ICRAF

Draft

Programme of Work and Budget for 1991

Indicative Plans for 1992 - 1993

DRAFT

Nairobi, Kenya

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ICRAF's Programme of Work and Budget for 1991 with indicative plans for 1992 - 1993

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1. INTRODUCTION

The present draft "Programme of Work and Budget for 1991 with forecasts for 1992 and 1993" represents an intermediate step in ICRAF's new process of programme/budget planning and approval. In May this year, ICRAF's Board of Trustees approved "ICRAF's Strategy to the Year 2000" which is the basis on which our Programme of Work will build. Subsequently, ICRAF's Donor Support Group endorsed the Strategy.

On 1 July ICRAF was reorganized to better meet the challenges of a programme based on the new Strategy. From 17 September to 2 October, the first ICRAF Annual Programme Review and Planning meeting was held at ICRAF House with participation of all professional staff. The outcome of that meeting was presented to the Programme Committee of the Board on 3-5 October. The PC approved the programme.

The intention was then to summarize the Programme of Work and to attach to it a detailed budget for 1991, with indicative budgets for 1992 and 1993, and present it to the Donor Support Group meeting in Washington on 27 October. Included in this report is a Programme of Work and Budget (PWB) for discussion. Based on comments received, a more detailed budgeting exercise will be undertaken on all projects/programmes. The detailed budget will be presented to ICRAF Executive and Finance Committee in December 1990, for eventual Board approval in March 1991. As presented here, only the total budgets for each programme are shown.

The intention is that, once our new programme and structure are smoothly operational, the annual review and planning meeting in August or September will produce a detailed programme and budget for the following year and an indicative, rolling 3 (or 5) year plan and budget for presentation to Board and Donors.

The programme and budget presented in this document build on the approved ICRAF "Strategy to the Year 2000". No consideration has been given to any possible programme implications related to the eventual outcome of the on-going discussion about ICRAF membership in the CGIAR.

2. ICRAF's STRATEGY TO THE YEAR 2000

In May this year, ICRAF's Board of Trustees approved the "Strategy to the Year 2000", an approval which concluded one and a half year's of intensive work. This work involved not only management, staff and Board of ICRAF, but also, very much, our collaborating partners, our donors and specially consulted resource persons. The present strategy is a logical progression of the institutional development of ICRAF which started in 1980/81. In the first phase (1980-85), emphasis was laid on developing the necessary scientific concepts, methods and tools (e.g. the D&D methodology, research designs, MPT and other information databases, etc.) for conducting agroforestry research. The second phase (1986-90) saw the systematic establishment of the four major collaborative research and institution-building networks in Africa (AFRENA's). Methods and concepts developed before are used and further refined in these applied research programmes.

When defining our strategy and programme of work for the 1990's there were basically three points of departure:

i) our mandate as a research institution;
ii) our present resources and comparative advantages; and,
iii) challenges, opportunities and needs in agroforestry research, including an understanding of all other existing and potential institutions dealing in agroforestry.

Our mandate, as derived from the Council's Charter, remains broad enough to guide us into the changing times of the 1990's; and therefore remains unchanged:

> *"To increase the economic and nutritional well-being of people in developing countries through the integration of woody perennials in farming and related land-use systems in order to achieve higher productivity, sustainability and diversity of output".*

In order to fulfil its mandate, ICRAF's ultimate goal is:

> *"To initiate and assist in the generation and dissemination of appropriate agroforestry technologies for use by farmers".*

ICRAF shares this goal with national institutions in developing countries and it is these institutions, not ICRAF, that bear the primary responsibility for generating and disseminating agroforestry technologies. ICRAF's task is to support their work, not to substitute for it. It follows that the Council's primary mode of operation will be collaborative.

In developing a strategy to reach this goal, ICRAF must take three factors into account:

- Agroforestry is complex in both technical and institutional terms. Not only does agroforestry present numerous technical options, but it is also being taken up by a rapidly growing number of institutions and yet has no real institutional home.

