

**PEOPLES DEMOCRATIC REPUBLIC OF ETHIOPIA**

**MINISTRY OF AGRICULTURE**

**NATURAL RESOURCES  
CONSERVATION and DEVELOPMENT**

**FORESTRY RESEARCH**

**PROBLEMS AND POTENTIALS  
PROGRAMME FOR FUTURE ACTION**

**STUDIES, REPORTS AND EVALUATIONS (1988/1)**

**A Report prepared by Berhanu Hika, Jan-Erik Nylund & Kari Mustanoja**

Reports in this Series:

1988:1 Forestry Research. Problems and Potentials.  
Programme for future action.

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**PROBLEMS AND POTENTIALS  
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**Berhanu Hika, Jan-Erik Nylund & Kari Mustanoja**

The Ethiopian forests are being depleted.

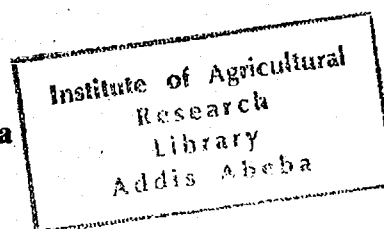
The Government attempts to reverse the present negative trends through intensified programmes in afforestation, soil conservation, agroforestry, etc.

Research is an important element in this strategy, but efforts and resources allocated so far have been weak and scattered.

The Government requested SIDA and the Swedish University of Agricultural Sciences (SUAS) to make a study of the present situation and outline a strategy for future activities.

The Report, which was prepared in close collaboration with the Silviculture Research Centre at Shola, provides a general frame for intensified actions and for giving priorities among various important research areas.

**Addis Ababa, Ethiopia  
1988**



FORESTRY RESEARCH PROGRAMME PREPARATION MISSION REPORT

0. EXECUTIVE SUMMARY

1. BACKGROUND

- 1.1 Purpose of the Mission
- 1.2 Report content

2. FINDINGS

- 2.1 Forestry sector policy and organization
- 2.2 Research and development needs and programme
- 2.3 Research and development institutions, infrastructure and coordination

3. RECOMMENDATIONS

- 3.1 Forestry research in Ethiopia: goals, function, and organization
  - 3.1.1 Role of forestry research in Ethiopia
  - 3.1.2 Organisation of national forestry research
  - 3.1.3 Central FRC functions
  - 3.1.4 Research and development
  - 3.1.5 Implementation activities
- 3.2 Research priorities: scope of the future FRC research programme
  - 3.2.1 Scope and priorities of forestry research
  - 3.2.2 Summary of revisions to the FRC research programme
- 3.3 Strengthening FRC through institutional cooperation with SUAS
- 3.4 Project startup; utilization of SIDA funds for 1987/88
- 3.5 Budget proposal

4. ISSUES AT THE TIME OF DRAFTING THE MISSION REPORT

12.1.1988

## 5. APPENDICES

- A.1 Mission Terms of Reference
- A.2 Institutions and Persons Contacted
- A.3 Mission Programme
- A.4 Documents Consulted
- A.5 Extract from the Ten Year Perspective Plan  
(1984/85..1993/94)
- A.6 Draft Project Document
- A.7 Organization of the Ministry of Agriculture
- A.8 FRC: Resources, Equipment and Results to Date

### CURRENCY EQUIVALENTS

ETB 1 - USD 0.483      USD 1 - ETB 2.07      SEK 1 - ETB 0.33

### FISCAL YEAR

Government of the People's Democratic Republic of Ethiopia

July 8 - July 7

### LIST OF ABBREVIATIONS

ADB	African Development Bank
CFSCDD	Community Forestry and Soil Conservation Development Department
DANIDA	Danish International Development Agency
FAWCDA	Forestry and Wildlife Conservation and Development Authority
FINNIDA	Finnish International Development Agency
FRC	Forestry Research Centre (sometimes referred to as SRC - Silvicultural Research Centre)
FTI	Forestry Training Institute, Wondo Genet
GOE	Government of the People's Democratic Republic of Ethiopia
GTZ	German Agency for Technical Cooperation
IDA	International Development Association (arm of the World Bank)
NORAD	Norwegian Agency for Development Cooperation
NRCMDM	Natural Resources Conservation and Development Main Department
PA	Peasant Association
PC	Producers' Cooperative
MOA	Ministry of Agriculture
SFCDD	State Forests Conservation and Development Department
SFODA	State Forestry Development Agency
SIDA	Swedish International Development Authority
UDA	Urban Dwellers' Association
UNSO	United Nations Sudano-Sahelian Office
WB	The World Bank

12.1.1988

## 0. EXECUTIVE SUMMARY

A Forestry Research Mission prepared, in November..December 1987, programme/project cooperation for joint Ethiopian/Swedish financing according to terms of reference agreed upon during the annual 1987 sector review.

### The Mission

- reviewed forestry sector research needs in Ethiopia on the basis of national policy; available information on the needs, production and use of forestry sector products and services; and the views of Government decision-makers,
- studied the type and adequacy of the institutional structure of forestry research and its activities, facilities and staff; and constraints to effective research, and
- prepared work programmes, and budgets or cost estimates, for the use of the 1987/88 SIDA allocation, and for forestry research development in the following five years.

### The Mission found that

- while the Forestry Research Centre is presently a weak organization, it can be built up to efficiently carry out and coordinate national sectoral research, and can have a major national development impact,
- this would require support from SIDA and SAREC to the tune of SEK 5 million in the third and consecutive years, with SEK 3.5..4.5 million inputs in the first two Project years,
- the 1987/88 SIDA allocation can be effectively used for strengthening the institutional foundation of FRC, for starting a research data bank and information file, and for selected baseline studies for research planning,
- forestry research should be given more economic, social, management and utilization content to better serve national development,
- support from other donors would be welcome, through parallel financed complementary projects, to speed up and strengthen research and development, and that
- success in development will very much depend on long term commitment to institutional development cooperation, such as the twinning arrangement planned between the Forestry Research Centre and the Swedish University of Agricultural Sciences. This is especially important in view of the long time required

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Addis Abeba

12.1.1988

for staff training and development, and for the maturation of the required institutional and research programmes.

The Mission recommends that

- the role of forestry research in Ethiopia is redefined, and the scope of the national forestry research programme widened to cover the social, economic, ecological, management and utilization aspects, in addition to silviculture,
- a strong coordinating body for forestry research is created, and an efficient division of labour between forestry research institutions, academic establishments and forestry executive agencies is established,
- a national forestry data base and information service is set up,
- a long term plan for the development of forestry research competence is worked out, and made to match research priorities,
- the necessary material resources are made available to forestry research, and
- arrangements are made to secure continued, sufficient funding from both national and donor agencies.

## 1. BACKGROUND

### 1.1 Purpose of the Mission

In recent years, the Government of Ethiopia (GOE) and SIDA have reviewed the need to a strengthen forestry research on a number of occasions. In 1985, M. Bendz and I. Fystro did a consultancy in preparing short term support to Forestry Research and Forest Seed Handling in Ethiopia. The next year, Bendz drafted a briefing memorandum for a mission to study the whole Natural Resources research sector. This joint Ethiopian-Swedish review was carried out in August..September 1986, recommending the establishment of a strengthened forestry research programme in the context of a Natural Resources Research Institute. The NRRI would operate under the Natural Resources Conservation and Development Main Department of the Ministry of Agriculture.

The Ethiopian Government and SIDA decided, during the 1987 Forestry Sector Review, to prepare a concrete proposal for action. This Mission is a result of that decision.

The task was to formulate proposals for long-term SIDA support to forestry research, based on institutional cooperation between the Ethiopian forestry research and development institutions and

12.1.1988

the Swedish University of Agricultural Sciences (SUAS) (Terms of Reference in Appendix A.1).

The Mission<sup>1</sup> was briefed in Uppsala on 9 November 1987, and worked in Addis Ababa from 10 November through 9 December. The work in Ethiopia was followed by discussions at FAO in Rome about Mission findings, on 10..11 December. Details on the programme, institutions contacted and the documentation reviewed by the Mission are given in Appendices A.2..A.4.

## 1.2 Report Content

The main report contains the Mission's findings on research and development needs and present programmes, and research and development institutions, infrastructure and cooperation, based on forestry sector development policy and information needs. This is followed by a summary of the Mission's recommendations, which includes analyses and proposals concerning future forestry research and SIDA support.

Appendix A.6 contains a draft Project Document on forestry sector research development. Its main component is a proposed SIDA project. Several of the other components included can be sponsored by SIDA or other donor agencies; funding sources for these have as yet not been allocated. Finally, the Mission has listed critical unresolved issues with a bearing on programme implementation, for decision by Ethiopian Authorities or settlement between Ethiopia and SIDA.

## 2. FINDINGS

### 2.1 Forestry Sector Policy and Organization

The main policy documents are the Forest and Wildlife Conservation and Development Proclamation No. 192/1980, the Ten Year Perspective Plan (1984/85..1993/94), and the Three Year National Work Plan. The Mission has been informed that additional policy content can be found in the documentation of the Forestry Campaign, and that revised policy issues are being discussed in Government in the context of a new Proclamation. Policy issues affecting research priorities are described in Appendix A.6. In summary, sectoral development is hampered by a severe lack of decision making information, especially in the economic, social, and management disciplines.

The present organization of the Ministry of Agriculture is shown

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12.1.1988

in Appendix A.7. The Mission considers that for the development of an effective research organization to support decision making, it is important that information needs are coordinated both within the Natural Resources Conservation and Development Main Department as a whole, and also within the forestry sector organizational substructure.

## 2.2 Research and Development Needs and Programme

The demand for research data has been steadily growing as a consequence of increasing forestry activity. Attention has concentrated on a few selected fields of immediate interest, such as nursery techniques, plantation trials, seed, and a variety of biotechnological agro-forestry matters. Research resources have not been adequate to cover other fields, essential for balanced development in forestry, in proportion to their importance for decision making.

Investment into forestry research is expected to bring major net benefits to Ethiopia. The largest direct forestry benefits are expected from

- increased survival of community and state forest plantations (annual increase in value of the order of ETB 100 million for an outlay of ETB 5 million/a; about one third of the gain is expected from better nursery and silvicultural techniques, and two thirds from improved social and economic adaptation of plantation systems);
- increased productivity of natural and planted forest stands (ETB 100 million/a increase if plantation survival targets reached, for a research outlay of ETB 3 million/a; two thirds of the increase would come from species selection, improved silviculture, and appropriate rotation determination techniques, and one third from improved social and economic adaptation of forestry to Ethiopian conditions);
- lower costs, improved recovery and less wastage from forest and industrial operations (gains of ETB 20 million/a expected against a research outlay of ETB 1 million/a);
- more efficient use of skilled personnel resources (gains of ETB 50 million/a are expected against an ETB 1.5 million/a research outlay; and
- increased product value and life (gains ETB 30 million/a for a research outlay of ETB 1 million/a).

Larger impacts of tree planting on agriculture are also expected through

- increased land availability resulting from soil stabilization,

12.1.1988

- larger harvests due to protection from windbreaks, and
- larger labor availability to agriculture due to shorter wood fuel and building pole collection times.

The Mission considers it important to base its analysis of research priorities on sectoral and regional GOE development policy and programmes.

On the basis of its analysis, the Mission has listed subject matter areas requiring attention in the Draft Project Document Chapter on Research needs and priorities. A full treatment of these subjects will not be possible during the first phases of an upgraded research programme. Top priorities was given, by parties consulted by the Mission, to

- consolidating and summing up existing results from plantation experiments, for guidance to ongoing forestry projects, and to
- updating the Ethiopian forestry sector data base.

### 2.3 Research and Development Institutions, Infrastructure and Coordination

Currently, forestry research and research-related activities are carried out by a number of institutions. The ones exclusively dedicated to research are the Forestry Research Centre (FRC), and the Wood Utilization and Research Centre (WUARC).

Teaching combined with studies and trials is carried out mainly by

- the Wondo Genet Forestry Training Institute, doing practical experiments in an integrated approach on management and utilization, and
- the Faculty of Forestry at Alemaya Agricultural University; a newly established institution which has inherited some agroforestry research activities from its mother Faculty of Agriculture. Agroforestry trials are also reported to be carried out at some agricultural colleges.

Other agencies concentrating on certain aspects of forestry research are

- the Soil Conservation Research Project, supported by University of Bern and coordinated by the Community Forests and Soil Conservation Development Department, CFSCDD, and
- the Addis-Bah Forestry Development Project, in cooperation between the State Forest Conservation and Development Department, SFCDD and the World Bank/International Development

12.1.1988

Association; the Project includes a component of research, mainly on nursery techniques, reforestation, the management of existing crops, and community forestry (agroforestry).

Furthermore, practical trials and information-gathering is carried out by CFSCDD and SFCDD. The Land Use Planning and Regulatory Department, LUPARD, is doing land use research with some relevance to forestry. Research on land use, regional development and soil conservation, and the use of trees for that purpose is also carried out by several non-forestry institutions.

Some of the research is overlapping, and coordination is weak. Much research already done is poorly documented. The Mission felt a strong need for improved coordination, and for an information network to make results available to the forestry sector as a whole.

#### Forestry Research Centre (FRC): Status and History

FRC is the nucleus of a forestry research institute, concentrating in its work on species and provenance elimination trials, seed, nursery techniques, agroforestry research and extension, and fuelwood survey. Because of the emphasis in its recent activities, the name Silvicultural Research Centre (SRC) has often appeared in informal English usage. The Mission will however use the official name of the institution in this report.

FRC does not currently carry out work on the silvics or management of forest stands, on the preparation of growth and yield tables, on forest inventory, or on forest management planning, although these are in its mandate.

Its mandate does not include such items as forestry and forest industrial economics or related social studies, forest products marketing and distribution, forest and wood protection, or forest utilization (part of this is included in the WUARC programme).

The history and status of FRC related forestry research is described in Appendix A.8.

Summarizing the analysis of the Mission, if FRC is to serve as a base for a normal forestry research institution it would have to be thoroughly overhauled and upgraded in every aspect, and given heavy specialist support over a long period of time.

As far as the Mission can see, there are no alternative institutions to serve as a base for a future forestry research organization. The problems encountered are consequences of the general situation within the forestry sector and the country, not particular for the present FRC. Consequently, they would not be remedied by the creation of a new institution. In spite of

12.1.1988

its shortcomings, FRC is the only institution where at least some facilities are present, and where at least some research capacity is present and can be further developed.

#### Wood Utilisation and Research Centre (WUARC)

WUARC studies the mechanical, physical and working properties of woods, their seasoning and preservation. New wood products are designed and tested to a small extent. It also gives training and services to industry in sawdoctoring.

WUARC does not study methods to improve the efficiency of forest industry operations or test industrial products, develop wood extraction or transport systems, or study the fuel properties of tree species. These activities should be added to its programme in the context of a new institutional arrangement, under which it would be under the FRC umbrella.

### 3. RECOMMENDATIONS

#### 3.1 Forestry Research in Ethiopia: Goals, Function and Organization

##### 3.1.1 Role of Forestry Research in Ethiopia

On the basis of GOE forest policy statements and discussions with concerned authorities, the Mission has formulated the purpose of forestry research in Ethiopia as follows:

Forestry research aims at providing national development and forestry practice with the data necessary for rational policy and decision making, and improving the efficiency of resource utilization in the forestry sector.

This definition of forestry research allows for an analysis of its scope as well as of the central institutional functions. The specialities required to cover the recommended scope of research - the economic, social, ecological, genetic, silvicultural, technological and management information for decision making at all levels in the forestry sector - will be discussed in section 3.2. However, the definition is also intended for focusing on the functional aspects: the two-way communication process through which

- research needs emanate from the work of decision makers and forestry practice, and are formulated into research programmes and projects by the research community,
- the information gained through research is organized into a form suitable for real-world decision making.

This approach should help to clarify the essential task of the forestry research organization: to ensure satisfactory decision

12.1.1988

making tools and information. It does not mean that the content of the actual research is unimportant, but stresses the fact that no research program is efficient or worth the cost unless the central functions are present.

### 3.1.2 Organization of National Forestry Research

Forestry research, decentralized to several institutions as described above, should be coordinated by one organization, also responsible for the maintenance of an information system. In line with its terms of reference and the discussion above, the Mission has considered the present FRC to be the nucleus of this system.

The Mission is aware of the intention of the Ten Year Perspective Plan to create a Natural Resources Research Institute, and has been briefed on the recommendations of a previous mission on that matter. However, its proposals are equally valid regardless of the position of FRC within the MOA structure. As no decision has as yet been made, FRC will be treated in the discussion as an NRCMD department.

The FRC institutional structure proposed by the Mission is shown in Figures 1 and 2. In terms of setting research and development priorities, the impulse mainly comes from forestry sector

FIGURE 1.

