their terminal velocity before striking the ground. In the selection and management of tree species for erosion control, litter production is of the greatest importance.

Scour erosion is prevented by the physical control of soil and water movement by the use of channels, terraces, check dams and the like. Such structures, although often necessary, must be regarded as supplementary to the correct management of the land between them. They do, however, form the framework for the rational development and subsequent management of arable land and are considered an essential part of land use planning.

Basic to all forms of erosion control is the correct selection of land in the first place. It is not normally possible, except at prohibitively high cost, to conserve land that is being used for a purpose for which it is inherently unsuitable.

It is clear that the management of crops (including trees) and stock plays the most important role in improvement of production as well as in the conservation. This is why it is essential that programmes for conservation include a complete agricultural package. Another reason why it is necessary to improve the standard of farming as part of soil conservation campaigns is to provide an improved standard of living for the people on the land. Farmers seldom get any direct benefit from digging bunds in their fields or closing off areas for tree planting. To succeed, conservation programmes must have a positive approach rather than the attitude which attempts in the first instance to stop people from using land. Alternatives must be provided. A high level of production from arable, pasture and rangeland and the measures used to obtain it are normally effective in erosion control. There is seldom any conflict between production and soil and water conservation.

Accelerated soil erosion occurs in Ethiopia because of varying degrees of land misuse by 5 million farm families and pastoralists. This can only be controlled by improving the husbandry of these people through agricultural extension services supported by adequate land use planning services. There is no way in which regulations can play a significant part in improving the land husbandry of small farmers. Soil conservation is mainly about the way people farm their land, and only marginally about gully plugs and reforestation.

The above discussion may seem irrelevant, but the Consultant considers it is necessary in order to define more clearly the priorities for land use services in the Country.

In promoting production with conservation, the essential functions of a land use services agency are to determine which areas of land are suitable for various productive enterprises.

and how this land should be treated to prevent its deterioration. In practice this means classifying land and planning the necessary conservation framework as appropriate. Land use planning is so closely tied up with soil conservation that it is normal for one agency to cover both aspects. Often the agencies concerned with land management, such as extension services and settlement organisations, will want the land use agency to layout physical conservation measures on the ground.

Land classification and conservation have therefore been identified as the essential contribution of a land use services agency to rural development in Ethiopia. There are, however, other services closely related to these which can best be undertaken by the same organisation. These are specifically mentioned in the terms of reference of LUPRD and supported by the FAO Project.

2.3.2. Land Evaluation and Master Land Use Plan

In brief, the results of these studies will be presented as a series of maps at a scale of 1:1 000 000 with supporting documents. The main maps will be geomorphology, soils, existing land use, agro-ecological zones, land resources, farming systems and, at 1:2 000 000, infrastructure and productivity. There is still some doubt as to the definition of the master land use plan and how it can be presented. Technical aspects of the land evaluation and master land use plan will be reviewed in the second part of the consultancy.

It is generally accepted that an overall assessment of the physical environment of a country is very valuable for planning purposes. This is particularly the case in sparsely populated lands where little is known about the agricultural potential. In preparing long term development plans it is necessary to have as accurate a statement as possible on the present situation in relation to potential. A land evaluation of this sort will also prevent gross errors in the selection of land for enterprises for which it is unsuited; for example, recent attempts to introduce rain-fed cropping to areas with insufficient rainfall.

In some cases the evaluation can also provide a valuable tool to land management if physical conditions, particularly soils, can be identified within a mapping unit by the land user, and then related to national or regional recommendations for their management. However, it is unlikely that this will be possible within the scope of the present work being carried out by LUPRO. Nevertheless, the evaluation will provide a coordinating framework for future research and investigations.

It is necessary to emphasise the limitations of the use of data presented at a scale of 1:1 000 000 in the immediate drive to increase production and to arrest environmental deterioration. Only very broad indications can be given of the suitability of land for particular enterprises. For example, if the Ministry of State Farms wish to identify an area for extensive wheat production they will be able to select an appropriate agroecological zone and avoid landforms which are, say, entirely mountainous. Indications as to the extent of land in present use will also be available. (It can be said that this type of information is already available in Ethiopia, even if not formalised). Within the area selected from the land evaluation there is likely to be a wide range of conditions-slopes too steep for cultivation, poorly drained soils and an unknown pattern of present occupation. Only semidetailed or detailed survey can provide the answers needed by development agencies. The same remarks apply to land rehabilitation work or any other aspect of land utilisation.