- Agroforestry technologies are highly location specific, more so than single-commodity technologies. This is because agroforestry is not a single land-use system, but an almost infinite variety of combinations of species and management techniques. The ultimate responsibility for developing locally adapted technologies lies with national institutions.

- ICRAF has a global mandate, but can never hope to acquire the resources needed to make a global impact through directly addressing the generation of location-specific technologies. ICRAF must therefore focus its programme for the 1990s on a few topics of importance in which it has a comparative advantage, while encouraging others to undertake research in other areas.

In summary, ICRAF's strategy for the 1990s is to:

- Strengthen national capacities to conduct agroforestry research by encouraging interinstitutional collaboration and promoting the dissemination of information on agroforestry through training and other activities.

- Encourage and conduct, jointly with national institutions, applied and adaptive research to develop appropriate agroforestry technologies through a careful selection of research priorities based on the needs and potential of selected land-use systems in the major agro-ecological zones of Africa.

- Conduct strategic research on selected topics of global importance in which a need has been recognized through collaborative applied research. ICRAF will encourage its partners and others to undertake strategic research in areas outside its own comparative advantage.

When developing the Programme of Work, based on this strategy, and described in subsequent chapters of this report, three overriding principles have been followed:

- The approach to research and institution building will continue to be systems- and problem-oriented, interdisciplinary, beneficiary-driven and client responsive.

- The mode of operation will continue to be collaborative

- Priority setting will continue to be based on the needs of land users and the relevance of agroforestry to address those needs.

The major directions which we envisage that our new strategy and programme will take us in the 1990's are to:

- Strengthen applied and adaptive research through the AFRENAs.
- Increase research on multipurpose-tree improvement
- Increase strategic research on issues related to sustainability
- Increase research on policy and economic issues
- Build agroforestry education programmes at national universities
- Provide more support to research in Asia and Latin America
- Reduce the relative emphasis on developing research methods

3. A NEW PROGRAMME STRUCTURE - THE MATRIX ORGANIZATION

ICRAF's two major activities fall under the broad headings of research and dissemination. Research include strategic, applied and adaptive forms, carried out in programmes based both at headquarters and in the collaborative AFRENA context. Dissemination include both training and information activities in their widest sense, some done for global audiences and others closely integrated within the AFRENA programmes. With a complex and highly integrated set of activities like this it is inevitable that management will be complicated.

ICRAF's total activities have been organized into three sets of programmes:

I. Collaborative Programmes:

- East Africa AFRENA
- Southern Africa AFRENA
- Humid Lowlands of West Africa (HULWA)
- Semi-Arid Lowlands of West Africa (SALWA)
- South Asia programme

II. Research Programmes:

- Agroforestry and land use systems
- Component interactions in agroforestry systems
- Multipurpose tree improvement for agroforestry systems
- Agroforestry policy and institutional issues

III. Dissemination Programmes:

- Training
- Education
- Information and documentation
- Communications

These programmes, each of which is headed by a coordinator, are subdivided into projects (which also serve as "cost centres"). The projects and programmes are organized into a matrix for planning, implementation and evaluation purposes. The matrix is shown in figures 1 and 2 (p.4).

In reality, the matrix is three dimensional in that the dissemination programmes also interlink directly with the research programmes, e.g. a training course for S.A. AFRENA is invariably within the technical scope of one of the research programmes.

Although this three-dimensional aspect is implicit in the way we present the programme of work below in chapters 4-6, the organizational structure for day-to-day management of the programme which became operational in July 1990, comprise only two divisions - the Research Division and the Training and Information Division (see fig. 3, p.5).

The Senior Director reports to the Director-General and is responsible for the overall coordination of programmes within and between the Research and the Training and Information Divisions, while the Director of Finance and Administration continues to report directly to the Director-General. A Programme Committee plans and coordinates the institution's thirteen programmes. Responsibility for implementing these programmes lies with the two Divisional Directors.

The previously separate Research Development and Collaborative Programmes Divisions are now merged in a single Research Division containing the four research programmes plus staff outposted to the AFRENAs. Training and education have moved from their former position in Collaborataive Programmes into the new Training and Information Division along with information and communications.