#### ORGANIZATION OF FORESTRY RESEARCH IN ETHIOPIA

##### FORESTRY SECTOR PRACTICE AND DEVELOPMENT

<p><u>Institutions</u></p> <p>Community Forestry C&amp;D Department          State Forestry C&amp;D Department          Seed Centre          PA &amp; UD Forestry          Soil Conservation &amp; Management          Wildlife Conservation &amp; Management          Commercial Enterprises</p>
<p><u>Activities</u></p> <p>Regular Activities          Development Projects          Inventories and Surveys          Land Use &amp; Productivity Studies          Other Activities</p>

##### CENTRAL FUNCTIONS OF THE FORESTRY RESEARCH CENTRE

<p><u>Planning and Coordination</u></p> <p>National Forestry Research Board          Programs/Project Task Forces          Research and Development Planning and Priorization Studies</p>
<p><u>Information Management and Services</u></p> <p>Data Bank          Library          Project Files          Information Exchange</p>
<p><u>Publication Service</u></p> <p>Scientific Publications          Extension Publications          Editorial Service</p>
<p><u>Research Support</u></p> <p>Research Design and Analysis</p>

##### RESEARCH AND DEVELOPMENT WORK

<p><u>FRC Research Projects (Present FRC and HURC)</u></p> <p>Internally (Budget) Financed          Externally (Contract) Financed</p>
<p><u>Research by Other Institutions Coordinated by NFRB/FRC</u></p> <p>Multi-Agency Research Projects          Trials and Studies by Other NRCMD Institutions          Trials and Studies by Other Institutions</p>
<p><u>Inputs free International Research and Data Banks</u></p> <p>Models and Data</p>

12.1.1988

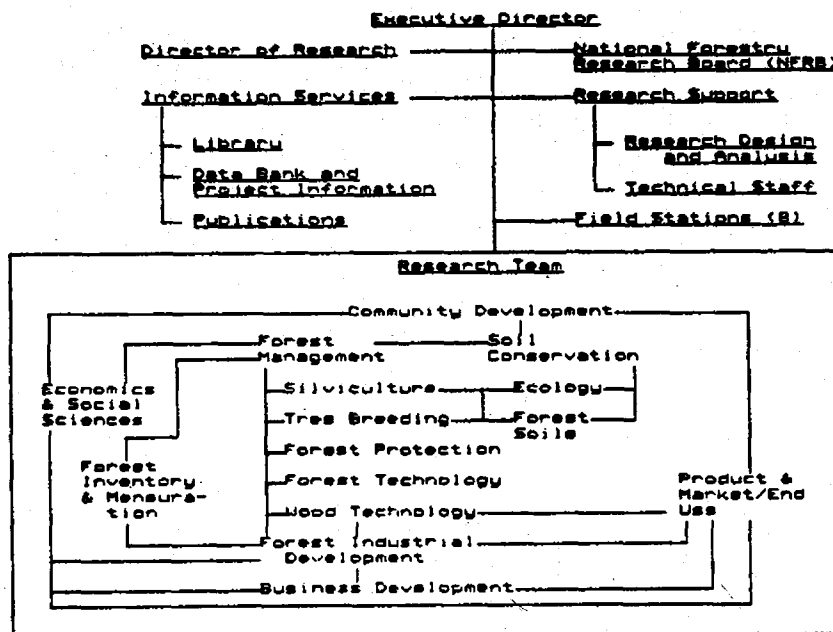
practice, through the National Forestry Research Board, to the FRC research planning/prioritization secretariat. The secretariat then prepares a research and development implementation programme for NFRB decision making, including the allocation of component research activities to FRC or other institutions. Research results flow back through the chain: from researchers through central FRC services to the secretariat, the NFRB, and decision makers.

The core of the system in Figure 1 is the central Research Planning, Coordination, Information Service, Publication and Research Support Function of FRC. The Research Team (Figure 2) is primarily responsible for seeing that the required decision-making information is available or generated, and only secondarily for doing hands-on research.

The system is simple to operate, once the rules have been set. Decisions should be made on time and they should be promptly and efficiently implemented. Information feedback and exchange within the system must be ensured. The Mission was instructed by NRCDMD Department heads that FRC will have to have executive power to act in research implementation in order for decisions to be effective; in this respect, NFRB decisions would have a guiding role rather than an executive role.

FIGURE 2. In the Proposed FRC Organization, the Research Team would carry out Research Coordination and Implementation Assignments in a Project Organization, which will change with time and Project Mix.

ORGANIZATION OF FORESTRY RESEARCH CENTRE  
AT FULL DEVELOPMENT (YEAR 15)



12.1.1988

NFRB membership would include

- NRCMDM Department heads or their representatives,
- the Executive and Research Directors of FRC and the Research Leader in charge of project and programme prioritization,
- the Heads of units engaged in forestry sector research at Alemaya Agricultural University and Wondo Genet FTI,
- a representative of agricultural research, and
- the National and Expatriate Managers of Development Projects engaged in forestry sector research, including those operating under FRC.

The Board would be chaired by the Vice Minister, NRCMDM.

While assigning a leading role to FRC in central research functions, the Mission recognizes the important studies carried out by a number of other agencies. It is proposed that this be continued even in the future: it is neither practical nor desirable that the execution of all forestry development studies is promptly centralized to one institution.

The central functions are discussed in more detail in Chapter 3.1.3. Actual research work is discussed in section 3.1.4.

### 3.1.3 Central FRC functions

The following functions should be the exclusive responsibility of FRC.

#### A. Research planning and coordination

Presently, there is little coordination of forestry research. Every institution defines its own priorities and designs its own research program, often in replication of what is already being done. As a consequence, scarce resources are wasted, while important fields of research are <sup>in</sup>priority. Particularly, this approach has resulted in concentration on a number of technical issues of immediate consequence, while important subject matters with bearings on policy making and management are being completely ignored. In general, forestry practice has only to a limited extent communicated its research needs to the research agencies; instead, they have designed their own trials and studies in vacuo. On the other hand, the researchers have frequently not been aware of results and information available from forestry practice, and in some cases lack practical skills mastered by other departments of the NRCMDM.

To cope with this situation, the Mission proposes that FRC is given the exclusive authority and responsibility to:

- define short and long term forestry research priorities

12.1.1988

- coordinate all forestry research within Ethiopia
- liaise with other authorities whose activities border on forestry research (eg. soil conservation, rural development)

and the chief responsibility for:

- formulating the research needs of practical forestry into scientifically sound research projects, and either execute them or get them executed by others.

To achieve this, a two-level structure is proposed:

- 1) The National Forestry Research Board (NFRB), composed of representatives from both research and the implementing agencies. The Board would be responsible for policy formulation, priority setting and research coordination, but not for FRC management or administration.
- 2) Research task forces, project and/or programme specific, composed of research project leaders and responsible field organization officers. When NFRB has translated the identified research needs into projects (the FRC secretariat doing the menial work!), these informal groups should function as contacts between practice and research and back up FRC staff in formulating the actual research programmes.

#### B. Information management & exchange

The storage, processing and retrieval of qualitative and quantitative research results is an other central task for FRC. Much data have already been generated through the work of FRC, its predecessors, and other agencies. Only part of this information is available, and even this is not in a form readily usable by forestry practice. The intensification of forestry research will continue adding to this body of information. To cope with this, and make this information accessible, the Mission recommends that a data bank be organized and maintained by FRC. This bank should hold the results of all forestry research in the country, regardless of executing agency, and be open for use just as if the data were published. The bank should not be limited to completed and published studies, but also include reliable interim results useful for national forestry development.

The bank should be given such a form directly useful for forestry practice. The Mission envisages a design with several subsets of data, one set consisting of "micro-articles" giving conclusions and recommendations, one containing hard data, and one consisting of the original files.

In most industrialized countries results are quickly published, and forestry sector practice is already based on compound



12.1.1988

knowledge. In Ethiopia, these preconditions do not exist; this makes a common data base so much more desirable.

The data bank should be backed up by a national forestry library, utilizing the nucleus already existing at FRC, and including the catalogues of Wondo Genet FTI and Alemaya Agricultural University (an interloan facility should be established).

#### C. Publication services

The results from research must be published for two target groups:

- the national and international scientific community, and
- the end users: forestry sector staff, including extensionists.

For both target groups, it is essential that publication is up to professional standard. This means in the former case that the researchers' text should be subjected to technical and linguistic review and professional editing. In the latter, the researcher usually will have to be supported by a competent style editor as well, to ensure that the message is relevant and comprehensible to the intended readers.

The establishment of publication series aimed at informing Forestry decision makers of research results should be considered (see Appendix A.8). However, results from more important research projects should, after strict editing, be submitted for publication by international journals as well.

#### D. Research support

A fourth recommended central function of FRC, intended more for servicing the research community than practical forestry, is a research support unit, assisting in matters of research design, statistical analysis and data processing.

The research support unit should also contain the staff resources for performing technical work related to the design of experiments, and coding and analysing data.

#### 3.1.4 Research and development

Once coordination and information exchange is ensured, the existence of several institutions carrying out research and development work is no problem but an asset. Within the proposed structure, long term institutional research programs as well as ad-hoc research projects, eg. donor sponsored ones, can easily be incorporated. For the institutions, the Mission has the following proposals:

12.1.1988

A. FRC

The scope of FRC's own engagement in research work depends on future allocations of staff and physical resources. Complementary funding could be obtained from contracting research services to other agencies requiring research data. In a consolidated FRC, part of the R&D work now done by other departments of the MOA would probably be better executed by research professionals through a contract. FRC's research programme could also be expanded and financed through cooperation agreements with agencies such as SAREC and IDRC.

B. WUARC

The work of WUARC forms such an integral part of the forestry research facilities that it should be consolidated into the future FRC, albeit working at two localities. The Mission found a lack of coupling between plantation trials and the possible end use of the timber produced; this underlines the need for close coordination between FRC and WUARC research work. Also, the Forestry Economics research (including market and marketing studies) proposed is closely connected to present and future work at WUARC.

C. Wondo Genet FTI and Faculty of Forestry, Alemaya

The research and development work currently carried out at a practical level at Wondo Genet FRI is indispensable for teaching and valuable from a research point of view. The recently founded Forestry Faculty at Alemaya Agricultural University is also expected to engage itself in research; actually, some agroforestry studies are already being done. For obvious reasons this research can not be brought under FRC, but it should be closely coordinated with FRC's own work. This can most conveniently be achieved through participation of the two institutions in the NFRB as well as in the research task forces.

D. R&D work by other MOA/NRCDMD agencies is often closely connected to practical operations and should not be separated from them. Information transfer is most important: results should automatically be communicated to the Data Bank. The NFRB should carefully consider, which of this research should be done by FRC, and how to provide research support from FRC in experimental design and data processing and analysis, to ensure the validity of project results in other NRCDMD units. CFSCDD and SFCDD should both be represented on the NFRB, and executing officers should participate in the task forces.

E. Research under projects sponsored by international agencies should always be coordinated by the FRC, and this should be explicitly included in Project Documents. The institutional arrangements should have the approval of the NFRB.

### 3.1.5 Implementation Activities

It is useful that the national forest tree Seed Centre is connected with FRC, since its work is strongly dependent on research results and laboratory analyses. The Mission proposes that also in forest inventory and forest management planning, where inventory design, plan-related studies and data processing have a decided research character, the future role of the FRC is carefully considered. This would be important in order to ensure that staff resources and the inventory and planning data are efficiently collected and used. National inventories are organized by the forestry research organizations e.g. in the Scandinavian countries.

### 3.2 Research Priorities: Scope of the Future FRC Research Programme

#### 3.2.1 Scope and Priorities of Forestry Research

Compared to needs, the present scope of research is very narrow. The following main subject matters should be covered at FRC at full development:

- Soil science and site studies, and the forestry related aspects of soil conservation
- Botany, ecology and supporting sciences
- Silviculture, including tree breeding and forest protection
- Forest management, including inventory and mensuration
- Forest economics including market and marketing studies
- Community forestry and the social aspects of forestry
- Forest and wood technology, the development of the technological, managerial and business aspects of forest industries, and product/end use studies
- Statistics and biometry (support function)

The Mission has frequently encountered the opinion that present forestry research should concentrate on silviculture because of the large ongoing planting programme. This would cover only part of the national expectations from forestry research. In fact, the importance of strategic planning and management information is also emphasised.

Several of the ongoing afforestation schemes are encountering social problems; this underlines the need of work in the field of man/forest interactions. Community forestry trials are to take place at the Mertule Maryam Centre; this work should be integrated into the FRC programmes and properly analyzed, disseminated and utilized. In the long run, community forestry should be a major component of FRC work.

Finally, forest technology and utilization has until now been given attention only as a subject of teaching at Wondo Genet

12.1.1988

FTI. Studies in this area will be important in order to improve the efficiency of resource use, to decrease wastage of scarce timber resources and reduce costs.

The draft Project Document contains an outline of a prioritized research programme. This covers all research, not only projects to be carried out at FRC.

### 3.2.2 Summary of Revisions to the FRC Research Programme

The Mission proposes a strengthening of ongoing silviculture research activities, stronger orientation towards stand management and community forestry problems, and studies serving sector development strategy decision making. All ongoing projects have to be summed up and the results fed into the data base, a task estimated to require at least two years of work. The Mission recommends incorporating expertise in several fields (economics, management, utilization,..) in order to make the required research programme possible, and a hard look at the proper shape of the field station and trial programme.

### 3.3 Research and Manpower Development at FRC through Institutional Cooperation with SUAS

In the past, support from bilateral and multilateral cooperation projects has brought about temporary improvement in the development of research, but the end of these time-limited projects, above all UNDP/FAO assistance, has led to reduced activity and broken continuity in long term research programmes.

The Mission has been informed that SIDA may wish to include support to FRC or corresponding institutions into the forestry sector cooperation programme, on a long term basis, and that the GOE has indicated willingness to increase its counterpart funding.

Due to staff limitations and research infrastructure, neither a consolidated FRC nor the MOA presently has the capacity of operating research completely on its own. Therefore, the missions quoted in Section 1.1 have recommended institutional cooperation with an overseas research institute, or more specifically with SUAS. The Mission fully agrees with this recommendation.

The draft Project Document contains a detailed plan for research and manpower development. To make that plan operative, The Mission recommends the following points to be covered by an agreement by GOE, SIDA and SUAS:

- A temporary agreement on M.Sc. and Ph.D. training of FRC staff is made by SUAS and the Commission of Higher Education on the same lines as the current B.Sc. (or B.For.) training at FTI and the proposed M.Sc. and Ph.D. training at Alemaya A.U.; there should be as much coordination as possible with Alemaya,

12.1.1988

once the programme is started.

- SUAS posts long term staff in the fields of research coordination and research/experimental design at FRC
- In line with research priorities and an agreed time schedule, SUAS Forestry Faculty Departments undertake to field subject matter specialists for 2-3 months per year to assist in the development of research programmes and to teach courses to M.Sc. and Ph.D. students among FRC staff. The SUAS departments will also receive these students for part of their studies in Sweden.
- FRC will receive Swedish graduate students and researchers from the participating SUAS Departments to do field work on a cooperation basis, the visitors paying for the direct costs of their research.

Through this twinning arrangement, the long-term institutional and competence development of the FRC would be ensured.

### 3.4 Project Startup: Utilization of SIDA Funds for 1987/88

Considering the long time SIDA support to FRC has already been under preparation, and the ongoing intensification of forestry in Ethiopia, the Mission found it urgent to get the program operational as soon as possible. For this reason it recommends that the funds available for 1987/88 (SEK 1,500,000) are utilized for this purpose; above all for preparatory short term consultancies. The main part of this preparatory work could be done by FAO on UNDP funding, if understanding is reached on the activities carried out during preparatory assistance. The Mission recommends that the balance of the funds is used for the procurement of microcomputers and other equipment which should be at hand at the estimated start of the main programme, in August/September 1988.

The draft Project Document contains a detailed description of further project activities.

### 3.5 Budget Proposal

The proposed main project component budget amounts to SEK 25.85 million for the SIDA inputs and ETB 7.7 million during the first five-year period. A breakdown is given in the draft Project Document.

## 4. ISSUES AT THE TIME OF DRAFTING THE MISSION REPORT

The main unresolved issues requiring action before starting the project are the following:

12.1.1988

- Assigning a governing role to the Forestry Research Centre in respect to research-related forestry development in Ethiopia.
- The GOE commitment on the long term financing of FRC at the level required to ensure continued adequate information provision for sectoral decision making.

12.1.1988

## 5. APPENDICES

### APPENDIX A.1 MISSION TERMS OF REFERENCE Prepared in Addis Ababa 30.4.87

#### Terms of Reference for the Preparation of a Forestry Research Programme in Ethiopia

##### Introduction:

Forestry research in Ethiopia is carried out by the Silviculture Research Centre (SRC) organized under the Natural Resources Conservation and Development Main Department. It has been proposed that all research within this department should be put together in a new organization (National Resources Research Institute - NRRI). No formal decision on the establishment of the NRRI has yet been taken. Irrespective of the future organizational structure, the need to strengthen and further expand forestry research is strongly felt.

SRC is a weak organization both in terms of qualified staff and funds. It cannot fulfill the demands for solutions to forestry problems that have come up as a result of the large programmes to stabilize the environment, to produce fuelwood and to establish new forests.

During the annual SIDA forestry sector review in April 1987 it was agreed that the best support to SRC's work would be a permanent and long-term cooperation between SRC and the Swedish University of Agricultural Sciences. Such cooperation would be based on a long-term agreement. The SIDA allocation to SRC for 1987/88 should be seen as the first step in its support to such long-term cooperation. It is expected that SIDA and SAREC would agree to jointly finance such a long-term programme of cooperation. This proposed consultancy is expected to provide basic information and suggestions for the continued discussion of the scope and content of the future programme of cooperation and its financing. SUAS should second two qualified researchers (at least one of them a silviculturalist) for about two months to work with the NRCD-MD on the preparation of the document.