It is obvious that the production of an inventory and evaluation of the Country's land resources can in itself have no effect on land deterioration, but it could for example provide broad guidelines for the identification of key areas to be presented under natural vegetation. Nevertheless, it is anticipated that most of the Country is at present being used for the purpose for which it will be classified as suitable by the evaluation at the scale to be used. Again we are concerned with the use and management of individual land units, only identifiable in detailed surveys.

In view of the very severe constraints on trained and experienced manpower it seems that the importance attached to small scale inventory work and master planning has been over emphasised. It is quite wrong to suggest that detailed surveys and plans should wait for the completion of the master plan, which, in fact, will not be suitable even for project identification. There is no doubt that work on the inventory should continue, but it should not be the only or even the main, effort of an agency which is entrusted with providing the Country's land use services.

2.3.3. Detailed Survey and Planning

Most of the agencies discussed in this chapter (Section 2) have continuing programmes in which there is a requirement for land classification and planning at the detailed or semidetailed level. There are also known to be other small scale projects with a similar need. Table 2.1 is an attempt to summarise these requirements in terms of the land area to be included in projects over the next 10 years, but obviously the figures are little more than rather optimistic targets.

Table 2.1 Requirements for Land Use Services 1980 - 1990

Agency	Area for which Detailed Surveys and/or Plans Required (km ²)
Ministry of Agriculture	15,000 ^{1/}
Relief and Settlement Commission	
(a) Rehabilitation	10,000
(b) Settlement	1,000
Ministry of State Farms	8,000
Ministry of Coffee & Tea Development	1,000
Water Resources/Irrigated Agriculture	1,000 ^{2/}
Total	36,000

^{1/} This figure represents about 10 percent of the cropped area of the Country, but is otherwise quite arbitrary and would include Peasants Associations planning, conservation schemes and other special agricultural and forestry projects.

^{2/} 500 km² net irrigated area.

Although some agencies expressed an interest in, and the need for, some of the other types of land use discussed, by far the most urgent requirements were for detailed surveys and/or plans. It is necessary to clarify what is meant by "detailed" surveys.

Apart from the special requirements for large scale topographical maps and soil surveys needed for irrigation designs, most users required land classification and layout plans of sufficient detail to allow them to identify individual units of land. It is appreciated that the phrase "individual units of land" is open to a wide range of interpretations, but what is implied here is the ability to identify clearly an individual mapping unit of the type used to classify land in the USDA Land Capability Classification. (This does not imply that the USDA system is being recommended for any particular Ethiopian situation). In practice this will require a mapping scale larger than 1:50 000 and for most rainfed cropping schemes and conservation planning a scale of at least 1:25 000 will be needed. Much of the aerial photography taken recently for special projects has been at an approximate scale of 1:20 000 and this is appropriate for this type of work.

Land classification surveys of this type and scale have been used to cover many millions of hectares in tropical Africa during the past 30 years, and have formed the basis of land use plans for a variety of purposes. Two examples from Ethiopia are the Sirinka Catchment Project and the Lower Didessa Settlement Scheme. These surveys rely heavily on aerial photographic interpretation, but obviously a considerable amount of field work is needed as well. Land suitability for arable cropping, and types of cropping, grazing and forestry is determined mainly by landform supported by soils information, but formal soil mapping is not normally required.

By stereoscopic interpretation of aerial photography at a scale of 1:20 000 it is possible to assess with considerable accuracy the state of land degradation in problem areas. It is also possible to design physical conservation measures with precision. Conservation structures are laid out within the topographical framework provided by watersheds (English meaning - drainage divide or ridge) and natural drainage depressions, and with careful interpretation even the most minor natural drainage ways can be located.

It is normally quite adequate to present the results of these surveys and plans as maps drawn from uncontrolled annotated mosaics. Expensive, large scale topographical maps are not needed.

Obviously in rangeland areas the above type of survey is quite unnecessary and small scale surveys of vegetation and other relevant features suffice for planning purposes.

The above remarks are included only to clarify the nature of land use services needed by most users, and not to elaborate on methodology.