RESEARCH PROGRAMMES	HQ FIELD S.	COLLABORATIVE PROGRAMMES					
		S. AFRICA	E. AFRICA	SALWA	HULWA	S. ASIA	OTHER
P1 AGROFORESTRY AND LAND USE SYSTEMS							
P2 COMPONENT INTERACTIONS							
P3 MPT							
P4 POLICY AND INSTITUT.							
P5 TRAINING							
P6 EDUCATION							
P7 INFORMATION AND DOCUMENTATION							
P8 COMMUNICATIONS							

Figure 1. The Summary Matrix

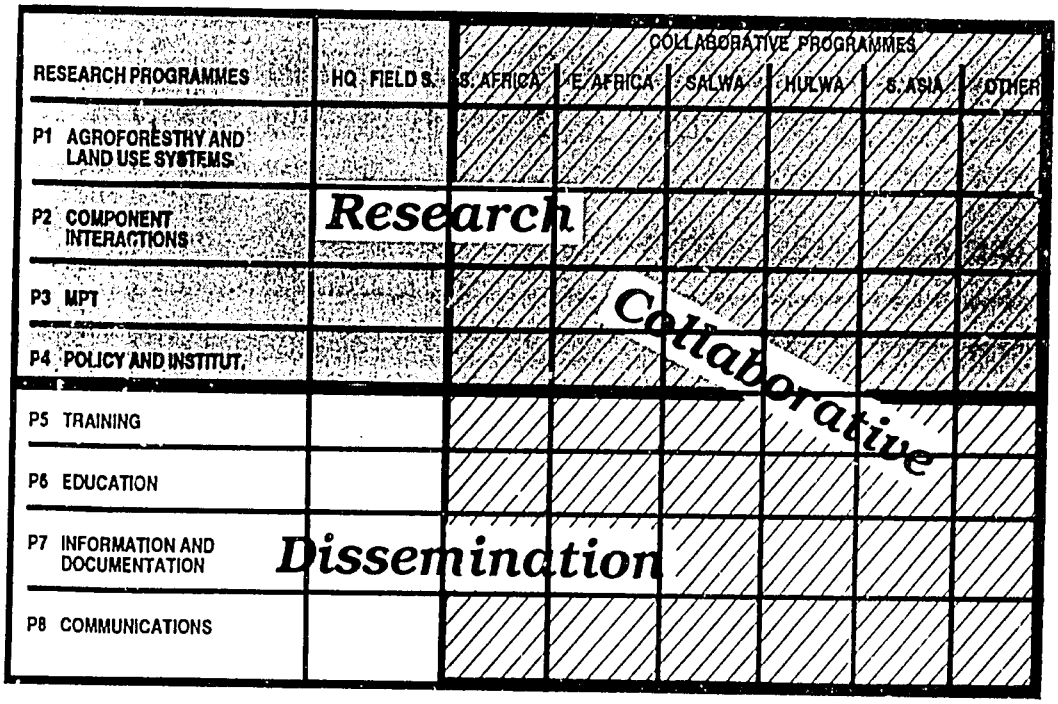

Figure 2. The Summary Matrix and Programmes

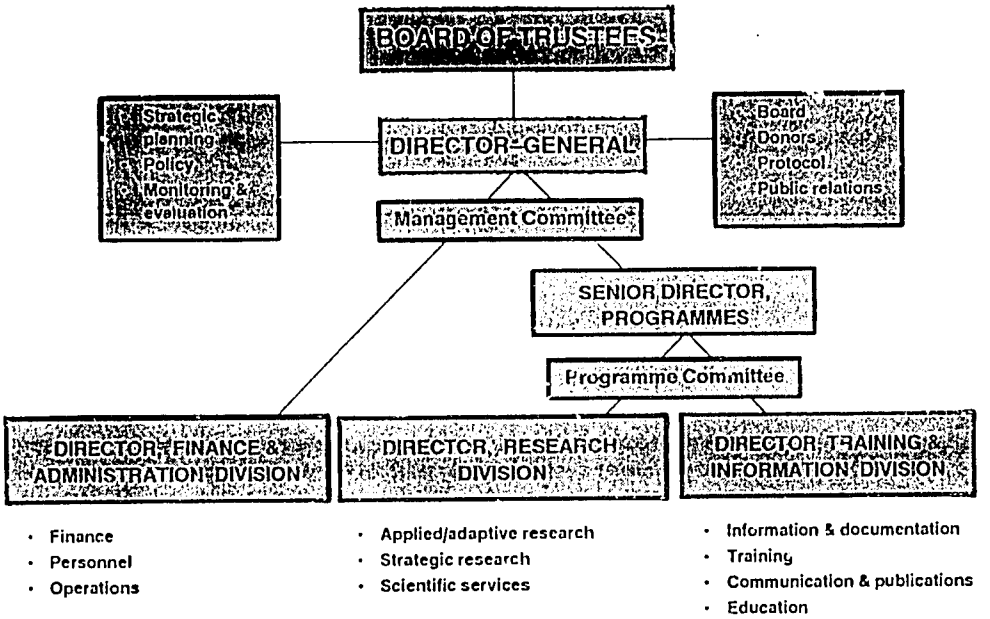

Figure 3. ICRAF's present structure

A new Planning Unit in the Director-General's office helps with strategic planning and monitoring, including developing a set of indicators for gauging the impact of ICRAF's activities. Another unit in the Director-General's office addresses Donor and Board relations, public relations and protocol with our host country, Kenya.

The Director of Research is responsible for the technical and scientific quality of the research programme, including research conducted in the AFRENAs. Initially at least, responsibility for institutional relationships will be shared between the Senior Director and the regional network Coordinators of the AFRENA's.

The zonal AFRENA programme continue to be organized and managed by regional Coordinators, reporting to the Director of Research. There are two main reasons why we chose to organize it like this instead of the AFRENA coordinators reporting to both Directors (note in the matrix and in the presentations below that there is a substantial volume of training and information work in the AFRENAs):

- one is the fact that virtually all ICRAF staff recruited directly for the AFRENA programmes are there primarily as scientists (although they contribute also to training and information), and,
- the sheer impossibility of running a programme where each individual reports to three different people.

It is in the light of the above that the important role of the Senior Director, Programmes, becomes obvious.

Activities and plans for all programmes and projects are discussed at an annual programme review meeting. Budgets are then prepared and funds allocated to those projects that have been approved. Project leaders are responsible for managing project funds under the supervision of the respective programme coordinators and divisional directors.