##### Terms of Reference:

The team shall prepare a document that can be used by NRCD-MD and SIDA, to decide on the utilization of the indicative SIDA support to SRC for 1987/88 and that can be used by NRCD-MD, SAREC and SIDA in their discussions of future support to silviculture research in Ethiopia.

In particular the team shall:

12.1.1988

- review the 1986/87 research programme and budget utilization,
- prepare an inventory and description of on-going research activities and evaluate them with respect to their relevance to forestry development in Ethiopia,
- prepare an inventory of existing facilities and resources, including existing staff and staff on training and evaluate their present use and potential usefulness,
- identify existing constraints to the efficient implementation of the research activities,
- prepare a proposal for a research and manpower development programme. The proposal should cover the first five-year period of planned 15-year cooperation. It should be based on the findings and recommendations of the September 1986 NRRRI-mission and any subsequent developments. The proposal should indicate research priorities, indicate how they can expand over a 5-10 year period, indicate staff development needs and provide cost estimates,
- propose a work programme and budget for 1987/88 that will be in line with the long-term proposal.



12.1.1988

APPENDIX A.2 INSTITUTIONS AND PERSONS CONTACTED

OFFICE OF THE NATIONAL COMMISSION FOR CENTRAL PLANNING

Mr. Gedion Asfaw	Head, Natural Resources and Human Settlement
Dr. Solomon Berhe	Team Leader, Forestry and Soil Conservation Team

MINISTRY OF AGRICULTURE

NATURAL RESOURCES CONSERVATION AND DEVELOPMENT MAIN DEPARTMENT

Mr. Bo Göransson	Programme Coordinator
Mr. Gustav Fredriksson	Manpower Development Coordinator
Ms. Karin Fahlström	Associate Expert, Manpower Dvt

Community Forestry and Soil Conservation Development Department (CFSCDD)

Mr. Kebede Tatu	Head, CFSCDD
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State Forest Conservation & Development Department (SFCDD)

Mr. Hailu Sharew	Head, SFCDD
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Munessa Industrial Forestry Project

Mr. Peder Nilsson	Forest Utilization Expert
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Land Use Planning & Regulatory Department (LUPARD)

Dr. Ermias Bekele	Head, LUPARD
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Natural Resources Conservation and Development Department, Southern Zone

Mr. Deribe Gurmu	Head, NRCDD Southern Zone.
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Forestry Research Centre (FRC)

Mr. Berhanu Hika	Head, FRC
Mr. Aregawi Belay	Agroforestry Research Coordinator
Mr. Mebrate Mihretu	Field Research Coordinator
Mr. Tesfaye Bekele	Junior Forestry Research Expert, Southeastern Zone

Forestry Training Institute, Wondo Genet (FTI)

12.1.1988

Mr. Aberra Ashinay	Principal
Mr. Sven Sjunnesson	Head of Academic Affairs
Mr. Abera Sahle	Assistant of Head of Academic Affairs
Mr. Klas Österberg	Teacher, Soil Conservation
Mr. Carl-Gustaf Dahlin	Expatriate Lecturer, Silviculture
Mr. Zebene Asfaw	Assistant Lecturer, Silviculture
Mr. Per Rudebjär	Lecturer, B.Sc course
Mr. Johan Palm	Lecturer in Management & Mensuration

Soil Conservation Research Project (SCRP)

Mr. Kefeni Kejele	National Director
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Ethio-German Reforestation Project (GTZ)

Dr. George Conn	Project Coordinator
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GOE/World Bank Addis-Bah Forestry Development Project

Mr. Woldekidan Nerie	Project Manager
Mr. Robert CD Bowles	Senior Forestry Expert
Mr. Gezahegn Negussie	Forestry Research Head
Dr. Alastair I. Fraser	Forestry Research Expert
Mr. Thomas Wormold	Consultant, Addis Ababa Plantations
Mr. Michael A. Russell	Planning, Monitoring & Evaluation Adviser

GOE/African Development Fund Addis-Ababa Fuelwood Plantation Project

Mr. Demissie Lisanewerk	Project Manager
Mr. Ingvar Westergren	Plantations Specialist

Institute of Agricultural Research (IAR)

Dr. Seme Debela	General Manager
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Wood Utilization and Research Centre (WUARC)

Mr. Melaku Abegaz	Head, WUARC
Mr. Demille Retta	Head, Seasoning and Preservation Section

Rehabilitation and Rural Development in Welo

Mr. Anders Tivell	Consultant
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SILVIVO Forest Plantation Project

Mr. Matti Heikinheimo	Project Manager
Mr. Kaj Wessman	Plantation Specialist

12.1.1988

ETHIOPIAN VALLEYS DEVELOPMENT STUDIES AUTHORITY

Dr. Zewdie Abate                      General Manager

UNIVERSITY OF ADDIS ABABA

Prof. Ayale Tirfie                      College of Social Sciences & Institute  
of Development Research  
Prof. Jukka Lehtinen                      Senior Adviser, Institute of  
Educational Research (IER)

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

Ms. Daphne Casey                      Assistant Resident Representative  
(Programme), Agriculture

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (FAO)

FAO Office, Addis Ababa

Dr. Michael Friesenegger Programme Officer (Socio-Economist)

Forestry Department, Rome

Ms. Christel Palmberg                      Chief, Forest Management Branch  
Mr. Mafa E. Chipeta                      Forestry Officer, Operations Service  
Mr. Ralph Schmidt                      Forestry Officer, Forest Management

FAO/World Bank Cooperative Programme

Mr. Andrew MacMillan                      Senior Adviser

Agricultural Services Division

Mr. K.-H. Friedrich                      Farming Systems Officer

FINNISH EMBASSY

Mr. Antti Rantala                      Development Cooperation Secretary

INTERNATIONAL LABOUR OFFICE, GENEVA

Dr. Peter Poschen                      Forest Engineer

INTERNATIONAL DEVELOPMENT RESEARCH CENTRE, NAIROBI

Dr. Ron D. Ayling                      Program Officer, Forestry

UNITED NATIONS SUDANO-SAHELIAN OFFICE

Dr. Veli Pohjonen                      Fuelwood Plantation Project  
Coordinator



12.1.1988

APPENDIX A.3 MISSION PROGRAMME

- 09.11. Briefing, Swedish University of Agricultural Sciences;  
Prof. Nils-Ivar Isaksson, Mr. Johan Toborn, KJM & JEN
- 10.11. Briefing: NRCDD; Mr. Gustav Fredriksson, KJM & JEN
- 11.11. Visit and Meetings: Forestry Research Centre; Mr. Berhanu  
Hika, Mr. Aregawi Belay, Mr. Bo Göransson, Mr. Gustav  
Fredriksson, KJM & JEN
- 12.11. Meeting: Institute of Agricultural Research; Dr. Seme  
Debela, Mr. Berhanu Hika, KJM & JEN
- Visit and Meeting: Wood Utilisation and Research Centre;  
Mr. Melaku Abegaz, Mr. Demille Retta, Mr. Berhanu Hika,  
KJM & JEN
- Meeting: Forestry Research Centre; Mr. Mebrate Mihretu,  
KJM & JEN
- Meeting: Soil Conservation Research Project; Mr. Kefeni  
Kejela, Mr. Mebrate Mihretu, KJM & JEN
- Meeting: Food and Agriculture Organization of the United  
Nations; Dr. Michael Friesenegger, KJM & JEN
- 13.11. Meeting: United Nations Sudano-Sahelian Office, Fuelwood  
Plantation Project; Mr. Veli Pohjonen, KJM & JEN
- Meeting: State Forest Conservation & Development  
Department, and GTZ Forestry Project; Mr. Hailu, Dr.  
George Conn, KJM & JEN
- Meeting: Finnish Embassy; Mr. Antti Rantala, KJM & JEN
- 14.11. Meeting: World Bank Forestry Project; Dr. Alastair  
Fraser, Mr. Gezahegn Negussie, Mr. Berhanu Hika, KJM &  
JEN
- 16.11. Meeting: Office of the National Commission for Central  
Planning, Natural Resources and Human Settlement; Mr.  
Gedion Asfaw, Dr. Solomon Berhe, Mr. Berhanu Hika, KJM &  
JEN
- Meeting: SFCDD; Mr. Hailu Sharew, Mr. Deribe Gurmu, Dr.  
George Conn, KJM & JEN.
- Briefing of Mr. Gustav Fredriksson: KJM & JEN

12.1.1988

- 17.11. Meeting: Land Use Planning & Regulatory Department; Dr. Ermias Bekele, Mr. Berhanu Hika, KJM & JEN
- Informal Discussion: World Bank Forestry Project; Dr. Alastair Fraser, Mr. Thomas Wormold, KJM & JEN
- Meeting: Ethiopian Valleys Development Studies Authority; Dr. Zewdie Abate, Mr. Berhanu Hika, KJM & JEN
- 18.11. Informal SIDA Discussion: Mr. Bo Göransson, Mr. Gustav Fredriksson, KJM & JEN
- Informal discussion: World Bank Forestry Project; Dr. Alastair Fraser, Mr. RCD Bowles, KJM & JEN
- Meeting: World Bank Forestry Project; Mr. Woldekidan Nerie, Mr. Berhanu Hika, KJM & JEN
- 19.11. Meeting: World Bank Forestry Project; Mr. RCD Bowles, Mr. Thomas Wormold, Mr. Michael Russell, KJM & JEN
- Meeting: SILVIVO Forest Plantation Project; Mr. Matti Heikinheimo, Dr. Veli Pohjonen, KJM & JEN
- Meeting: Lutheran World Federation/World Service; Mr. Paavo Färm, Mr. Matti Heikinheimo, KJM & JEN
- 20.11. Visits: Agrisilviculture and Fencing Trials near Dukem; Mr. Mebrate Mihretu, KJM & JEN
- Visit: Forest Tree Species Trials at Asela; Mr. Tesfaye Bekele, Mr. Mebrate Mihretu, KJM & JEN
- Drive skirting Munessa State Forest
- Informal Discussion: Forestry Training Institute, Wondo Genet; Prof. Ayale Tirfie, Mr. Klas Österberg, Mr. Per Rudebjär, KJM & JEN
- 21.11. Visit: Forestry Training Institute, Wondo Genet; Mr. Sven Sjunesson, Mr. Carl-Gustaf Dahlin, Mr. Klas Österberg, Prof. Ayale Tirfie, Mr. Abera Sahle, Mr. Zebene Asfaw, KJM & JEN
- Visits to Hamulo Forest Plantation Trials and Jigesa Sawmill (Shashamene), and Meki Forest Plantation Trials; Mr. Mebrate Mihretu, KJM & JEN
- 22-23.11. Report Drafting; SIDA Guest House & FRC
- Briefing: SIDA Development Cooperation Office; Mr. Bo

12.1.1988

Stenson, KJM & JEN

24.11. Meeting: Addis Ababa Fuelwood Project; Mr. Demissie Lisanewerk, Mr. Ingvar Westergren, Mr. Berhanu Hika, KJM & JEN

25-30.11. Report Drafting; SIDA Guest House & FRC

30.11. Meeting: FAO Office; Dr. Michael Friesenegger, KJM & JEN

1.12. Report Review: FRC; Mr. Berhanu Hika, KJM & JEN

2.12. Report Redrafting; KJM & JEN

Meeting: UNDP Office; Ms. Daphne Casey, Mr. Berhanu Hika, KJM & JEN

3.12. Report Redrafting; KJM & JEN

4.12. Report Review Meeting: FRC; Mr. Kebede Tatu, Mr. Hailu Sharew, Mr. Melaku Abegaz, Mr. Lars Leander, Mr. Bo Göransson, Mr. Gustav Fredriksson, Mr. Alastair Fraser, Mr. Berhanu Hika, KJM & JEN

Meeting: Lutheran World Federation/World Service; Mr. Paavo Färm, KJM & JEN

5-6.12. Report Redrafting; KJM & JEN

6.12. Meeting: International Development Research Council (IDRC); Dr. Ron Ayling, Mr. Berhanu Hika, KJM & JEN

7.12. Meeting: Alemaya Forestry Education Mission; Prof. P.-O. Bäckström, Ms. Marianne Wibom, Mr. Johan Toborn, JEN

Meeting: UNDP; Ms. Daphne Casey, KJM

8.12. Meeting: FRC; Mr. Berhanu Hika, KJM

Meeting: LWF; Mr. Paavo Färm, KJM & JEN

10.12. Meetings: FAO Forestry Department; Ms. Christel Palmberg, Mr. Mafa Chipata, Mr. Ralph Schmidt, KJM

11.12. Meeting: FAO Investment Centre; Mr. Andrew MacMillan, KJM

Meeting: FAO Agricultural Services Division; Mr. K.-H. Friedrich, KJM

12.1.1988

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GRANHOF, J.J. 1985. Report /to DANIDA/ on an official journey for DFSC to Ethiopia. December 2-10, 1985. (Main contact: Forest Research Centre).

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12.1.1988

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ÖRLANDER, GÖRAN 1986. Growth of Some Forest Trees in Ethiopia and Suggestions for Species Selection in Different Climatic Zones. Research Note No. 2. Forestry Research Center, Addis Ababa. 52 p.

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SIDA LANTBRUKSBYRÅN 1981. Review Mission of the Forestry Development Programme 13-26 March 1981. 6 p. + many appendices.

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12.1.1988

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STATE FOREST DEVELOPMENT AGENCY & MINISTRY OF AGRICULTURE FORESTRY DIVISION 1974. A National Forestry Programme for Ethiopia. Phase One. A Three-Year Development Project. Addis Ababa. 66 p + appendices.

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Ministry of Forestry  
Research

APPENDIX A.5 EXTRACT FROM THE TEN YEAR PERSPECTIVE PLAN  
(1984/85..1993/94)

(unofficial translation received by the Mission)

NATIONAL FOREST RESOURCES DEVELOPMENT PLAN

1. Objectives

One of the main objectives of the Ten Year Development Plan is the conservation, development and rational utilization of the nation's renewable resources such as forests, soils, water, and wildlife. Quantitative and qualitative improvement of such resources is given a priority.

With a view to counteracting the negative effects of deforestation on the environment and on general development, and because of the substantial contribution the forestry subsector is capable of making to the country's overall development, all aspects of forestry development, including reforestation and afforestation, wildlife, soil and water conservation, research and training will be given high priority.

2. Strategy

In order to realize the above overall objective, the National Forestry Resources Development Plan will incorporate the following main strategies.

- Survey, demarcation and inventory of the country's main natural forests
- Afforestation of denuded catchment areas
- Conservation and reforestation of natural forest areas
- Launching a nation-wide community forestry programme
- Establishment of fuelwood plantations around major urban centers
- Enclosure of highly eroded areas for natural regeneration
- Conservation, development and rational utilization of wildlife and parks
- Production of food and non-wood forest products for domestic and export markets
- Mobilization of community labour for afforestation and soil and water conservation programmes

- Strengthening of forestry research services
- Establishment of training centers for graduate and middle level forestry development workers, as well as centers for peasant training in forestry and soil and water conservation matters.

### 3. Main Targets

The targets set in Table 1 for forest products refer only to production by forest products enterprises operating under the Ministry of Agriculture. The production targets of wood enterprises operating under the Ministry of Industry, private enterprises and the forest products of Peasant Associations are not included.

### 4. Major Projects and Programmes

- Survey, demarcation and inventory of natural forests. 21 major natural forest areas covering approximately 4 million ha are to be surveyed and demarcated.
- Natural forest conservation and development. 250 000 ha are to be planted for industrial wood production purposes (sawlogs and pulpwood).
- Urban fuelwood plantations. 475 000 ha of fuelwood plantations are to be established around major urban centers with fuelwood shortages.
- Community forestry programme. Peasant Associations and Urban Dwellers' Associations are to establish about 1 300 000 ha of woodlots throughout the country primarily for their own needs of firewood and construction poles.
- Forestry research. The forestry research service is to be strengthened to conduct trials and support the various afforestation programmes in the selection of suitable species as well as other aspects of forestry. Research will also be carried out with respect to logging, sawmilling and utilization of wood and minor forest products.
- Wildlife conservation and development. 10 national parks and other wildlife reserve areas are expected to be established up to a reasonable standard within the plan period. The plan also envisages an improvement in various aspects of wildlife management and utilization. A research center is to be established. The establishment of game ranches is expected, as well as an expansion of crocodile farms, mainly for export.

12.1.1988

- Forestry training. It is planned to establish a Natural Resources Institute for graduate training, strengthen the Wondo Genet Forest Rangers Training Institute and open a number of centers for training Peasant Association members in different aspects of natural resources conservation and development.
- Forest products enterprises. The plan envisages the strengthening of the forest product enterprises operating under the Ministry of Agriculture and as a result increasing the production of various forest products including natural gum and resins for export.

## APPENDIX A.6

### FORESTRY RESEARCH DEVELOPMENT PROGRAMME, AND DRAFT PROJECT DOCUMENTS

#### 1. BACKGROUND

##### 1.1 Forestry Sector Activities and Priorities

The Government of the People's Democratic Republic of Ethiopia (GOE) estimates that wood fuel at market prices represents about 5%, and the rest of forestry about 2% of the GDP of traded products. The sector employs directly some 35,000 persons in Government and industry, and some 400,000 persons in commercial wood fuel harvesting, processing and distribution.