All the organisations with which land use problems were discussed rated detailed survey and planning as their top priority for land use services. This priority rating is endorsed by the Consultant. Detailed planning of the type described is a direct contribution to increasing production and to soil and water conservation. This assumes, of course, that the plans will be put into operation, but there is a very good chance of this happening as the work will have been commissioned for a specific purpose rather than forming part of a general study.

2.3.4. Land Administration and Regulation

Strong emphasis was placed on the possible regulatory function of LUPRD in its terms of reference. It was to be entrusted with allocating land for Government and other users, and controlling and regulating land use and land management. The present situation is that legal control over land is vested in the Ministry of Agriculture (Negarit Gazeta Notice No. 8 of 31 March 1980), but in practice no control appears to be exercised and Government agencies take over land as they require it.

It is important to distinguish between the allocation of land to various users and the control of land management after allocation. As there is no privately held rural land in Ethiopia at present, land allocation means a decision regarding its distribution between Government agencies or Peasants Associations. The Consultant does not think that a Government Department could effectively perform

such a function. Decisions of this sort can only be taken by the political Government. LUPRD should, however, be in a position to give the necessary advice on the suitability of a piece of land for a particular purpose. The fact that land is being used by Government agencies for purposes for which it is not suited is due to a combination of the lack of planning staff and to development targets which do not allow time for correct land selection and planning.

On the question of the control of land management after allocation more or less the same situation exists--land is either managed by Government, cooperatives or small farmers. It would not seem possible for a technical department to exercise control over other agencies, but again it could bring misuse to the attention of the political Government.

The strong emphasis put on the regulatory functions of LUPRD was probably prompted by concern for environmental deterioration and this is certainly a subject which will be covered by LUPRD, if the recommendations for its structure made in this report are accepted. But attempts to control environmental deterioration by regulation are unlikely to meet with much success.

As the problem of land allocation is one which is primarily concerned with the eventual Government structure for the administration of land matters in general it will be discussed further in Chapters 3 and 4.

The fact that land is to be allocated to various users assumes that boundaries will be defined and plotted on some type of plan. In the absence of individual land ownership, accurate cadastral survey with detailed definition of coordinates which could form the basis of legal title is not required. Boundaries will often follow natural features or straight lines between such features, and where 1:50 000 scale maps exist can be plotted quite accurately on these. In the absence of 1:50 000 maps it will normally be quite acceptable to plot the boundaries on maps prepared from 1:50,000 uncontrolled aerial photographic mosaics. Assuming that the plotting of Peasants Association boundaries is not to be undertaken on a national basis, the total amount of work

involved will be quite small. When land use plans are prepared for Cooperatives or any other organisation obviously the boundaries will be indicated.

If it is necessary to make use of regulations to prevent Government agencies using unsuitable land for their enterprises then obviously regulatory functions are of some priority in terms of both production and conservation. It will be necessary to revise and redraft environmental legislation and LUPRD can provide guidelines for this. In terms of conserving the major part of the land resources which are being utilised by small farmers, legislation is unlikely to play a significant part.

2.3.5 Documentation

This heading refers to the collection and processing of all available data on the natural resources of the Country and the storage of the information in a form that can be readily available to users. Some of the information will be collected during the course of the land inventory and detailed survey work being carried out by LUPRD itself, but there is already a great deal of information available from previous studies and surveys. In some cases potential land users are not aware that an area in which they are interested has already been covered by an earlier survey.

The methodology for data storage and retrieval will be advised by the Land Administration and Documentation Expert attached to LUPRD. It is essential that an area of land in which a user is interested can be located on a 1:50 000 or 1:250 000 and all known information provided without delay. As well as the sort of data contained in the inventory and land evaluation, there should be information on what maps are available covering the area, all aerial photography, details of any previous studies and the status of land allocation.

It is desirable that information should be filed on a regional basis and in time each region would maintain its own documentation centre.

If the information already available about a particular block of land is insufficient for the immediate needs of the user, it will

often be possible to supplement it with serial photographic interpretation and possibly some preliminary ground checking. This would probably be sufficient to determine the general suitability of an area for a particular use. A detailed survey could then be undertaken as discussed above. With such a great diversity of rural development activities in progress and being planned, as is the case in Ethiopia, it is essential to have the facilities for "quick preliminary assessments" of land suitability and availability. With a well organised documentation system and an experienced aerial photographic interpreter, a remarkably accurate assessment can be made in a very short time. It must be made clear that the level of detail required for project identification will not be available from the 1:1 000 000 land inventory. The need for this preliminary assessment service is of the highest priority.