4. COLLABORATIVE PROGRAMMES

4.1. Introduction

Collaboration with national institutions is an essential feature of ICRAF's strategy not only in its research programmes but also in its training and information activities. ICRAF's collaborative work for 1991 will, as in the past, focus on Sub-Saharan Africa where land use systems are complex, needs are acute and the potential contribution of agroforestry is substantial.

The objectives of ICRAF's collaborative programmes are:

- To generate appropriate agroforestry technologies for priority land use systems.
- To strengthen national capacity and the institutional framework to plan and implement agroforestry research, and
- To identify priority issues for ICRAF's strategic research activities.

To implement these objectives, ICRAF uses the following operational principles:

- Focus in sub-Saharan Africa
- The adoption of an agroecological approach to identify major land use systems
- Networks of participating countries within the respective agroecological zones (AFRENAs).
- Within each country to apply the "Cycle for technology development" process (see next section).
- Use of a multidisciplinary approach to planning, formulation and implementation of agroforestry research activities.
- Mechanisms at the national level to ensure interinstitutional collaboration for priority setting, developing agroforestry strategies and implementing effective research programmes.

ICRAF's approach to collaborative research for purposes of generating agroforestry technology revolves around the **"Cycle for Technology Development"**.

This is a logical, reiterative research process that uses a systems perspective with an interdisciplinary approach. The steps in the process include:

1. MACRO D&D
2. MICRO D&D
3. Design of proposed technologies
4. Component experimentation and component interaction experimentation (research on-station and on-farm)
5. Review of relevant research findings.
6. Testing and validation of technology on-farm.
7. The dissemination of validated technologies through extension agencies.