Current estimates indicate that about 10% of the 24 million m<sup>3</sup> of wood extracted annually is used for construction (1 million m<sup>3</sup>), pole (1 million m<sup>3</sup>), and other industrial (0.15 million m<sup>3</sup>) needs. The rest is used for charcoal (1.6 million m<sup>3</sup>) and fuelwood (20 million m<sup>3</sup>).

Forest is reported to have covered 37% of Ethiopia's land area at the turn of the century, about 16% in the early 1950's, and now about 2.7%. The forest area has been decreasing at a rate of about 100,000 ha/a. The ways and means to maintain and develop forest cover have not been fully solved.

The use of forest products and services is limited by supply, resulting in a high cost in money and human effort, in limitations to national and regional development caused by scarcities, and in environmental degradation.

Both wood fuel/building pole and industrial wood supply in Ethiopia is inadequate for future needs (Annexes 1 and 2), and development would require concerted research support. About three quarters of the development work should be directed to the community forestry sector, and the balance to the State forestry sector. The needs can be roughly classified into two categories: those in the social and economic, and those in the physical, biological and technological fields of work. Especially the social and economic aspects of development require added attention.

The utilization of industrial forest stands has received inadequate research support; especially the dynamics of stand management and wood processing, and the mechanisms of product distribution and end use. Forest industrial products are expensive compared to international price levels, indicating a low level of resource use efficiency, and especially in relation to what Ethiopians can

12.1.1988

afford.

Considerable information applicable to forestry sector development has been accumulated in the past, but it is poorly accessible or usable, and poorly developed for decision making. Consequently pressure on information collation and analysis is growing especially in:

- the consolidation of existing information into a form usable by forestry practice, and
- a rapid buildup of additional management and utilization information for decision-making in forestry and wood utilization.

### 1.2 Past Research and Development Activities and their Results

An Ethiopian Forestry Research Institute was first established at the Addis Ababa University Faculty of Science in 1961 with German and US support. After the end of external support, the Institute was disbanded in 1967.

Forestry research has been included in the SIDA supported forestry development programmes since support to the sector was first begun in the early 1970's. Before this, much trial work had been done in Ethiopia, most notably the one leading to the introduction of eucalypts around 1895. ODA has supported work in forest inventory and resource assessment in 1972..1979, and in forestry development planning, including the planning of research and investigations, especially from the early 1950's through the 1970's.

In 1975, UNDP/FAO supported GOE in starting a Forestry Research Centre, and initiated a research programme based on FAWCDA plans prepared with ODA support, mainly in support of reforestation in the north. In 1979..1982; a second phase of UNDP/FAO support was mainly directed to the FRC seed centre and species trials on various sites. After the termination of UNDP/FAO support, the main sponsor of FRC research has been the International Development Research Centre (IDRC) of Canada, supporting agroforestry trials and fuelwood survey, and seed centre development outside forestry research proper, in a 1984..1987 project.

A Wood Utilization and Research Centre was started in 1978 to improve the efficiency of Ethiopian wood and woodbased product utilization. It has been partly supported by foreign funding, including SIDA funding from 1984 onwards.

### 1.3 Current and Planned Forestry Sector Research Related Activities

FRC is carrying out studies related to species and provenance elimination trials, seed, nursery techniques, agroforestry research and extension, and fuelwood survey. Its central facilities include

12.1.1988

a seed centre, nursery, arboretum, library. It has several field offices, and many experimental sites in all agroclimatic zones of Ethiopia.

FRC's work programme in the silvics and management of forest stands, the preparation of yield tables, forest inventory, and in forest management planning can not be implemented to an appreciable degree due to limitations in staff and facilities.

WUARC, partly with SIDA support, studies wood properties, and wood seasoning and preservation. The institutional incorporation of WUARC into an expanded FRC is planned; an expansion in its work programme to cover utilization technology and economics more comprehensively has also been discussed.

The Land Use and Regulatory Department is carrying out studies, especially in the highlands, on land use for various crops and other ends. For forestry land use planning, the Department has a shortage of information on land productivity under various systems.

The Institute of Agricultural Research has an agricultural and livestock husbandry research programme, increasingly catering to the needs of the farmer. It has a Board of Directors composed largely of Ministers or Commissioners at the national level, and a system of Zonal Research Extension Liaison Committees for research prioritization. Committees in five of the eight zones are operational. Research infrastructure is still limited, but it is under development. Except for some work in agroforestry, the Institute is not set up to cater for forestry research.

Practical trials and studies are carried out by all NRCMD departments in support of their regular activities. FRC is currently not involved in the design of this work, nor do mechanisms exist for making its results available for general research and development work.

The GOE, in cooperation with IDRC, UNSO, SIDA, GTZ, FINNIDA and Swiss institutions have made some trials and measurements in development projects, and are planning further studies and development work. WB/IDA has an appreciable applied-research component in their project. UNDP/FAO and NORAD are planning support for future FRC activities.

IDRC of Canada is financing Seed Centre staff and programme development, agroforestry trials and a wood fuel consumption study. These are executed by FRC.

UNSO supports fuelwood and pole projects, both in State and community forestry, in cooperation with the GOE, FINNIDA and DANIDA. DANIDA has identified a possibility of funding a forest tree seed project through UNSO, for the development of the seed centre at FRC. This would be supported by subregional FAO seed



12.1.1988

centre development coordination, headquartered in Djibouti, in which the Ethiopian centre would be one of the basic units.

SIDA has started supporting studies, development, demonstrations and training in community forestry at the Mertule Maryam Centre.

SIDA has also supported, since 1976, practical studies in various aspects of forestry, including wood utilization, at the Wondo Genet FTI. The studies have been designed to provide an integrated view of primary production operations in the sector.

The SFCDD, in cooperation with GTZ, has started building models of various forestry sector operations, to serve as tools for practical decision making.

The CFSCDD, in cooperation with the University of Bern, has studied the use of forest and other vegetation in soil and water conservation, especially in community lands in the Ethiopian highlands.

The WB/IDA studies will be carried out in cooperation with the FRC. They will cover the raising of planting stock (except the use of organic growing media), planting and fertilizing techniques, plantation design trials, rotation determination for eucalypt stands, and trials with windbreaks, fodder trees and boundary tree effects on agricultural crops.

UNDP through FAO has submitted a proposal for six month Preparatory Assistance, in Forestry Conservation and Reforestation, to the Forestry Research Centre. The stated purpose is to clarify the present status, constraints and future direction of forestry research in Ethiopia as a basis for a project document for UNDP/FAO assistance. An adjustment in the content of this Assistance is probable.

NORAD has indicated its willingness in principle to finance the establishment and development of two FRC field stations, one starting in 1988 and the other in 1989.

The International Labour Organization (ILO) is planning a study of wood fuel transport (primarily manual, by women) in the Addis Ababa area. It is likely that the study will be carried out by Addis Ababa University, and in cooperation with the FRC, and the Addis-Bah, Addis Ababa Fuelwood, and UNSO Projects.

## 2. RESEARCH NEEDS AND PRIORITIES

### 2.1 Needs and Priorities Determined in National Development Policy for the Forestry Sector

National forestry sector development policy is determined in four documents: the Ten Year Perspective Plan for 1984/85 - 1993/94,

12.1.1988

the Forest and Wildlife Conservation and Development Proclamation No. 192/1980, the Three Year Plan, and the National Forestry Campaign carried out by communities.

The Ten Year Perspective Plan lists the following nine major projects/programmes:

- (a) Survey, demarcate and inventory 21 major natural forest areas covering 4 million hectares
- (b) After demarcation of forest areas, resettle persons living in the area outside its boundaries and employ them to a maximum in forest work
- (c) Establish and tend 250 000 ha of sawlog and pulpwood plantations in clearfelled natural forest areas
- (d) Establish 475 000 ha of peri-urban fuelwood plantations
- (e) Peasant Associations and Urban Dwellers' Associations to establish 1.3 million hectares of firewood and construction pole plantations
- (f) Strengthen the forestry research service to carry out forestry and forest and wood utilization research
- (g) Establish wildlife reserves, improve wildlife management and utilization, and establish game ranches
- (h) Establish a graduate forestry faculty, strengthen forest ranger training, and open natural resources conservation and development training centres for Peasant Association members
- (i) Strengthen forest products enterprises under MOA and increase forest products production and export

## 2.2 Implied Needs

The strategy and programmes in the Ten Year Perspective Plan (TYPP) outline

- the close connection between forestry and soil conservation in both community and Government projects,
- the close connection between physical/biological and social/economic measures in development, whether plantations or other forestry sector development, and
- the need to tie silvicultural, including ecological and genetic information on plantation management, with information on the properties of tree species and woods.

The strategies, methods, and techniques which would satisfy the implied needs can be developed by a research organization covering

12.1.1988

the following areas of study. This way of identifying research fields results in a structure of work which differs from that carried out to date. It does still give much importance to the work already carried out:

- (a) Social and economic studies emphasizing community development and the use of land, and forest products and services, by communities (TYPP programmes a..e)
- (b) Land capability classification, including soil and climatic site descriptions, optimum crops for the site, and protection needs and values (TYPP programmes a..e)
- (c) Forest inventory, biometry, and experimental design and analysis (TYPP programmes a, c, and d)
- (d) Technological studies of forest management and utilization activities (TYPP programmes b..e, i)
- (e) Species, variety, and provenance trials and selection, for specific sites and social/economic conditions, and for various end uses (TYPP programmes e..e)
- (f) Soil conservation, erosion control, and agroforestry studies (TYPP programmes b, d, e)
- (g) Economic, financial and market/end use/marketing studies of forest products manufacture, including poles, wood fuel, and industrial wood products (TYPP programmes c..e, i)
- (h) Wildlife/game ecology and management (TYPP programme g)

### 2.3 Timing Strategy and Priorities

The following timing strategy of forestry research programmes considers the scarcity of resources for research and the long time required to develop them to the desired level. It is however important that the programme addresses three types of needs from the start:

- incorporating existing data from past and related research into an information base,
- broad development strategy studies, and
- specific research, which addresses new critical implementation needs.

Research information would be stored and analysed in the context of regional, sectoral and lower-scale models and modules. The structure of these can largely be extracted from research done abroad and adapted to Ethiopian conditions. They will enable putting the data in context.

12.1.1988

It is also important that problems are identified and solved by the combined use in research of

- Economic and social,
- Technological, and
- Biological analysis,

and that communication to and from the research community is done by specialists in

- Information.

The following research and studies programme has been drawn up on the basis of national development priorities and the above considerations:

Phase I. Pre-Programme Assistance Period  
Research and Project Data Bank & Information System

- Provisional data and model hierarchy, and input, storage and retrieval systems for a Research and Decision Making Data Bank, and a Development Project Information System
- Initial data and information input into the Data Bank and Project Information System
- Retrieval of preliminary plantation planning reports from the Data Bank and Project Information System

Nursery Trials

- Design and initiation of developed nursery plantation stock growing trials at Shola and cooperating nurseries

Social Research in Forestry: Action Programme

- Review of needs and findings concerning the social aspects of forestry development in Ethiopia: proposed research action programme

Phase II. Project Start-Up Phase. Years 1..2

Species Selection for Plantations

- Reworking and supplementing information from existing species and provenance trials to include site description, production utilization value, and stand management data
- Preparation of a provisional species selection manual for large scale planting in Ethiopia

12.1.1988

Economics, Statistics, and Research Priorization

- Initiation of a research development programme in economics and forest management, including research priorization and the decision making needs in forestry practice
- Review, updating and publication of information on forestry sector production, utilization, and trade statistics for Ethiopia

Nursery Practice Manual

- Revised nursery practice manual for Ethiopia

Studies on Social Issues in Forestry

- Study on the social issues of wood fuel and construction pole production and utilization
- Review of how social issues can be covered in forest management plans

Biofuel Development Trials

- Study and trials on the complementary production and use of biofuels from wood and agricultural residues

Phase III. Medium Term Project Development, Years 3..5

Species Selection for Plantations

- Complementing and supplementing the information data base on species and provenance trials
- Revised and updated species selection manual for large scale planting in Ethiopia

Community Forestry Development

- Research on the silvic, technological, social and economic aspects of adapting community, soil conservation planting and agroforestry systems to Ethiopian conditions
- Preparation of a provisional manual for applying community and soil conservation forestry, and agroforestry systems in Ethiopia

Forest Management

- Research on the management of plantations and natural forest stands
- Studies in the protection of forests, logs, and forest products

12.1.1988

- Research in site productivity classification for forest and agroforestry crops

#### Forest Industries Development Studies

- Studies in the technological and economic feasibility of forest industrial development alternatives

#### Market/Marketing Studies

- Forest products market and marketing studies

### 3. PROJECT CONTENT AND JUSTIFICATION

Forestry and related natural resources research will be developed by building up the Forestry Research Centre institutionally to properly cover research planning and coordination, and information and research support services, and to acquire the capability needed for priority research. This will be done within a project system consisting of one central and several related, but essentially autonomous, building block type components. The system will allow inputs into research from various Ethiopian and international sources, as long as coordination is ensured. Inputs can consist of research contracted from the FRC under separate budgets, or work done externally with FRC coordination.

#### Central component

The central component of the Project is built on long term institutional cooperation between the Swedish University of Agricultural Sciences and the Natural Resources Conservation and Development Main Department of the Ministry of Agriculture. The component consists of the development of staff and facilities of the Forestry Research Centre, the provision of developing research methods, and intermittent specialist support services.

#### Justification

The development of the institutional framework and relations is a long term institution building exercise. This is also true for the research programme: its structure, content, quality, and impact on governmental and non-governmental forestry sector operations.

Research staff development for FRC, complemented by developing the facilities for its work, will only have started in the time period of a normal project (5-6 years or less). It will require 10..20 years for the FRC programme. The volume of formal training will need to be phased to a pace in line with the institutional absorption capacity, and sandwiched between intensive on-the-job training and real life confrontations.

The model provides continuity also in institutional and specialist support.

12.1.1988

Building Block Component    Justification

- Building an information centre consisting of a data bank for existing and planned research data, a user-oriented retrieval system, and an expanded documentation centre/library, both catering to the needs of research users;
- Developing the existing seed centre facilities, and competence to include information on seed properties, handling and treatment methods, and the site requirements and end use properties of species, and provenances;
- Creating a service translating the results of research and development work into implementation guidelines at household, community, zonal, and national levels, and to making them available to technical and decision/policy makers in published form; and
- Establishing a contract research facility for studies financed by external governmental and non-governmental entities
- Considerable research information from past research carried out by the Forestry Research Center and other institutions in Ethiopia and abroad can and should be compiled and stored in a data bank in a form readily accessible to users of research information in Ethiopian development projects. Retrieval should be in a form common to that standardized internationally.
- The Shola Seed Centre has been developed into a national seed service. With improved facilities and capacity, the incorporation into the Research Centre, and the ability to certify the quality of the seed to meet users needs, development will minimize the need for foreign exchange for seed procurement and ensure the optimality of the seed for users' needs.
- This facility will ensure the direct utilization of research results for practical implementation in the forestry and related sectors.
- The Forestry Research Centre will provide the facilities to carry out user-specific studies in projects not included in its regular budget, but critical for the implementation of priority studies in the forestry/natural resources sector.

12.1.1988

#### 4. PROGRAMME OBJECTIVES

##### 4.1 Development Objective

Optimum contribution of the forestry sector to the national economy, in harmony with general economic policy, requiring

- the balanced use of land for purposes including forestry, and maximum production on forest land, in relation to the production potential;
- an optimum structure of products and services from forest and agroforestry land, in relation to needs; and
- the economic viability of activities in forestry and the forest industries.

##### 4.2 Immediate Objectives

Reliable and Accessible Information Base for Decision Making on Ethiopian Forestry Sector Development

Functional Institutional Structure for Forestry Practice Oriented Research

Research and Extension Publication Service

Research Support Service

Decision Making Information from Studies in High Priority Subject Matter Areas

Competent and Experienced Forestry Sector Research Staff

#### 5. PROGRAMME IMPLEMENTATION STRATEGY

The groundwork for the Programme will be done in Year 0. This will be followed by a two-year startup phase and a three-year medium term development phase. Project Documents for subsequent Programme phases will be prepared at least six months before the termination of the preceding phase.

Research Cooperation Programme Strategy

Although planned for five years, the Programme is expected to continue in new phases beyond this period. This is due to the long time required for the maturation of many research and personnel development activities in the forestry sector. However the new phases, if considered appropriate, will have autonomous objectives and outputs.



12.1.1988

### Draft Project Documents

Draft Project Documents will be prepared for new high priority development activities during the programme. For programme continuation, planned to start in 1993, the draft will be produced for appraisal by the end of 1992.