2.3.6 Soils Laboratory

A decision was made recently to transfer responsibility for routine soil analyses from the Institute of Agricultural Research to LUPRD. It is intended to provide a service for all users and there is no doubt that there is an urgent need for this, the extent of which will be assessed in the second part of the Consultancy.

2.3.7 Training

There are very few people in Ethiopia who have had any experience in resource surveys and land use planning. Training is an essential part of the present FAO project and will continue throughout. Although there is provision for overseas courses it is considered very much more effective to carry out the bulk of the training within Ethiopia and within LUPRD. Most of the overseas courses are quite irrelevant to immediate needs. Induction and in-service courses are needed for all staff concerned with land use work both within LUPRD and other agencies.

It is essential for training purposes to produce suitable written material setting out clearly the procedures to be followed in the various aspects of the work. An excellent example is the

"Land Husbandry Manual" produced by the Malawi Ministry of Agriculture. A similar manual specifically related to Ethiopia conditions would be invaluable as a training aid and for reference purposes.

Training has the highest priority of all, as without trained staff none of the activities mentioned above can be performed, but it is again emphasised that a few months "on-the-job" training in the Country will serve the needs of land use planning very much more effectively than courses of overseas study. Local training of this sort costs almost nothing.

2.3.8 Summary of Requirements for Land Use Services

It is concluded from the above review that the most urgent need is for quick overall assessments of land suitability for specific purposes, or to locate priority areas for projects. This must then be followed up by detailed resource survey and planning.

Other useful activities include the compilation of a land resources inventory and evaluation. Soil analytical services are needed to support the resource surveys and to provide a routine service for other agencies. There is a need to regulate the allocation of land to the various Government organisations and its subsequent use. A documentation centre and training facilities are necessary to support all the other activities.

Chapter 3

THE PROVISION OF LAND USE SERVICES

3.1 GENERAL

Having identified the main needs and priorities for land use services, this Chapter discusses the institutional framework within which they can most effectively be provided. In this Consultancy it has not been possible to ascertain the future availability of personnel in the professional and technical grades. To do so would involve a manpower study of the agricultural and related sectors. Not is it known what budgetary provision is likely to be made available for land use work. Nevertheless, it is almost certainly safe to assume that it will be impossible for the Government itself to meet the demand for land use services over the next ten years. In practice some of the work will be done by Government, some by consultants, some by external aid agencies and some will be left undone.

3.2 FUNCTIONS OF A LAND USE SERVICES INSTITUTION

3.2.1 Evaluation, Documentation and Regulation

There can be little doubt that the national land inventory and evaluation and documentation services are the work of a single agency. The present LUPRD has a strong international team assisting it with this work and much progress has already been made. Care must be taken by the Mapping Agency not to duplicate some of the activities in its Geography Section. The relevant aspects of administration and regulation discussed in Chapter 2.3.4 are very closely tied with evaluation, documentation and conservation.

3.2.2 Detailed Resource Surveys and Planning

In considering carefully how the needs for detailed planning can best be met, there is only one possible reason for having the capability dispersed throughout various agencies. That reason is the fear by individual agencies of not being given the priority they think they merit. All users are competing for the same resources of trained manpower and funds, and splitting these up can only result in much lower efficiency--less output of poorer quality work. In the first few years of building up a service when experienced staff are very few, as much flexibility as possible is needed in fielding survey teams. Inexperienced people are able to contribute most and to leave more effectively when working under experienced supervision. Techniques can be standardised and output and quality of work monitored. Specialists are available to deal with difficult situations.

The proposal that the agency for land use should develop techniques for detailed planning, which would then be communicated to other organisations who would carry out the work, is not considered to be the correct approach. Detailed surveys and planning are a refinement of more general studies and require the same basic training and expertise. They should be carried out by a land use institution as a service to other agencies. The problem of allocating priorities should not be insurmountable.

Without prejudice to the above principle it would be foolish to ignore the present situation reviewed in the following paragraphs.