In short, this process is systems and problem oriented, interdisciplinary, beneficiary driven and client responsive. As a result of this rigorous and participatory process, ICRAF is confident that the technologies and programmes of experimentation reflect the needs of resource poor farmers. During the phase of research implementation, the activities focus on research dealing with components and component interaction to examine the bio-physical and socio-economic interactions both on-station and on-farm. At any location, typical trials include:

- General screening of MPT species and provenances;
- Technology screening of MPTs;
- Management trials;
- Prototype technology trials.

Most of the trials dealing with screening are by definition restricted to controlled sites on-station whereas most of the prototype trials are undertaken through on-farm experimentation.

ICRAF's collaborative programmes are specifically aimed at generating technologies and will, in their present form, continue to be restricted to activities in sub-saharan Africa through the four AFRENAs.

ICRAF will expand its activities in other regions of the tropical developing world by establishing "liaison offices" in these regions with the following functions:

- Agroforestry research planning and priorities setting.
- Training and Education.
- Information, Documentation and Communications.

It is anticipated that the first of these regional liaison offices will be established for the South Asia region in 1992-93.

Finally, and as a principle, all of ICRAFs collaborative programmes ensure that training, education, information and documentation are integrated in all phases of the "Cycle for Technology Development". Although these will be reported within the Training and Information activities at ICRAF, it is important to emphasize that they form an integral part of ICRAF's collaborative programmes, specifically addressing the issue of building institutional capacity.

4.2. EASTERN AND CENTRAL AFRICA AFRENA

4.2.1. Background

This network covers the highlands of Eastern and Central Africa. Altitudes for the zone vary from 1,000m to 2,500m, rainfall is bimodal and on average above 1,000mm per annum. Soil types vary considerably and in particular in pH, soil depths and texture. In 1990 the participating countries in the network included: Kenya, Uganda, Rwanda and Burundi. In 1990, Ethiopia became a member of the Network and activities concentrated on the finalization of the MACRO D&D study. Zaire joined the network in 1990, and it is expected that research in the eastern highlands will commence in 1991.

In 1990, the network had established on-going trials at ten sites:

Burundi	Kenya	Rwanda	Uganda
Mashetsi	Maseno	Rwerere	Kachuokana
Karuzi		Gakuta	Kabanyolo
		Rubona	Bushenye
			Kalengerere

The network is being implemented in a collaborative mode between ICRAF and 8 national research institutions in the four participating countries. In addition, a sub-regional organization, IRAZ, is also participating in the network.

Major land-use problems identified in the planning phase of this network were low soil fertility and soil erosion problems especially in food crop plots, shortage of fodder, particularly in the dry season and shortages of fuelwood.

4.2.2. On-going Research

To address these problems 56 different trials are ongoing at all of the research station sites. These trials can be summarized as follows:

A. COMPONENT TRIALS

a) Initial species screening
   - Woody (general)
   - Shrubs/herbaceous

b) Initial species management

c) Initial species establishment

B. COMPONENT INTERACTION TRIALS

a) Hedges in cropland
- species screening
- green manure/fertilizer
- cutting height (fodder)
- hedgerow arrangement/crop distance

b) Trees on bunds/boundaries
- upperstorey species screening
- grass/shrub combination
- grass/shrub establishment time/spacing
- upperstorey/understorey combination/spacing
- fruits with or without understorey/bund position (land-use specific)
- *Grevillea* with or without understorey

c) Trees in banana plots
- species screening
- species density

d) Trees in coffee plots
- woody species screening/mulch
- herbaceous species screening/mulch

e) Fodder banks (blocks)
- cutting time dry season

C. SYSTEMS/TECHNOLOGY TRIALS

a) *Grevillea/Leucaena* on contours
b) *Casuarina* woodlots
c) Fanya juu *Calliandra/Pennisetum* on bunds
d) Physical structures/live barriers on bunds

On-farm Research Activities in the network started in 1990. In Kenya the on-farm research in the food crop based land use system in Western Kenya comprises a monitoring study on previously established hedgerow intercropping studies on 20 farms and a study into the adoption of trees.