## 6. SUMMARY OF PROGRAMME INPUTS FROM THE GOVERNMENT OF ETHIOPIA

The Ministry of Agriculture, through the Natural Resources Conservation and Development Main Department, will provide the following national personnel, office facilities, and the local Programme operating costs not provided by external financing agencies:

### Personnel (Terms of Reference in Annex 7)

- Programme Director/National Coordinator
- Information Development and Management Officer
- National Publications Specialist/Editor
- Statistician/Experimental Design Officer
- Forestry/Forest Industries Economist
- Other Research Leaders, Officers and Assistants as outlined in Table 1
- Administrative and clerical support personnel and drivers

### Office Facilities

- Offices for national and expatriate Project staff

### Local Project Operating Costs

- Telephone, electricity and postal charges
- Customs duties and clearing charges for Project-related supplies, materials and equipment
- Travel and subsistence allowances for Project-related national staff travel within Ethiopia

12.1.1987

Table 1. ESTIMATED FORESTRY RESEARCH CENTRE STAFF NEEDS (LOCAL STAFF ONLY)

FIELD	EXISTING				SHORT TERM				
	PROJ.	LDR	RES.	OF CR TECH. PER TOTAL	PROJ.	LDR	RES.	OF CR TECH. PER TOTAL	
FOREST MANAGEMENT					1		1	2	4
SILVICULTURE	4		10	7	21	4	10	10	24
SOIL SCIENCE					0	1	0	2	3
ECOLOGY					0				0
PROTECTION					0				0
TECHNOLOGY					0	1		2	3
ECONOMICS					0	1		2	3
STATISTICS					0	1		2	3
COMMUNITY DVT /EXTENSION					0		1	2	3
DIRECTION	1				1	1	1		2
<b>TOTAL</b>	<b>5</b>	<b>10</b>	<b>7</b>	<b>22</b>	<b>10</b>	<b>13</b>	<b>22</b>	<b>45</b>	
	MEDIUM TERM				LONG TERM				
	PROJ.	LDR	RES.	OF CR TECH. PER TOTAL	PROJ.	LDR	RES.	OF CR TECH. PER TOTAL	
FOREST MANAGEMENT	1		1	2	4	1	2	6	4
SILVICULTURE	4		10	10	24	4	10	12	26
SOIL SCIENCE	1		0	2	3	1	1	3	5
ECOLOGY	1		1	2	4	1	1	4	6
PROTECTION	1		0	1	2	1	1	3	5
TECHNOLOGY	1		0	2	3	1	2	5	8
ECONOMICS	1		1	3	5	1	2	4	7
STATISTICS	1		0	2	3	1	1	3	5
COMMUNITY DVT/EXTENSION	1		1	4	6	1	2	6	9
DIRECTION	1		1	1	3	2	1	2	5
<b>TOTAL</b>	<b>13</b>	<b>15</b>	<b>29</b>	<b>57</b>	<b>14</b>	<b>23</b>	<b>48</b>	<b>85</b>	

12.1.1987

## 7. Draft Project Documents

### 7.1 MAIN PROGRAMME COMPONENT: RESEARCH AND MANPOWER DEVELOPMENT

Title: Forestry Research and Manpower Development Project

Project Period: 1988-1993

Ethiopian Implementation Agency: Ministry of Agriculture  
Natural Resources Conservation &  
Development Main Department

External Financing Agency: Swedish International Development  
Authority

Swedish Implementing Agency: Swedish University of Agricultural  
Sciences

Swedish Contribution: SEK 23.0 million

Ethiopian Contribution: BIRR 3.7 million

OBJECTIVE: Staff and organization with the competence, capacity and experience to carry out the research programmes required for forestry sector decision making

OUTPUT: An FRC research programme providing information in the required fields of field action, carried out by capable professional Ethiopian research staff

#### RATIONALE:

The research programme of FRC is presently concentrated to some aspects of silviculture and to seed handling. The Centre is also extremely short of academically trained staff (2 M.Sc., 2 B.Sc.), none of which have a background in forestry practice. As fully trained forestry research staff can not be recruited within the country, any development of research must be closely linked to a manpower development programme. Previous experience of research projects being discontinued upon the departure of expatriate, long term research specialists makes an alternative solution mandatory.

12.1.1987

In line with agreed priorities, SUAS will assign specialists backed up by university departments for each research subject matter or project. The specialist will visit Ethiopia for 2-3 months per year, initiating and supervising research and giving instruction. While in Sweden, he/she will be responsible for FRC graduate students studying the subject matter at SUAS. Support is planned to continue for 15-20 years, with SUAS departments ensuring continuity as individual specialists change over the years.

On the average four new staff members will be recruited annually, each assigned to a specific research project. In order to ensure a minimum knowledge of forestry practice among the new research officers, as a rule only B.Sc. holders with top grades from Wondo Genet FTI should be recruited. After an introductory period of practical instruction and field work, followed by a qualifying examination, they will be admitted to M.Sc. studies organized by SUAS and carried out mainly in Ethiopia, but for 4 months in Sweden. During the whole training period, the studies will be combined with regular research work, supervised by the specialist, and result in a M.Sc. thesis defended in Ethiopia.

After a year of work and a qualifying examination, the best M.Sc. officers will continue their studies for a Ph.D., following the same model, but including two separate terms in Sweden. The theses will be defended at SUAS to ensure international acceptability.

No new field of research will be developed separately from the staff training programme, unless a well qualified Ethiopian subject specialist can be recruited. Even in this case, a SUAS specialist should be assigned to support the work for a number of years.

SUAS will also field two staff members on long term:

- a Senior Research Coordinator to advise on the development of the total research programme, to coordinate the activities in Ethiopia of the SUAS specialists, and to provide competence on general research project implementation,
- an Experimental Design and Statistical Analysis Specialist, to advise the research project teams and individual officers on the said subject matters.

These expatriates will also conduct training in basic research methods, as well as in their own fields of specialization when appropriate.

A review of social studies needs in forestry research will be carried out in the pre-project phase to assist in programme

12.1.1987

planning.

Much staff will be recruited to FRC, over the duration of the Programme, at the graduate and technical levels. Consulting services will be included into the Project, for three months per year,

- for the preparation of introductory in-service staff training materials and procedures, and
- for training senior FRC staff in management and development training.

Modern training techniques will be covered in this activity. It will include such elements as the principles of transactional analysis, and the use of case studies and simulation.

#### Timetable

##### PHASE I: YEAR 0: PRE-PROJECT ASSISTANCE

- a. Formulation of priority research projects (NFRB & FRC)
- b. Recruitment of first batch of B.Sc's (FRC)
- c. Elaboration and approval of M.Sc. curricula (SUAS)
- d. Review of needs and findings concerning the social aspects of forestry development in Ethiopia; proposed research action programme

##### PHASE II: ACTIVITIES IN PROJECT YEARS 1..2

- a. Initial research training
- b. Research programme preparation
- c. Study and thesis programming for individual staff members
- d. Basic courses
- e. Research work
- f. Provisional checklist of design features and manuals on research/experimental design and analysis

##### PHASE III: ACTIVITIES IN PROJECT YEARS 3..5

- a. Studies (4 months per M.Sc student) in Sweden
- b. Additional courses in Ethiopia
- c. Research work; preparation and defence of M.Sc. thesis
- d. Activities listed as a-e under Phase II for new batches of trainee staff members.
- e. Revised checklist covering basic research/experimental design and analytical procedures and manuals

#### Project (Development) Inputs from SIDA for Phase I

<u>Personnel</u>	Consultant	Person/months
	(Other Items are Covered by FRC Institutional Development)	3

12.1.1987

Project (Development) Inputs from SIDA for Phases II & III

	Person/months
<u>Personnel</u>	
- Senior Research Coordinator	60
- Specialist in Research/Experimental Design and Analysis	60
<u>For Terms of Reference see Annex 7</u>	
- Intermittent Research and Academic Advisory Services and Consultancies in:	
- Tree Species and Provenance Trials	
- Forestry and Forest Industries Economics	
- Information Management	
- Publishing/Editing	12
- Sociology/Social Anthropology	36
- Forest Soils	
- Forest Ecology	
- Community Forestry and Extension	
- Forest and Wood Protection	
- Silviculture	
- Seed Collection, Storage and Certification	
- Forest Research Administration and Management	
- Forest Management	
- Training of Trainers	15
<u>Equipment &amp; Miscellaneous</u>	
- Two 4WD Vehicles	
- One Microcomputer for Analysis	
- Four sets of inventory tools (compass, chain, calipers, hypsometer, diameter tape, long and short increment borer, simple relascopes, mirror relascope and stand, bark gauge, pentagon prism, soil probe, pocket stereoscope, map pouch)	
- Map preparation equipment (light table & drafting board, drawing tools, plastic film, planimeter, mirror stereoscope with movable pad)	
- Basic tools (machetes, saws, axes, barking spuds, extendable ladders, Baumvelo or other tree climbing equipment, etc.)	
- Camera and photographic materials	
Supplies & Materials	
Miscellaneous	

12.1.1987

7.2 PROJECT DESCRIPTION: INSTITUTIONAL DEVELOPMENT  
OF THE FORESTRY RESEARCH CENTRE

**OBJECTIVE:** Functional Institutional Structure for  
Forestry Practice Oriented Research

**OUTPUT:** Established communication and cooperation  
structure within forestry research, and  
between researchers and research users

**RATIONALE:**

The Project Preparation Team, and the users of research results and the GOE units involved in specific research, have underlined the need for an established formalized structure of research planning and implementation.

The proposed structure consists of a National Forestry Research Board, task forces for research planning and implementation in high priority programmes and projects, and a structure for research development catering for both national and regional needs.

The structuring of forestry research can be carried out, irrespective of whether the GOE decides to set up a Natural Resources Research Institute, or forestry sector research is done by a subsectoral setup. The analysis of subsectoral affinities however clearly requires that wood utilization research is brought under the FRC umbrella, and indicates that there are strong reasons to also include soil conservation under the same umbrella.

In order to contain research decision making and implementation within a manageable development implementation sector, the structure should be set up under the Natural Resources Conservation and Development Main Department of the Ministry of Agriculture.

The National Forestry Research Board would consist of the Heads of NRCMD Departments, and the persons in charge of research in major development projects. FRC would serve as the NFRB secretariat. The Board would decide on the national forestry research programme and allocate its implementation to the most suitable units, on research development activities, and on the setting up of research programme and project task forces.

The NFRB will be established in the first half of 1988, and will meet at least four times a year, chaired by the Vice Minister in charge of NRCMD. The preparation of the agenda or the coordination of this work, and of agenda items, will be the responsibility of FRC.

The establishment and startup of NFRB activities will be supported by UNDP/FAO Preparatory Assistance.

12.1.1987

Timetable

PHASE I: YEAR 0: PRE-PROJECT ASSISTANCE

- a. Establishing the National Forestry Research Board
- b. Establishing task forces including forestry research staff and the users of research results, in forest plantation establishment, and in the evaluation of existing experimental data

PHASE II: ACTIVITIES IN PROJECT YEARS 1..2

- a. Establishing research/user task forces in sectoral research and development in forest/log/forest products protection, utilization, biofuel development, and forestry economics and management
- b. Starting and developing a research programme in forestry sector research and development planning and prioritization
- c. Identifying and establishing forestry research field stations for high priority regions and subjects

PHASE III: ACTIVITIES IN PROJECT YEARS 3..5

- a. Establishing research/user task forces planning and prioritization, the social aspects of forestry development, forest forest products markets and marketing, and forestry sector feasibility studies
- b. Continuing the identification and establishment of forestry research stations

Project (Development) Inputs for Phase I

	Person/months
<u>Personnel</u>	
Research Adviser	3
Other Personnel Costs	
<u>Equipment &amp; Miscellaneous</u>	
One 4WD Vehicle	
Photocopier	
Supplies & Materials	
Miscellaneous	

The Project is planned to be implemented jointly with the Setting Up of a Data Base and Project Information System. The vehicle (e.g. Nissan Patrol 7-seater which is widely used in forestry projects in Ethiopia) and a good photocopier (which can make and sort 20 sets of two-sided copies from one or two sided originals, and has a sheet feeder and a copying scale ratio of 67%..150%) are indispensable for Project implementation. Inputs for Phases II and III will be defined during Phase I.



12.1.1987

7.3 PROJECT DESCRIPTION: SETTING UP OF A DATA BASE  
AND PROJECT INFORMATION SYSTEM

**OBJECTIVE:** Reliable and Accessible Information Base  
for Decision Making on Ethiopian Forestry

**OUTPUT:** Established system of information collec-  
tion, storage, management and retrieval

**RATIONALE:**  
Considerable data and information has been generated by forestry  
sector research and experimental activities in the past. Much of  
this information is not in a form readily usable or applicable  
in forestry sector decision making and development.

The information will be compiled, organized and stored in a form  
which allows the preparation of the desired reports. It will be  
supplemented by data and models from experience in similar  
conditions in other countries. The basic system will be stored  
in microcomputer data bases and retrieval programmes.

The FRC library will be developed by

- acquiring a set of Forestry Abstracts,
- setting up a research publications exchange system,
- by procuring key research publications and manuals in the FRC  
fields of work, much of them in microfiche format,
- by cataloging and organizing the library, preferably according  
to the Oxford System of Decimal Classification for forestry  
sector books and materials,
- by organizing an interloan system with Alemaya University,  
Addis Ababa University and Wondo Genet FTI, and
- by acquiring a machine for copying microfiche pages to A4 size.

Timetable

PHASE I: YEAR 0: PRE-PROJECT ASSISTANCE

- a. Provisional data and model hierarchy, and information system  
to provide regional and sectoral data on research relevant to  
sectoral and regional decision making at various levels
- b. Instituting provisional Data Bank and Development Project  
Information Base input, storage and retrieval systems
- c. Initial data and information input into the system
- d. Retrieving preliminary reports from the system

PHASE II: ACTIVITIES IN PROJECT YEARS 1..2

- a. Developing the input, storage and retrieval systems for the  
Research Data Bank, and Sector and Project Development Infor-  
mation Base
- b. Developing the FRC library to cover up-to-date forestry sector  
publications; a catalog, retrieval and interloan system for

12.1.1987

- forestry and supporting publications at FRC and other institutions in Ethiopia
- c. Instituting an information management system covering the data bank, library, and development project information systems

PHASE III: ACTIVITIES IN PROJECT YEARS 3..5

- a. Continued development of data bank and information system

Project (Development) Inputs for Phase I

		Person/months
<u>Personnel</u>	Research Adviser	3
	Data Bank/Information System	
	Consultants	3
	Other Personnel Costs	
<u>Equipment &amp; Miscellaneous</u>	One 4WD Vehicle	
	Three Microcomputers <sup>2</sup>	
	Supplies & Materials	
	Miscellaneous	

The Project is planned to be implemented jointly with the Institutional Development of the Forestry Research Centre. The Inputs for Phases II and III will be defined during Phase I.

UNDP and FAO have indicated interest in studying the possibilities for implementing the Project.

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<sup>2</sup> Two of the three would be IBM AT-compatible microcomputers each with battery power supply/voltage regulator unit, 40 MB fixed disk and external tape backup, a 1.2 Mb and a 360 kb floppy disk drive, math coprocessor, and mouse. One would have a normal laser printer (for Data Bank and Information System), the other one which is postscript-programmable (for Word Processing/Desktop Publishing).

One would be a portable IBM compatible microcomputer for multipurpose use; with back lighted LCD display, internal floppy diskette units, hard disk, printer and external 360 kb disk drive.

Accessories would include an 11"x11" digitizing pad, an overhead display monitor, and an 8-pen plotter (for minor maps & drawings).

Software would include a data base program (Paradox?), a word processor (WordPerfect?), a map program (Map Master?), a desktop publishing program (Ventura?), a spreadsheet (123+HAL?), a modeling program (Javelin?), a compiler (TurboPascal?), a multipurpose desktop manager & drafting program (GEM, including GEM Graph, Draw, etc.), and various utility programs. In addition, many FAO programs and databases would be helpful.

12.1.1987

7.4 PROJECT DESCRIPTION: PUBLICATION SERVICES

**OBJECTIVE:** An Effective User Oriented Editorial and Publication Unit at FRC: An established system of information dissemination for implementation, development, training and publicity

**OUTPUT:**

- Articles in international journals
- A Forestry Research Bulletin
- Field Manuals and Application Leaflets for Practicing Foresters and Extensionists

**RATIONALE:**

The publication of research results has been irregular, slow and in a form not directly usable by the field. For easier application of research results by decision makers in forestry practice, communicating the required data and information to the end user will be considered a central task of the consolidated FRC. For this purpose, a Publication and Editorial Unit will be set up at the Centre.

The unit will contain the following functions:

- A scientific editorial service, advising on the style of articles, arranging referee and language review, and publishing a Forestry Research Bulletin
- A research results' dissemination service, assisting in the writing and lay-out of manuals and leaflets targeted at forestry practitioners and extensionists
- A publishing service, preparing materials for printing or arranging for this to be done elsewhere, and taking care of the distribution

Timetable

PHASE II. ACTIVITIES IN PROJECT YEARS 1..2

- a. Establishing and developing a publication service for use in state forestry development, with emphasis on the provision of research information in a form suitable for decision making
- b. Establishing and developing community forestry decision making, extension and training publication services, and research information based materials for publicity
- a. Preparation of national, community and state forestry leaflets for forestry sector development at various levels

12.1.1987

PHASE III: ACTIVITIES IN PROJECT YEARS 3..5

- a. Reviewing the published information dissemination programme  
and preparing possible continuation

Project (Development) Inputs for Phase II

		Person/months
<u>Personnel</u>	National Publications Specialist/Editor	24
	Publications/Editorial Consultants	12
	Other Personnel Costs	
<u>Equipment &amp;</u>	One 4WD Vehicle	
<u>Miscellaneous</u>	Supplies & Materials	
	Miscellaneous	

The Project is planned to be implemented jointly with the Setting Up of a Data Base and Project Information System, and in close cooperation with the National Forestry Research Board and Research Task Forces.