It was mentioned in Chapter 2.2.5 that the Relief and Rehabilitation Commission has a much greater capacity for detailed land use surveys than the present LUPRO, and that this capacity is being extended. The involvement of both agencies at Sirinka has been discussed. FAO is providing planning support to the settlement activities of the Commission, although this includes full feasibility studies with economic appraisal, as well as the basic land studies. As far as can be ascertained there has been insufficient liaison between either the national or FAO staff working in the two institutions, although both have training and executing activities in land use planning.

It is claimed that the Relief and Rehabilitation Commission is a temporary organisation set up to cover emergency needs. It has considerable outside financing from multilateral and bilateral donors, and therefore planning expertise and consultancy services can more readily be obtained while it operates on an independent basis. It is also fair to say that up to the present no alternative service within Ethiopia was available. Whatever arguments may now be advanced for a unified land use planning service, the Commission is likely to continue to build up its own expertise. Depending on what progress is made in the future the situation can be reviewed. It is strongly recommended, however, that there should be very close liaison between LUPRD and the Commission. This applies to both FAO project staff and their national counterparts; both sides can learn much from each other.

The Valleys Agricultural Development Authority has commissioned consultants to undertake resource surveys work in the past. While there is still lack of capacity within Government it is reasonable for it, or whatever organisation replaces it, to continue to operate in this way. It is, however, difficult to accept that an organisation of this sort is not within the Ministry of Agriculture. The eventual aim should be to have the capacity within the land use services agency to cover these surveys.

The Minister of State Farms and Coffee and Tea Development and the Relief and Rehabilitation Commission have had some help in planning from the Mapping Agency and the Physical Planning Unit of the Central Planning Supreme Council. In both cases the approach to planning has been through cartography with no firm land resource or conservation base. It seems inappropriate for these organisations to become involved in resource surveys which at present they are not equipped to do. The greatest contribution at the Mapping Agency can make to all aspects of rural development is to complete as rapidly as possible the 1:50 000 map series.

3.2.3 Soil and Water Conservation

As discussed in Chapter 2.3.1 the planning and layout of physical soil and water conservation measures are an essential feature of land use planning. Conversely projects designed only for the implementation of soil conservation works cannot be effectively implemented in the absence of an overall land use plan. Hence the desire of the Soil and Water Conservation Section in the Agricultural Development Department to establish land use planning teams. It is therefore considered essential that the land use services institution should have responsibility for soil and water conservation.

3.2.4 Environmental Aspects

Responsibility for advising Government on environmental matters would seem most appropriately to rest with the institution dealing with land use (excluding items like industrial pollution). Environmental control is closely tied in with resource survey and planning, soil and water conservation and land administration and regulation.

3.2.5 Soil Analytical Services

Placing the service for routine soil analysis within the land use agency would seem reasonable, as much analytical work will be concerned with surveys. There are, however, complications. Users of soil analytical data are usually concerned about fertility status, moisture relationships and fertilizer recommendations. This means that the data needs very careful interpretation by research workers and by subject matter specialists before they are usable by extension workers and farm managers. It is recommended that the relationships between soil analysis, research and extension should be studied in the second part of this Consultancy.