In Uganda, the on-farm research in the Kigezi annual montane food crop system started with five women's groups totalling 45 farmers. The technologies tested are upper storey trees and multistorey tree planting on field bunds.

In Rwanda, the on-farm research activities in the "systeme intensif de haute terre non- volcanique" started with the study of the potential role of woody stakes for climbing beans on 135 farms.

4.2.3. Plans for 1991

In 1991, three important activities will take place:

A. In July 1991 a scientific seminar to report on technical results will take place in Nairobi.

B. Funding for Phase I of this network from USAID will end in September 1991. A proposal for Phase II has been prepared and will hopefully commence in October 1991 for a period of five years.

C. In 1991, an additional site in Kenya, Embu, will form the country-specific site for the Kenya Programme (funding from SIDA) and executed by KARI/ICRAF. In addition, a research programme for the highlands of Ethiopia will be implemented at three sites in Ethiopia. D&D studies will commence in eastern Zaire.

In 1991, the concentration of efforts will be on maintaining on-going trials. However, there will be a number of new surveys initiated in all of the participating countries. These surveys can be categorized as follows:

A. Surveys of trees in existing land use systems.

B. Surveys of existing agroforestry systems and the management of and arrangement of trees within systems.

C. MICRO D&D surveys (i.e. Ethiopia) as well as a reiteration of MICRO D&D in Uganda and Kenya.

In 1991, approximately 20 new on-station trials examining component interaction will be initiated in all of the countries. However, the bulk of new trials will be restricted to activities in Kenya (at Embu) as well as in Ethiopia.

With respect to on-farm trials, six new experiments are being proposed in 1991. The bulk of these will be located in Kenya. With respect to MPT improvement activities, there will be six new trials dealing with MPT screening and evaluation. Most of these will be specifically looking at screening for particular technologies (e.g. fruit trees and upper storey trees in Uganda).

4.2.4. Plans for 1992-1993

As the second phase of the network gets underway in 1991 the following general lines of research will be pursued:

A. On-farm testing of zonally researched technologies

On-farm research will be initiated in selected land-use systems in each country, i.e.:

a) Kenya:	-	Food crop based land-use system in Western Kenya.
	-	Coffee based land-use system in Embu.
b) Uganda:	-	Kigezi annual montane food crop system
	-	Intensive coffee, banana, lakeshore food crop system
c) Rwanda:	-	Intensive, high altitude land-use system on non-volcanic soils
	-	Extensive high altitude land-use system on non-volcanic soils.
d) Burundi:	-	"Système du plateau central"
e) Ethiopia:	-	High potential perennial system
	-	High potential cereal system (hilly, intensive)
	-	High potential cereal system (flat, intensive)

The main aim of the on-farm trials will be to obtain farmer evaluation of some prototype technologies as well as to obtain feedback for further researcher managed trials.The most prominent and promising technologies identified which will be included for the on-farm prototype trials are:

a) Hedgerow intercropping for soil conservation and soil fertility maintenance and improvement;

b) Grass/shrub strips on bunds for soil conservation and fodder production;

c) Upper storey trees for poles, timber, fruit and fuelwood production on bunds and boundaries;

d) Multistorey arrangement on bunds and boundaries;

e) Multistorey arrangement on bunds and boundaries for soil conservation, fodder, poles, timber, fuelwood and fruits;

f) Stake production in short-term fallow systems.

An integral part of the on-farm research will be special diagnostic studies to verify/quantify diagnosed problems and potentials as well as to determine research questions aimed at improving already existing agroforestry technologies.

B. Expanding technology specific on-station research

Three major areas of expanding technology specific on-station research are envisaged.

a) Additional trials using species identified during some of the earlier general species screening trials.

b) Additional station/trial sites to broaden the range of sites representing different altitudes, soil types and climate. These would be satellite stations.

c) Additional technologies would include agroforestry technologies for grazing lands and farm woodlot technologies.