12.1.1987

7.5 PROJECT DESCRIPTION: DEVELOPMENT OF FIELD AND REGIONAL ACTIVITIES

**OBJECTIVE:** Adequate Regional Implementation of Research Activities Emphasizing Regional Needs

**OUTPUT:**

- Established system of setting up, starting and operating field stations for the management of trials and regional research programmes and projects
- Two field stations started in the first two project years
- One additional field station each consecutive two years, up to a total of eight stations in Year 15

**RATIONALE:**

FRC currently has research plots, mainly plantation trials, at close to 40 different locations. These areas cover well some bioclimatic zones, while others are left almost without attention. The maintenance of the existing experiments is limited due to difficult travel; in many cases there is even no guard to prevent illicit interference at the site.

After inspecting all existing sites, a preliminary plan for locating eight field stations will be made, taking into account the coverage of the agroclimatic zones as well as the forestry development needs in the area, and the location of the present continuable field experiments. Preliminary plans for tasks, staffing and design will be worked out for all stations; two will be established.

Each station will be responsible for the practical management of the experiments in its area; overall research planning and data evaluation will be the task of FRC at Shola. The station should be headed by a Wondo Genet FTI graduate, who will be considered for the M.Sc. program after the Station is fully operational. It will be equipped with the equipment and materials necessary for day-to-day operations, and its main research projects, and contain facilities for the field work of visiting research officers as well. Where relevant and possible, stations should be located at the same place as IAR field stations and coordinate the use of their material resources with these.

Timetable

PHASE I: YEAR 0: PRE-PROJECT ASSISTANCE

- a. Selecting locations and staff development/research programmes for the two highest priority research stations

12.1.1987

PHASE II: ACTIVITIES IN PROJECT YEARS 1..2

- a. Establishment of two research stations in the two first consecutive Project years

PHASE III: ACTIVITIES IN PROJECT YEARS 3..5

- a. Setting up and institutionalizing the development programmes for the two first research stations
- b. Selection of location and emphasis for third research station, and its establishment and institutional buildup
- c. Preparing the continuation of the field research station establishment project

Project (Development) Inputs for Phase I

		Person/months
<u>Personnel</u>	National Field Research Coordinator	2
	Field Research Consultant	2
	Other Personnel Costs	
<u>Equipment &amp; Miscellaneous</u>	One 4WD Vehicle	
	Supplies & Materials Miscellaneous	

The Project is planned to be implemented jointly with the Institutional Development of the Forestry Research Centre. The Inputs for Phases II and III will be defined during Phase I.

12.1.1987

7.6 PROJECT DESCRIPTION: DEVELOPMENT OF THE SHOLA SEED CENTRE

**Title:** Development of the Shola National Seed Centre

**Project Period:** 1988-1993

**Ethiopian Implementation Agency:** Ministry of Agriculture  
Natural Resources Conservation &  
Development Main Department

**External Financing Agency:** (Proposal: United Nations Sudano-Sahelian Office (UNSO))

**External Implementing Agency:** UNDP Office of Projects Execution (OPE)

**External Contribution:** USD 632,500  
**Ethiopian Contribution:** BIRR 1 million

**OBJECTIVE:** National Seed Centre with Adequate Supplies of Suitable Seed for Ethiopian Quantitative and Qualitative Needs, for Most Sites and Uses

**OUTPUTS:**

- Sustained supply of good quality seed of tree species suitable for community and state forest planting on different sites and for different land uses at a rate of ca. 100,000 ha/year
- Smoothly operating arrangements for seed supply from and to principal foreign cooperating seed centres
- Sufficient staff trained in all aspects of the seed collection, storage, certification and supply/distribution programme at the national and district levels
- Adequate physical facilities and equipment for the national seed programme, including buffer stocks for bad seed years
- Standardized documentation, and the maintenance of standard records, for all seed handled; this includes treatment and handling recommendations for the

12.1.1987

species, provenance, and site, and  
production and utilization predictions  
for the seed lot at various suitable  
planting sites

**RATIONALE:**

The Shola FRC Seed Centre will be increasingly important for national forestry development due to heavy pressure to increase tree planting for household and industrial wood supply.

The facilities are being enlarged by constructing a new seed store and seed laboratory/offices in Shola. These will be ready by the end of 1988. They will provide the basis for an expanded supply of seed; storage would be sufficient for planting up to 200,000..300,000 ha/annum, as compared to an annual need of seed for roughly 100,000 ha at full development of the afforestation/-reforestation programme. Laboratory and storage related equipment are insufficient for the needs.

The quality of the supply is not satisfactory; information on seed treatment and handling, and on the suitability of species and provenances for specific sites, needs considerable additional input.

Part of the Seed Centre staff has received training from IDRC funds; recently the Head has been in formal M.S. training in Canada. There is a shortage of trained and experienced staff.

Timetable

PHASE II: ACTIVITIES IN PROJECT YEARS 1..2

- a. Procuring, installing and taking into use adequate seed storage and laboratory equipment in Shola
- b. Introducing modern management/administration systems for the seed centre, and adapting them to Ethiopian needs
- c. In-service training of seed centre staff in Ethiopia and abroad

PHASE III: ACTIVITIES IN PROJECT YEARS 3..5

- a. Continued development of seed centre management/administration, species/provenance information, and seed testing and certification systems
- b. Strengthening of Seed Centre international contacts
- c. Continuation of training programmes for additional staff



12.1.1987

d. Project Review, and decision on Project continuation

Project (Development) Inputs

		Person/months (Support)
<u>Personnel</u>	National Project Coordinator	
	Consultants	8
	Fellowships and Training	21
	Other Personnel Costs	
<u>Equipment &amp; Miscellaneous</u>	- One 4WD Pickup + Trailer for Shola and each of four District Seed Centres	
	- One station wagon for Shola	
	- Seed storage, collection, testing and management equipment	
	- Supplies & Materials	
	- Miscellaneous	

The Project is planned to be implemented jointly with the development of the Forestry Research Centre.

12.1.1987

**7.7 PROJECT DESCRIPTION: SUPPORT TO DEVELOPING AND STUDYING THE SOCIAL DIMENSION IN FORESTRY PROGRAMMES, ESPECIALLY COMMUNITY FORESTRY, AND SOCIAL ISSUES IN FOREST MANAGEMENT PLANNING**

**OBJECTIVE:** A Research Structure and Content for Optimum Forestry Development and Management Planning Programmes

**OUTPUT:**

- Up-to-date research programmes in social forestry development
- Support to the Research Programme from international sources of data and models
- Field Manuals and Application Leaflets for Practicing Foresters and Extensionists

**RATIONALE:**

In Ethiopian forestry sector activities, community forestry is estimated to represent some 75% of the development need. The expertise for identifying, developing and implementing a social research and development programme in this subsector is limited in Ethiopia. It has been estimated that improved planting stock would raise plantation success from the present low level to 1.5..2 times the present, but the acceptance and integration of tree planting into community and household land use and production patterns may result in an increase in plantation success of up to 5..10 times the present.

Social issues will also play a major role in state forest development, due to the need for optimizing resettlement and job creation programmes for the population which has encroached existing or planned forest reserves, and in planning future forest production and utilization in these areas.

A support function is required in the field of social research, over and above the inputs foreseen under long term cooperation between FRC and SUAS. Support is mainly provided in the form of advisory and consultant services, initially over a period of five years.

"Baseline" inputs are foreseen from a consulting assignment during the preparatory project phase, already included in the proposed SIDA allocation for 1987/1988.

**Timetable**

**PHASE II. ACTIVITIES IN PROJECT YEARS 1..2**

- a. Support to FRC studies in the social aspects of state forestry development, with emphasis on the resettlement and job creation programme alternatives, and the needs of forestry management planning

12.1.1987

- b. Support to FRC planning, coordination and implementation of studies and pilot/experimental development programmes in community forestry, including the development of data and tools for decision making, extension and training

PHASE III: ACTIVITIES IN PROJECT YEARS 3..5

- a. Reviewing the social studies research programme support services and preparing possible continuation

Project (Development) Inputs for Phase II

<u>Personnel</u>	Consultant in Social Sciences Other Personnel Costs	Person/months 36
<u>Equipment &amp; Miscellaneous</u>	One 4WD Vehicle Supplies & Materials Miscellaneous	

The Project is planned to be implemented jointly with the Research and Manpower Development Project, and in close cooperation with the National Forestry Research Board.

12.1.1987

7.8 PROJECT DESCRIPTION: SUPPORT TO DEVELOPING AND STUDYING BIOFUELS AND THE PLACE OF FORESTRY ELEMENTS IN THE HOUSEHOLD AND COMMUNITY LAND USE SYSTEM

(Proposed as a potential project for IDRC funding)

OBJECTIVE:

OUTPUT:

RATIONALE:

Timetable

PHASE II. ACTIVITIES IN PROJECT YEARS 1..2

PHASE III: ACTIVITIES IN PROJECT YEARS 3..5

Project (Development) Inputs

Personnel

Person/months

Equipment &  
Miscellaneous

12.1.1987

8. WORK PLAN

A detailed work plan for the Projects will be prepared during the Preparatory Assistance phase. A schematic work plan is shown in Annex 5.

9. INSTITUTIONAL FRAMEWORK

The Ministry of Agriculture of Ethiopia, and the Swedish International Development Authority will agree, for joint execution by the Natural Resources Conservation and Development Main Department and the Swedish University of Agricultural Sciences, on the terms of implementing the Main Component of the Programme and any other projects included within the Programme scope.

10. PROJECT BUDGETS

The budgets covering the GOE and SIDA contributions to the Programme are shown in Annexes 3 and 4.

12.1.1987

APPENDIX 6. ANNEX 1. RESEARCH NEEDS IN WOOD FUEL CONSUMPTION AND PRODUCTION DEVELOPMENT

Fuelwood and charcoal are estimated, in the UNDP/World Bank Energy Assessment Study, to represent a third of the biomass energy supply; the rest comes from dung and crop residues. This would mean that the wood fuel equivalent of biomass energy consumption would be three times the wood fuel consumption of 21.6 million m<sup>3</sup>/a, or 65 million m<sup>3</sup>. 93% of Ethiopia's energy is said to come from biomass.

Computing the biomass consumption in wood fuel equivalents on the basis of a population of 45 million and a consumption of 1 solid m<sup>3</sup>/person/year, this would be the equivalent of 42 million solid m<sup>3</sup>/a of roundwood, if 93% of energy consumed is biofuel. If the annual consumption were 1 ton of dry matter per person, this would be equivalent to 70 million solid m<sup>3</sup>, assuming a specific gravity of 0.6. The true consumption figure would probably lie in the 42..70 million solid m<sup>3</sup>/a range.

At a 2.9% population growth rate, biofuel consumption would increase annually by 1.0..1.7 million m<sup>3</sup>. In order to compensate for this increase, fuelwood plantations would have to be increased by 100,000..170,000 ha/a. Ongoing and approved plantation, agroforestry and soil conservation projects will establish ca. 20,000 ha of State and 30,000 ha of community wood fuel and pole plantations in the next five years. This is equivalent to the projected consumption increase (at a production of 10 m<sup>3</sup>/ha/a, this represents some 500,000 m<sup>3</sup>/a), assuming that the share of wood fuel in biofuel consumption remains constant. In other words, no improvement would be achieved.

The solution in achieving improvement in wood fuel supply could be found mainly through a better survival rate in community fuelwood plantations. Alarming low rates of 5-20% have been reported. This would mean that

- seedlings for community forestry plantations would have to be better (better root/shoot ratio, better root systems, improved species and varieties), and
- the community forest, agroforestry and soil conservation plantations would need to be better suited and accepted for the desired land use patterns and agricultural/grazing systems.

12.1.1987

APPENDIX 6. ANNEX 2.

RESEARCH NEEDS IN STATE AND INDUSTRIAL WOOD  
PRODUCTION AND DEVELOPMENT

Natural high forest areas covered about 2.3 million ha in the mid-1970's according to FAWDA/ODA inventories. These areas in the southern and western parts of Ethiopia are the main source for industrial wood. 0.8 million ha of these are accessible (Järholm & Tivell 1987). With selective harvesting, these forests yield 100,000 m<sup>3</sup>/a of industrial wood on a sustained basis. With intensive regeneration, their AAC could be increased to 200,000 m<sup>3</sup>/a. This would mean quadrupling the regeneration area from the present, from 2000 to 8000 ha/a.

According to Järholm and Tivell, sawmilling production (40 old mills with 4000-5000 m<sup>3</sup>(r)/a intake capacity) is about 65,000 m<sup>3</sup>(s)/a; consumption in 2025 is expected to be 1.5 million m<sup>3</sup>(s). This projected consumption growth will require a fresh look at investment into the sawmilling industry and its raw material supply. At a 45% sawnwood recovery rate, some 3.3 million m<sup>3</sup>(r) of sawlogs would be needed to supply the industry.

To meet the gap, at an average sawlog production of 15 m<sup>3</sup>/ha/a, an additional 5,000 ha/a of plantations would be needed over the next forty years. Another 5,000 ha/a is envisaged for other mechanical forest industry needs. Adding the 6,000 ha/a from above, annual industrial planting would be of the order of 16,000 ha.

Forest industrial development will require changes in forest management, utilization, manpower and skills development, in industrial organization, planning and infrastructure, and in development implementation and financing.

The planning data and other information generation will require considerable inputs into the capacity of the Ethiopian forestry sector in the economics and financial and technological analysis capacity. Much of this information could be generated by a developed FRC.

12.1.1987

**APPENDIX 6. ANNEX 3. FRC DEVELOPMENT BUDGET COVERING GOE CONTRIBUTION**

**Programme Budget Covering the GOE Contribution**

This budget covers the development costs of the FRC Headquarters' research programme payable in national funds, during the preparation phase and the first five years of implementing the programme proper.

Thus it covers development related costs only, not the full costs of operating the FRC and the Seed Centre, and it represents national development funding budgeted for all component projects, irrespective of donor, with the exception of field research station development.

**Personnel Costs for Programme Duration**

	Person/months	Start mo/yr	ETB 1000
Project Director	60	07/88	96
Statistician/Research Designer	60	07/88	57
Publications/Editor	57	10/88	54
Information Systems Manager	64	03/88	70
<b><u>Research Staff Development (Table 1)</u></b>			
Research Leaders & Officers	1580		1328
Tech/Admin/Clerical Staff/Drivers	3066		1583
<b>Offices &amp; Support Facilities</b>			
(Construction)			1650
Operating Costs			2100
Contingency 10%			762
<b>Total</b>			<b>7700</b>



Figure 6.5.1. Times of Selected Key Programme Activities

Project and Activity	Prep Year 0	Programme Implementation Phase				
		Year 1	Year 2	Year 3	Year 4	Year 5
<b><u>Institutional Development</u></b>						
National Forestry Research Board	—					
Task Force Operation	—					
Field Station Research						
<b><u>Research and Manpower Development</u></b>						
Senior Research Coordinator						
Research Design / Analysis Specialist						
Industrial Plantations MSc						
Agroforestry MSc						
Forest Management MSc						
Economics MSc						
Tree Breeding/Research Mgt PhD						
Community Forestry PhD						
Seeds / Nurseries / Spp Selection PhD						
Forest Technology MSc						
Soils MSc						
Statistics MSc						
Ecology / Meteorology MSc						
Forest Protection MSc						
Ecology MSc						
Community Forestry / Extension MSc						
Forest Management MSc						
Forest Industrial Economics						
Forest Management MSc						
Forest Technology MSc						
Forestry Economics PhD						
Soil and Crop Protection PhD						
Training of Trainers		—	—	—	—	—
<b><u>Database / Information System</u></b>						
Design and Pilot Operation	—					
Full Implementation & Development						
<b><u>Social Aspects of Forestry Development</u></b>						
Review & Research Programming	—					
State Forestry / Mgt Planning						
Community Development						
<b><u>Publications / Editing Services</u></b>						
Forestry Research Bulletin			—	—	—	—
Field Manuals / Leaflets		—	—	—	—	—
Decision Models / Data		—	—	—	—	—
<b><u>Seed Center Development</u></b>						
FAO Regional Coordination						
National Support		—	—	—	—	—

12.1.1987

#### APPENDIX 6. ANNEX 6. MANPOWER DEVELOPMENT SCHEMES

Manpower development will be an essential task in the development of FRC and of improving the forestry sector research at large. During the years, several scholarship schemes for studies abroad have been offered by various donors. The experience has not been altogether good: prolonged absence from job and country are difficult to cope with, and furthermore a considerable number of students have never returned to the position for which they were given the training, or at all to Ethiopia. In line with SIDA engagement at Wondo Genet FTI, the Mission has considered "sandwich models" for FRC staff training.

##### 1. General education requirements

Regardless of the education level among the academically trained staff, there is a strongly felt need for training in experimental design, statistics, and the processing and presentation of research results. The Mission proposes that the first expatriates to be recruited shall have good competence in these fields, and give weekly lectures, seminars and workshops on these subjects, attended by all research staff. This should be complemented with computer training of selected persons.