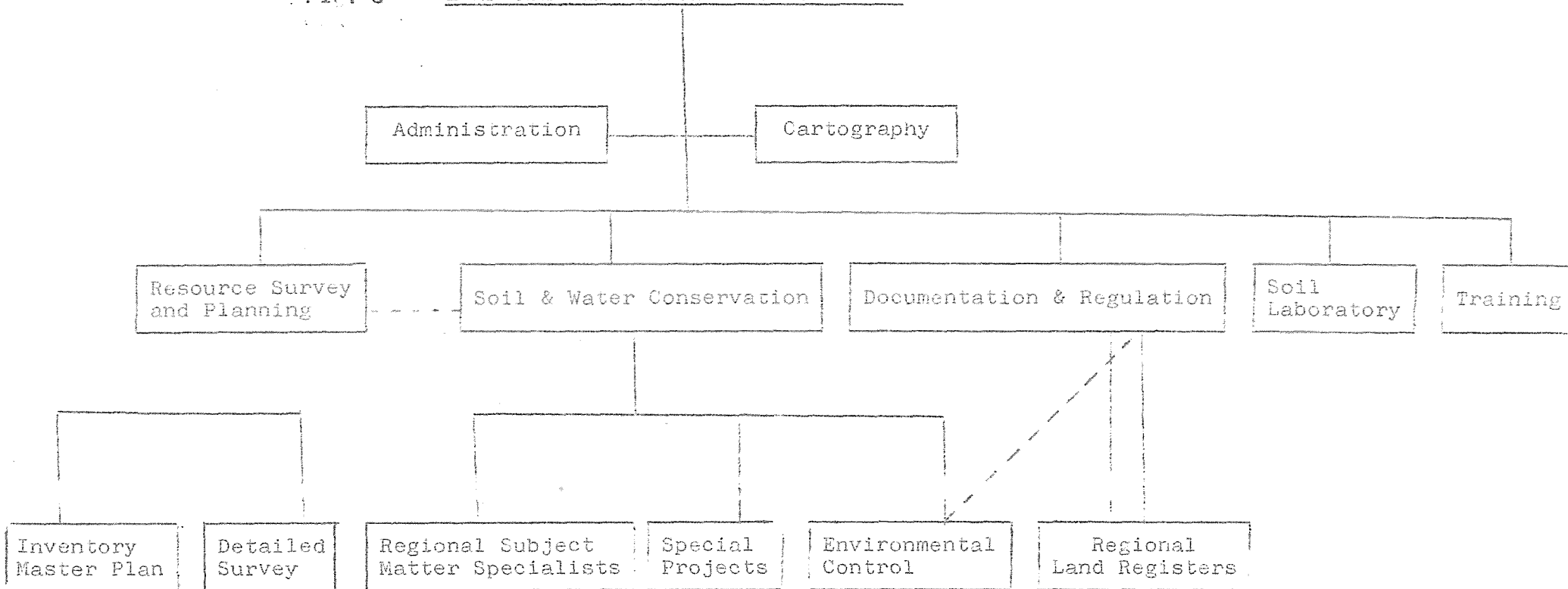
3.2.6 Training

For the reasons already discussed it is considered that training in the various aspects of land use work could only be carried out effectively within the land use agency itself.

3.3 STRUCTURE OF THE LAND USE SERVICES INSTITUTION

If the recommendations made in the previous section on the activities to be covered by a land use institution are accepted, then a possible organisational structure is shown in Fig. 3.1. At this stage no specific title is being given to the institution, pending the discussion in Chapter 4 on its placing within Government. In addition to the common services of administration and cartography there are five sections, but the very close links between all sections must be stressed. The work programme of each will be dependent in almost every case of inputs from other sections. The Consultant is not specifying the grades of the various categories of staff as it is assumed that these are defined by Government regulations.

Fig. 3 LAND USE AND CONSERVATION SERVICES



1/ Department, Agency, Commission or Authority as may be appropriate. See Chapter 4.

3.3.1 Resource Survey and Planning

This section would be responsible for the ongoing work on the land evaluation and master plan for the whole Country. Detailed recommendations on the staffing and programme for this service will be provided in the second part of the Consultancy.

The section would also be responsible, in cooperation with the soil and water conservation staff, for detailed surveys and planning for specific projects. It is considered that the detailed surveys would be carried out by a team consisting of one professional officer and one or two technical assistants, a driver and casual labourers as required. It is more satisfactory if the resource survey and land classification can be carried out by the same person, up to the stage where soil conservation planning is superimposed. Skill in aerial photographic interpretation is obviously essential, together, with a basic knowledge of soils, vegetation, agriculture and land classification system. Specialist help with soils, etc. will be available within the agency. Apart from a four-wheel-drive vehicles, photographic interpretation equipment, soil augers and camping gear would be needed.

People engaged in detailed surveys are best based in the regions, as otherwise excessive travelling and long periods away from base make the work unpopular and lower the output considerably. Assuming that land use services remain in the Ministry of Agriculture, administrative support would be available from the regional agricultural office.

The allocation of priorities for detailed surveys and planning would be decided by the Head of land use services, but in practice these may be met by higher authority. Initially all the major work might be concentrated on one or two projects, but the constant requirement by the Ministry of Agriculture for surveying "Producers Cooperatives" land, and selection of land for woodlots, etc. must not be forgotten.