##### 2. Graduate training of B.Sc. holders.

In an interim report to SUAS on graduate training of B.Sc.'s from Alemaya Agricultural University (Toborn & Wibom 1987, p.33-34), the following system is proposed:

- a) Two terms in Sweden for basic studies in mathematics, statistics, experimental design and research methods, and computing (and Swedish), as well as literature studies,
- b) Field work in Ethiopia, accompanied by a Swedish supervisor with his/her national counterpart (3 months),
- c) Two terms of individually selected M.Sc. courses, literature study and (Master's) thesis work in Sweden, followed seminar and defence of thesis at Alemaya.

We consider a similar approach applicable at FRC as well, with one important modification: The two first terms can just as well be had at the FRC. The weekly training sessions would form the basis of the course, as the subject of these coincides with the proposed teaching programme in Sweden. This should be supplemented with special courses given by either the expatriate specialists or other expatriate or national staff. The students should discuss their thesis subject already at the

12.1.1987

beginning of the training; in some case the expatriates may serve as supervisors, in others the procedure above should be followed. The remaining studies should take place in Sweden, but could possibly be somewhat shortened and replaced by supervised studies and thesis preparation at FRC. In all, FRC should function as the institution in the same role as SUAS for covering interinstitutional subjects. The major advantages over the model proposed by Toborn & Wibom would be the lower cost and the possibility of a greater adaptation of the studies to the students present and future work.

### 3. Ph.D. studies

Students for PhD studies can be accepted after a minimum one year of consolidating the results of their MSc studies has passed. During this period, adequate attention should be given to consolidating the research ability acquired during the MSc program into the Ethiopian research context, both in terms of content, and in terms of organization, information management, and suitable reporting.

The consolidation period is also devoted to planning the research for the PhD program phase. Special attention would be given to an in-depth analysis of research priorities, to formulating a research programme manageable in the context of dissertation preparation, and to reassessing (by the PhD candidate and the Academic/Research Adviser) the strengths of the candidate in a doctoral program. The qualifying examination for PhD studies will cover both the candidate's ability to understand forestry and/or forest industries practice, and his/her understanding of the discipline and subject matters on which the PhD program is based.

Two periods of study abroad are envisaged: one semester after the one-year basic studies at FRC, for a thorough academic study and seminars on the basis and logic of the dissertation subject matters; and one semester after subject matter exams and field research at FRC, to finalize dissertation preparation and defend it.

The PhD program is followed by a consolidation phase similar to that following the MSc program, in order to ensure that the experience and subject matter understanding gained are fully incorporated into FRC.

12.1.1987

#### 4. Cost estimates

Using Toborn & Wibom's estimates, the cost of training 6 Bachelors would be the following:

Students:

Travel Addis Ababa-Umeå-Addis Ababa	105 000
10 months in Sweden SEK 4 500*6	270 000

Supervisors:

Travel 2* Umeå-Addis Ababa-Umeå	105 000
Salary, per diem & hotel in Ethiopia	209 000
Lecturers, 2*25% of total cost for 2 expatriates	400 000
<u>Total</u>	<u>1 089 000</u>

This calculation is based on the assumption that one supervisor can instruct two students (limitation: subject, not student number). It also charges a proportion of the total cost of maintaining two expatriates to the manpower development account; this cost could just as well be seen as a part of the general project cost.

The cost for six PhD students has been estimated at approximately SEK 2,065,000 according to following breakdown:

Students:

Travel Addis Ababa-Umeå-Addis Ababa	210 000
10 months in Sweden SEK 4 500*6	270 000

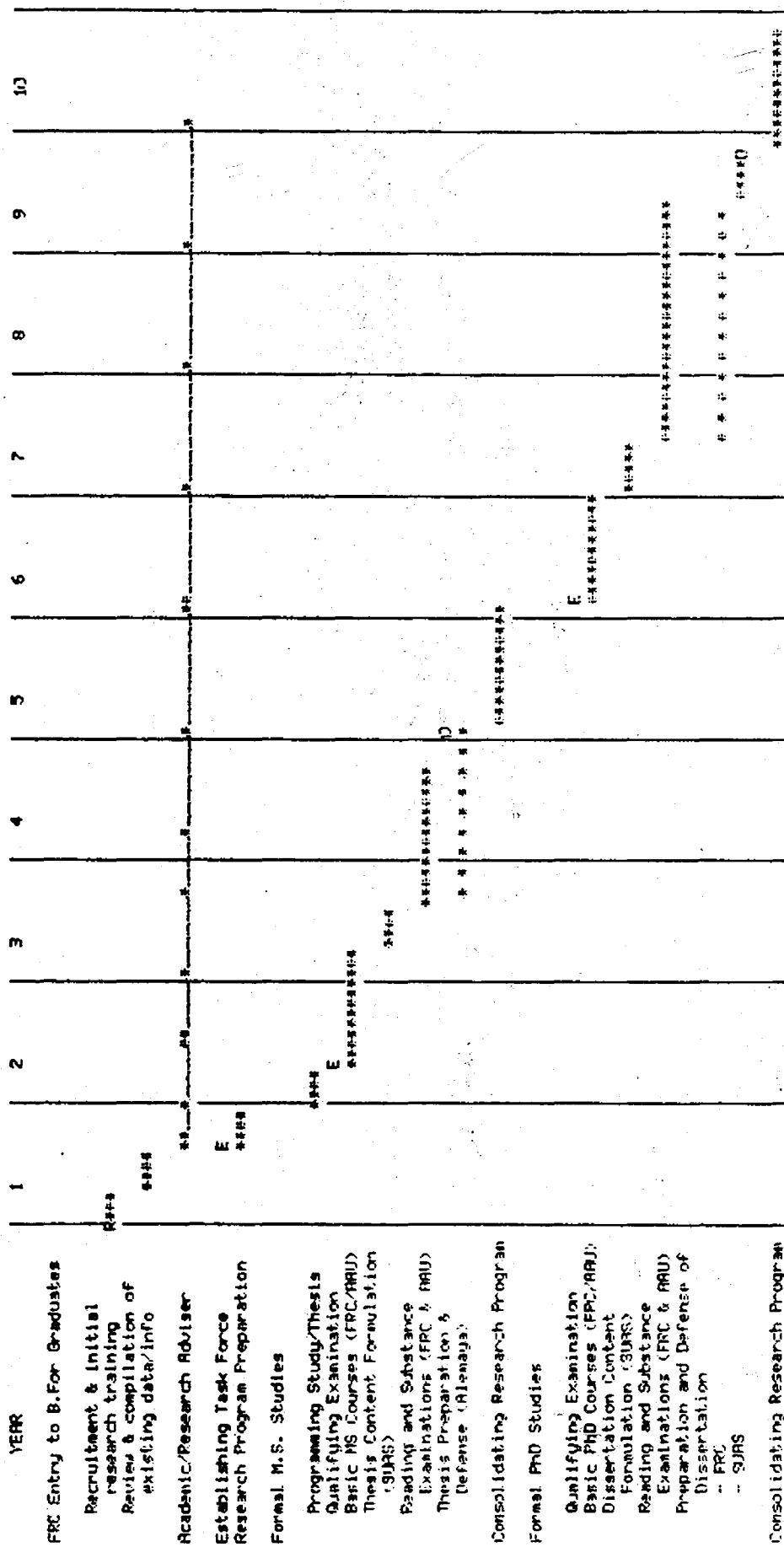
Supervisors:

Travel 5* Umeå-Addis Ababa-Umeå	262 500
Salary, per diem & hotel in Ethiopia	522 500
Lecturers, 2*25% of total cost for 2 expatriates	800 000
<u>Total</u>	<u>2 065 000</u>

It is, however, difficult to apply a realistic cost for the custom-made postgraduate training at SUAS; compensation for which most likely will be the subject of negotiation between SUAS and SIDA.

An overview of the training programme for a successful Wondo Genet B. For graduate, through MS and PhD studies, is shown in Figure 4. Much of the research work carried out at FRC would be done through this system, and very little outside of it. The adviser would be in Ethiopia during the periods indicated by crosses; the rest of the time would be on part time or standby duty.

Figure 6.6.1. Research Staff and Programme Development



APPENDIX 6. ANNEX 7. TERMS OF REFERENCE OF PROJECT STAFF

1. National Staff

1.1 Programme Director/National Coordinator

The Programme Director is a specialist assigned for leading FRC development.

- Duties:
- lead the development of the FRC research programme;
  - plan the development of FRC's internal organization, particularly the setup of project teams and field stations;
  - lead the evaluation of proposed new research projects and the scientific/technical monitoring of ongoing projects; and
  - develop and lead research activities within his/her own field of specialization.

Qualifications:

Degree in Forestry. Experience as a project leader at a University or Research Institute.

1.2 Information Development and Management Officer

The Information Officer heads the FRC information management system.

- Duties:
- direct the development of the FRC research information system;
  - direct the development of FRC's internal information generation, communication and exchange organization; and
  - arrange workshops/seminars and training in information generation, storage, retrieval, and management.

Qualifications:

Degree in Information Science, preferably acquaintance with forestry and forest industries. Experience in information management and research an asset.

1.3 National Publications Specialist/Editor

The National Publications Specialist/Editor heads the information publishing/dissemination system of FRC.

- Duties:
- Lead the implementation and development of the FRC information publishing/dissemination system;
  - assist FRC and cooperating staff in the preparation of lucid and efficient reports for forestry sector decision making; and
  - arrange workshops/seminars and training in information publishing and dissemination.

12.1.1987

Qualifications:

Degree in Information Science, preferably acquaintance with forestry and forest industries. Experience in editorial work and research an asset.

1.4 Statistician/Experimental Design Officer

The Officer reports to the Director of Research of the FRC.

- Duties:
- direct the development of research and experimental design and analysis at FRC, in order to ensure the relevance and reliability of FRC activities;
  - assist and support FRC staff in the design of new research projects and in optimizing the utilization of scientific/technical data from past research in Ethiopia and abroad. This will e.g. entail thorough analysis and transformation of such data to ensure compatibility; and
  - arrange regular workshops/seminars on project design and reporting.

Qualifications:

Degree in Statistics and Experimental Design. Preferably experience in research or development work in industry and/or natural resources planning and management.

1.5 Forestry/Forest Industries Economist

The Forestry/Forest Industries Economist is an advisor to the National Forestry Research Board, the Director of Research, and the Head of the FRC.

- Duties:
- Advise on the development of the FRC research prioritization system and programme;
  - assist in the design and evaluation of proposed new research projects, in order to ensure the inclusion of proper decision making data in the design;
  - arrange regular workshops/seminars on project design and reporting, from the point of view of assigning values on costs and benefits of forestry sector activities, and properly prioritizing project information collection and handling;
  - lead the research prioritization task force of FRC; and
  - counsel individual researchers on the economic aspects of project design and report formulation.

Qualifications:

Degree in Forestry/Forest Industrial Economics. Experience in research or development an asset.

1.6 Other Research Leaders and Officers

The other research leaders and officers will be responsible for FRC research in their specific fields, and for leading

12.1.1987

task forces, or participating in their work, in their subject matter area where relevant. Research leaders will report to - the Director of Research in the development of decision making information in their fields;

- to the Forestry/Forest Industries Economist in matters pertaining to research prioritization;
- to Research/Academic Advisors appointed to develop research and development activities in the specific disciplines; and
- to the Head of FRC in the institutional and administrative aspects of research based development work.

- Duties:
- lead the development of the FRC research activities and programme in their fields of specialization;
  - carry out and/or coordinate research in their fields, with the aim to ensure the availability of adequate decision making information on the basis of knowledge contributed by this discipline;
  - arrange workshops and task force meetings on research design and reporting, in their own field of specialization; and
  - counsel external researchers on project design and report formulation.

Qualifications:

Degree in Forestry, with adequate progress in studies toward graduate degrees, and demonstrated ability to lead and/or carry out research and development work.

2. Expatriate Staff

Expatriate staff will have both advisory and executive functions in line with those of the teaching staff at Wondo Genet FTI: advisory in matters of policy and basic administration; executive in the conduction of staff training activities and approved research projects.

2.1 Senior Research Coordinator

The Senior Research Coordinator is the advisor to the Head of the FRC.

- Duties:
- advise on the development of the FRC research programme;
  - advise on the development of FRC's internal organization, particularly the setup of project teams and field stations;
  - assist in the evaluation of proposed new research projects and in the scientific/technical monitoring of ongoing projects;
  - arrange regular workshops/seminars on project design and reporting, especially in his/her own field of specialization;
  - counsel individual researchers on project design and report formulation;
  - coordinate the activities of SUAS specialists in Ethiopia; and



12.1.1987

- develop and lead research activities within his/her own field of specialization.

Qualifications:

Ph.D. in Forestry. Experience as a project leader at a University or Research Institute. Experience in research or development work in the tropics.

**2.2 Specialist in Research/Experimental Design and Analysis**

- Duties:
- participate in the preparation and design of ongoing and proposed projects, with emphasis on experimental design and the analysis of the results;
  - train FRC staff in, and arrange regular workshops/seminars on applied statistics, and experimental design and analysis;
  - counsel individual researchers on their research work;
  - organize a report system where results from ongoing and completed research are in compatible form and easily retrievable; and
  - review, in cooperation with the responsible Ethiopian research officer, field plots established previously but not currently maintained as well as field experiments laid out by other branches of the NRCMD and its predecessors and propose a plan for their utilization in the research programme.

Qualifications:

Ph.D. or advanced Graduate studies in relevant fields of forestry or biology, with special competence in statistics and experimental design. Good knowledge of IBM compatible microcomputer use.

**2.3 Specialist in Social Development Research in Forestry**

The Specialist services in Social Development Research in Forestry are provided in support to research planning at FRC, and in support of developing the FRC research programme. The Specialist is also expected to act as an academic advisor to researchers in research prioritization, community development, and extension.

- Duties:
- Advise on the development of the FRC research programme in the social aspects of Ethiopian forestry sector development and social forestry development, with emphasis on resettlement and job creation programme alternatives;
  - advise on developing and studying the social dimension in forestry programmes, especially community forestry;
  - advise in generating prioritized social information for forest management planning, including support from international data and models, and preparing field manuals and application leaflets for practicing foresters and extensionists;
  - advise in the evaluation of proposed new research projects

12.1.1987

- and in the scientific/technical monitoring of ongoing projects for adequate inclusion of the social aspects for decision making;
- advise FRC research staff in the forestry sector social studies;
  - arrange periodic workshops/seminars on project design and reporting for adequate social analysis and decisions; and
  - counsel individual researchers on project design and report formulation.

Qualifications:

Social Anthropologist/Sociologist with experience from forestry development projects and training. Experience in research or development work in the tropics.

**2.4 Research Adviser (Institutional Development, Information System Design, and Project Preparation)**

The Research Adviser supports NRCMD, especially FRC, in starting the FRC institutional and information system development.

Duties:

- Advise on the development of the FRC research programme;
- advise on the development of the Ethiopian forestry research organization, particularly the setup of researcher/research user communication, FRC/external research execution, and subsectoral task forces;
- lead the initial setting up of an Ethiopian forestry sector research based decision making information system;
- coordinate inputs from a baseline review of social study needs for forestry sector development; and
- prepare a project for setting up a decision making data base and project information system for the Ethiopian forestry sector at FRC.

Qualifications:

Ph.D. in Forestry/Forest Industries. Experience in research administration and management, and forestry sector development and decision making. Experience in research and development work in the tropics. Familiarity with information generation and management systems and IBM compatible microcomputer use. Experience in project design and preparation.

**2.5 Data Bank/Information System Consultants**

The Data Bank/Information System Consultants category is needed in two phases: in the preparatory phase (Year 0) to support the Research Adviser in the technical design and operation of the system, and during the project proper to provide training and technical assistance to project staff in the management and reporting of data and information.

- Duties:
- Assist and advise FRC to organize and insert existing research information into a form and databases suitable for streamlined management for comparability and utilization;
  - design and organize data and other information input and retrieval/reporting systems;
  - arrange workshops/seminars and other training on data input, management and retrieval/reporting; and
  - counsel individual researchers on data and information organization, input and retrieval.

Qualifications:

Degrees in Forestry. Experience in research and development information management in required fields and specializations.

## 2.6 Publications/Editorial Consultants

The Publications/Editorial Consultants will support the FRC staff in the technical design and operation of the publishing/research information dissemination system, and provide training and technical assistance to project staff in the preparation of research reports, manuals, and application leaflets.

- Duties:
- Assist and advise FRC to prepare research reports in a form suitable for utilization by forestry sector decision makers, extensionists, and the general public;
  - design and organize information editing and reporting systems;
  - arrange workshops/seminars and other training on research publishing and the dissemination of research results; and
  - counsel individual researchers on information preparation for reporting and publications.

Qualifications:

Experience in research and development reporting and publishing.

## 2.7 Trainer of Research Trainers

The Trainer Specialist will provide training to FRC staff in the training methods and techniques of research staff, in order to facilitate the building up of a body of knowledge for introducing new staff to the research working environment.

- Duties:
- Assist and advise FRC to carry out research training;
  - design and organize research training systems and procedures;
  - arrange workshops/seminars and other training on research training; and
  - counsel individual researchers on research training.

Qualifications:

Degree in Education. Experience in training methods. Acquaintance with forestry an asset.

12.1.1987

## 2.8 Field Research Consultants

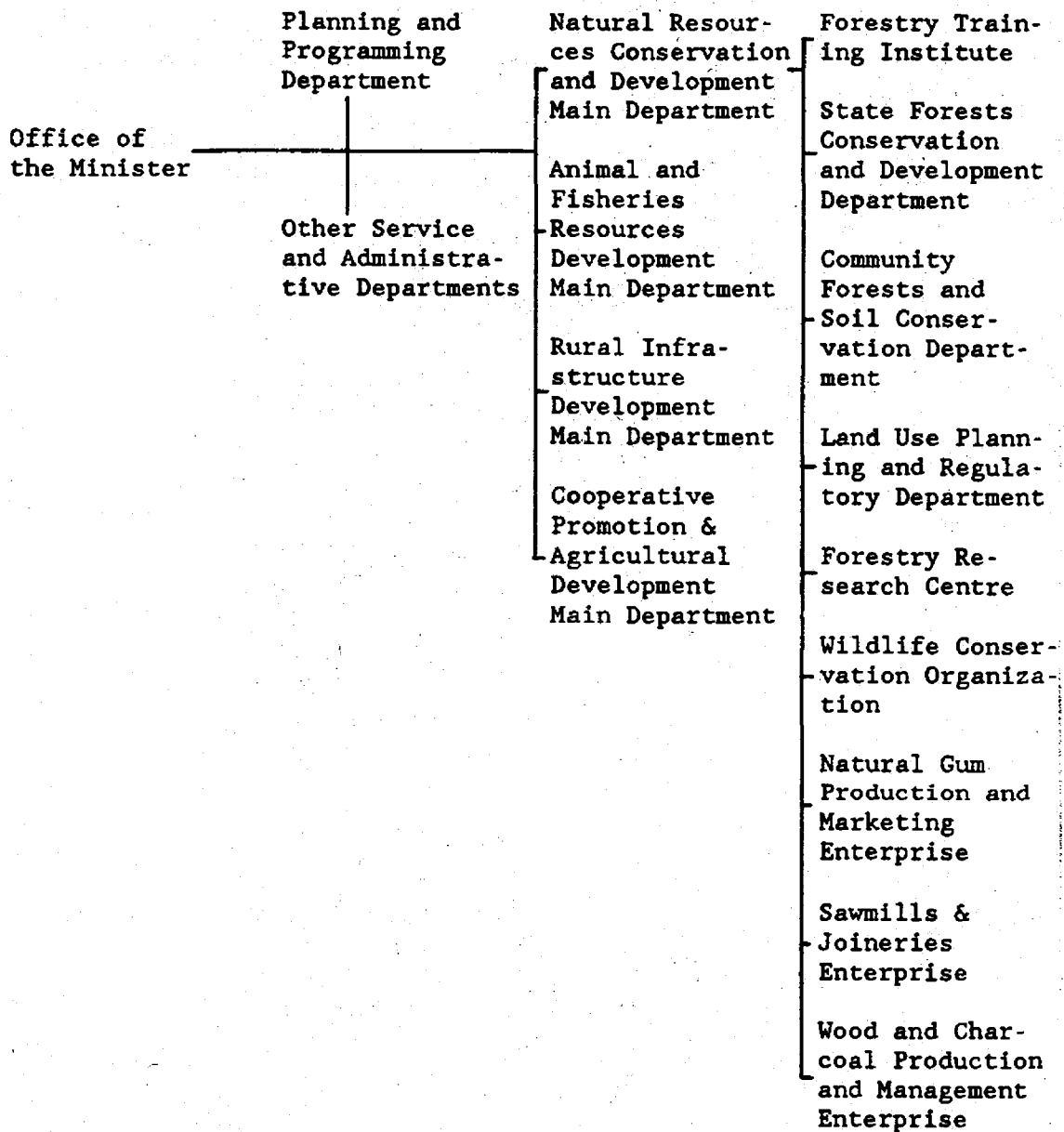
The Field Research Consultants will advise FRC in the setting up of a field research station network, and in designing the operations of such stations and their communication system with FRC Headquarters.

- Duties:
- Assist and advise FRC to set up field research stations;
  - design and organize field research station operating systems and procedures;
  - arrange workshops/seminars and other training on research station operations; and
  - counsel individual researchers on field research.

Qualifications:

Degree in Education. Experience in training methods. Acquaintance with forestry an asset.

APPENDIX A.7 ORGANIZATION OF THE MINISTRY OF AGRICULTURE



12.1.1987

ANNEX A.8 FRC: RESOURCES, EQUIPMENT AND RESULTS TO DATE

1. History of FRC and forestry research in Ethiopia

The history of forestry trials in Ethiopia goes back to the end of the last century.

A French philologist and adviser to Emperor Menelik II, Mondon-Vidaillet introduced fifteen Eucalyptus species into Ethiopia in 1895, to overcome fuelwood shortages in some of the principal towns. Among the species tried, E. globulus has done well and been extensively planted, largely through private enterprise, about towns and villages on the Western Plateau. At lower elevations E. camaldulensis plays a similar role (Henry 1973).

Institutionalized research came up much later, although trials have been made by agriculture and forestry administrations over the years.

A Forest Research Institute was set up and inaugurated in 1961, through financial support of GTZ and US Point Four. The Institute had modern equipment for wood testing and physical and chemical water and soil analysis, but was poorly staffed. In early 1967 the Institute, which was incorporated into the Addis Ababa University Faculty of Science, was discontinued due to the lack of funds.

Forestry research was to some extent included in SIDA supported development programmes since the commencement of the CADU (Chilalo Agricultural Development Unit) Project in 1965, when the first species trials were laid out in Asella. Since the initiation of the Forestry Sector Programme in the early 1970's, many research components have been included, however without a long-term research development plan or strategy.

A comprehensive description of the role of research and investigations in forestry sector development was described in "A National Forestry Programme for Ethiopia. Phase One: a Three-Year Development Project" published by SFoDA in 1974.

In 1975, UNDP/FAO started a Forestry Research Centre (the present FRC) and initiated a small part of the research programme promoted by SFoDA, mainly in support of reforestation in the north. In 1979..1982, a second phase of UNDP/FAO support was mainly directed to the FRC seed centre and species trials on various sites. After the termination of UNDP/FAO support, the main sponsor of FRC research has been the International Development Research Centre (IDRC) of Canada, supporting agroforestry trials and fuelwood survey in a 1984..1987 project.

Institute of Agricultural Research  
Library  
Addis Ababa

12.1.1987

## 2. FRC today

The FRC has not developed much from the UNDP/FAO days. External support in both cash and kind is still a precondition for filling the role set for research in development already in 1974. GOE has increased cash support, although not to the level considered adequate by the Mission for Ethiopia's needs, but staff numbers and skills continue to be a serious problem.

FRC has some, though limited staff capacity at the M.Sc and B.For levels. It has however been made responsible for research without adequate additional support after B.For or M.Sc graduation. Several years of such further support in the form of supervision and guidance by senior research staff would both increase research skills and acculturation into the values and tradition of science.

For these reasons - limitations in numbers and skill levels - present staff can not satisfactorily carry out the present research programme. The Mission does not consider adequate restructuring possible without long-term technical assistance, and cooperation in research and training, with an established research institute, over ten..twenty years.

A way to strengthen the impact of the FRC work without increasing staff resources could be to install two or three microcomputer work stations and train the staff in their use, in order to convert the collected data into a form usable by forestry practice.

Regarding the possibilities to expand the activities at FRC, the Mission found that:

- the present site is very suitable, near other scientific (International Livestock Center for Africa, ILCA etc) and natural resources (Addis-Bah Forest Plantation Project, the Plant Protection Department etc) agencies, with 6 ha of land at the present site (3-4 ha after encroachment), and a good 25 ha site in the neighborhood
- the present office and research facilities are used to their maximum and would have to be increased
- the present staff would have to be substantially increased (see Staff Development Plan in annex A.6)
- the Centre has to be restocked with field equipment, as much of the old ones have been taken over by other NRCMD departments during periods of low FRC activity.

12.1.1987

### 3. Location and physical infrastructure

FRC is located in the Shola area of Addis Abeba, near the International Livestock Centre for Africa (direction: Asmara Road). The present site has been reduced through encroachment from originally 6 ha to an estimated 3 ha. In the vicinity, FRC possesses a 25 ha block of unexploited land suitable for development, possibly jointly with other branches of the NRCD-MD. The present site may be a little narrow for an extensive construction programme; however, in case of a removal of all research activities to the larger site, space will be sufficient for all possible future activities. Concerning the localization in Addis Ababa, the Mission considers this to be the only viable alternative, taking into account FRC's primary function as a coordination and information center.

Table 1 lists buildings and other installations at the present site. With the completion of ongoing works, office space will be sufficient for the first and early second phase of the project proposed. Also, the old seed laboratory can be converted into a pathology & soil science lab, while any physiological studies can be done in the new seed lab. The old seed store can be converted into a computing center. The information center should be housed in the present library building. It is suggested that all administrative functions should be moved to the present head office building, and that remaining offices in the library building should be used for research groups.

In view of the proposed expansion of FRC in phase 2 and 3, further construction will be necessary within next year. Specifications for these works should be made during the preparatory phase (early 1988). In this connection the possibilities to relocate all activities except those of the seed center to the new site should be carefully considered.

Concerning the present nursery, the Mission found the areas available and the general lay-out sufficient for the present scope of operations. As much of the nursery research in the immediate future will be carried out by other agencies than FRC, no expansion is proposed. The soil handling facilities, however, need to be improved. Above all, well-sized composting facilities ought to be set up.

### 4. Staffing situation

FRC is presently poorly staffed. Besides its Head (M.Sc in forest genetics), only one M.Sc (environmental forestry) and two B.Sc. (agronomy) are employed. The remainder of the staff consists of 17 diploma holders (Wondo Genet), 12 "technicians" (with 12 grades of school) and 17 "junior technicians" employed in Addis Ababa. Another 12 "technicians" are said to be stationed at MoA regional offices to look after field trials. There are also day



12.1.1987

labourers in the nursery and the field.

This staffing situation is untenable. Even the best trained staff lacks specific research training or experience, and has furthermore time only for keeping the most essential work going. Field measurements of existing plots can be carried out with difficulty only.

In the past, several attempts have been made to improve the situation through overseas scholarships. As a result, however, very few of the trainees have returned to FRC employment after completion of the studies. Also, past assistance projects to FRC have not aimed at resolving the entire manpower and research development problem, but concentrated on a few, limited sectors. Of these, the assistance to the Seed Center has been most successful; however, even in this case a recent "defection" has caused great trouble to the programme.

Unless a long-term manpower development programme is initiated, there are no prospects for the situation to improve. Graduates from other sciences cannot be expected to take up forestry research without considerable additional training; academic foresters will continue to be in short supply and are furthermore trained to manage forest, not to do research. Research training, on the other hand, is a long process involving formal studies as well as apprenticeship at a research institution. Any forestry research development scheme must cater for these requirements, and be of a long-term character.

#### 5. Material resources: vehicles, equipment etc.

FRC is relatively well provided with vehicles for the moment (table 2), but several of the vehicles are very old and require either a thorough overhaul or should be replaced within a few years. No cars can be made available to arriving expatriates or new activities. Hence, some new vehicles have to be procured for the new activities proposed. Funds should also be allocated for spare parts and maintenance.

The center is poorly equipped with office machines. It has one modern word processor and a small photocopier, a duplicator, two microfiche readers (for the library) and an insufficient number of manual typewriters (amharic and latin). No computers or advanced calculators are available. Such equipment is urgently needed for rational processing of experimental data as well as for the information service proposed. Better photocopying and material for report preparation is also much required.

Equipment for laboratory work and field measurements is listed in table 3. Seed lab germinators have to be serviced, and some basic equipment is required. No equipment for pathology, physiology and soil science work is available, but has to be

12.1.1987

procured. Major items would be a good photo microscope, a medium range balance, pH and conductivity meters, a large freezer/refrigerator, and a good stock of routine glassware. The Centre has been relatively well stocked in respect of inventory equipment, but much has been transferred to other NRCMD departments during periods of low activity. A selective restocking is necessary.

#### 6. Research programme

The research work has been concentrated on three fields:

- work related to seed collection and storage
- nursery work
- plantation trials

The seed research is the best developed activity and involves germination tests after different storage schemes, quality tests and related activities. As this work will be covered by a separate project component it will not be further commented on here.

Nursery work has mainly dealt with examination of soil mixtures, fertilization schemes and watering regimes. In this, it has tried no new approaches; in the opinion of the mission there is still ample room for improvement of the seedling quality. Seedling production will be looked into by a research component of the Addis-Bah fuelwood plantation project and UNSO-FINNIDA plantation project, which will work in close cooperation with FRC; hence the subject will receive increased attention in a near future.

A list of existing field trials is included as table 4. In addition to these trials, a number of older plots has been established since the late 1960. Part of these have been inventoried during the last years. The Mission made the following observations:

- many plantation trials have been established without due consideration of the possible end use of the timber
- many older plantations have been lost due to faulty record keeping and/or lacking (resources for) maintenance
- no general strategy exists for the establishment of plantations trials
- attention has been given only to the species selection aspect, while management questions have been disregarded
- the number of experimental sites seems to be far too large for efficient management
- communication of preliminary (and when existant, final) results to forestry practice has been very deficient

12.1.1987

Besides some technical aspects where the Mission represents a philosophy different from the "classical" one followed by many forest administrations, it finds the main reason for the conditions criticized to be in the extreme shortage of research staff of the FRC. The Center has simply not had the personnel, or the financial resources to follow up existing field experiments.

This applies even more to any criticism of the presently very limited scope of the work; no expansion has been possible for these very reasons.

#### 7. Conclusions

- FRC is well situated
- Buildings are sufficient for the initial phase of an expansion programme, but new buildings at the present or nearby site are required for the future
- New computer, laboratory and inventory equipment has to be procured, as well as a few vehicles, and spare parts.
- The research programme has been very limited in scope, and reporting scarce.
- The manpower problem is an all-important one, and is the cause of reported shortcomings. Unless a considerable increase in staff number as well as competence is achieved, FRC stands no chance for an improved performance in the future.

Table 1. Buildings and installations at FRC

Building and spaces area, m<sup>2</sup>

---

Head office building:

- Head office 20
- 5 offices (9 m<sup>2</sup>) 45
- General store and duplication 28

Library building:

- Library 80
- 6 offices (3 @12 m<sup>2</sup>, 3 @ 7.5 m<sup>2</sup>) 66

Seed laboratory building:

- General laboratory 48
- Office/special lab 18

Seed store building:

- store 48
- office 9

Small greenhouse (for cutting propagation)

Provisional seed store (corrugated metal)

Nursery with water source, hedges and concrete ramps,  
approx. 2500 m<sup>2</sup>

Arboretum, approx. 1 ha

Under construction (completed within 1988):

Cold store 200

Seed center:

- Laboratory 110
- 6 offices (9 m<sup>2</sup>) 54

Planned for 1988/89:

- Cafeteria
- General store

12.1.1987

Table 2. Vehicles at FRC

vehicle	shape	donor
-----		
Trucks pick-ups and buses:		
- Mercedes heavy truck	new	SIDA
- Toyota pick-up 4-wd	new	SIDA
- " " 4-wd	ok	IDRC
- Staff transport bus	ok/old	FAO
Other:		
- 2 Nissan Patrol	in customs	SIDA
- Toyota 6-seater	good	IDRC
- " "	old	GOE
- 3 Land Rover	old	FAO
- 1 " "	old	GOE
- DX Toyota	out of order ?	
- Suzuki	out of order ?	

Table 3. Laboratory and inventory equipment at FRC

Diameter tape	11	Range finder	2
Measuring tape	10	Luna six	1
Haga meter	5	Suunto hypsometer	4
Compass	10	Haga meter	5
Relascope	1	Blume-Leiss rel.	2
Caliper	6	Dial caliper	3
Hand level	5	Binocular	3
Increment borer	13	Hand lens	7
Soil moist. met.	3	Soil Kit	3
Calculators	10	Map dist meter	1
Germinators	3 (1 out of o.)	autoclave	1
Large incubator	1	water distillator	1
Small incubator	2 (120 & 250 o)	Retsch mill 100g	1
Refrigerator	1	Sample divider	1
Analytic balance	1	Seed blower	2
Heavy balance	2 (10 & 100 kg)	Gas heater	3
Stereo zoom micr.	1	Seed counter	1
Monoc. microscope	2 (no light)	soil sterilizer	2
Thermohygrograph	2	glassware	very little

# MINISTRY OF AGRICULTURE

The **NATURAL RESOURCES CONSERVATION and DEVELOPMENT MAIN DEPARTMENT** of the Ministry of Agriculture is responsible for developing the natural resources in Ethiopia. Its mandate includes soil conservation, forestry, wildlife and manpower development programmes. It has a main office in Addis Abeba and branch offices in all regions of Ethiopia.

The "Studies, Reports and Evaluations" published in this format are intended to inform a wider audience of the results of studies, plans, evaluations within the area of work of the Department.

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