C. A limited expansion of general species screening trials

At present 163 accessions are tested in various screening trials. Not all accessions/species are tested in each site and one new activity is to replicate the most promising species from each site across other sites. The second activity is to enlarge the number of species by including promising indigenous and exotic species.

4.2.5. Resources

In 1990 there were 7 ICRAF scientists working in this network. Two positions are under recruitment for 1991; one for Embu, Kenya, and one for Ethiopia.

Current donors are USAID, SIDA and the Governments of Switzerland and The Netherlands.

4.3. SOUTHERN AFRICA AFRENA

4.3.1. Background

The Southern Africa AFRENA programme was initiated in 1986 with funding from IDRC and CIDA. The programme focuses on the plateau zone of southern Africa, a region which covers approximately one million square kilometres at an altitude of 700 to 1,500m. Rainfall is in a unimodal pattern and ranges from 800mm to 1,200mm per year. Soils include luvisols, ferric acrisols and ferric luvisols.

Initially, there were three countries participating in the network: Malawi, Tanzania and Zambia. The Network is jointly executed by ICRAF and the Southern Africa Coordination Centre for Agricultural Research (SACCAR). In 1990, Zimbabwe joined the network and the initial trials will be planted there in November/December 1990.

In each of the participating countries, there is a zonal research site as well as a country-specific (or land-use specific) research site. These are:

Country	Zonal Site	Country Site
Malawi	Zomba	Lilongwe
Tanzania	Tabora	Shinyanga
Zambia	Lusaka	Chipata
Zimbabwe		Domboshawa
		Makoholi

In terms of implementing the research programme, ICRAF is collaborating with seven national institutions in the four countries, and one regional institution, SACCAR.

Problems in the region include food shortages and deforestation. Most food is produced by smallholder farmers whose crop yields are declining due to pressure on land, resulting in shortened fallow periods. At the same time, many farm families face critical shortages of fuelwood and fodder for livestock, particularly during the long dry season. These issues were identified through the D&D exercises and formed the basis for designing the agroforestry technologies to solve these problems as well as defining the respective experimental research programmes in the respective countries.

4.3.2. On-going research

In 1990, there were 30 on-going experiments which can be categorized into three main research thrusts:

A. MPT species/provenance screening and testing.
B. MPT management for soil improvement.
C. MPT management for fodder production.

It should be pointed out that trials in the country-specific projects in Lilongwe (Malawi), and Zimbabwe will start in the 1990 season (November/December). Trials in Shinyanga (Tanzania) will commence in 1991.

The on-going research in the zonal programme and the country specific project in Chipata, Zambia falls into the following categories:

A. MPT species and provenance screening.
B. MPT surveys.
C. MPT Management trials:
    a) Soil fertility improvement
    b) Fodder production
D. Technology testing:
    a) Hedgerow intercropping
    b) Improved fallows.
E. Animal Feeding Trials of proven MPTs
F. MPT litter decomposition
G. Nursery studies
H. On-farm research:
    a) Improved fallow
    b) Hedgerow intercropping
    c) Live Fences.

A summary of the highlights of the ongoing work follows:

A. MPT screening and testing

The main screening is centred at Makoka Research Station in Malawi with replication of some trials at Chalimbana in Zambia and in Tumbi, Tanzania.

The results so far show that after preliminary screening a few species/provenances are interesting in relation to various technologies being proposed. The species have been selected on the basis of

survival, growth rates and tree characteristics. As such, *Sesbania sesban* and *Sesbania macrantha* were included in the management trials at Chalimbana, Makoka and Tumbi.

Results from screening trials at three sites for the last three seasons have also shown consistently superior performance of ex-Jamhuri (Kenya) *Leucaena*. Another screening trial of Leucaena from 20 seed sources conducted at two sites has demonstrated that only 4 out of the 20 seed source of *Leucaena* merit further investigation.

Gliricidia sepium provenance screening trials at Chipata in Zambia has been ongoing for three years. Four promising provenances have been selected for further testing.

Screening work on *Sesbania* provenances and pigeon pea varieties at Tumbi have demonstrated wide diversity. On this basis, a few provenances and varieties will be tested in management trials in 1990-91 for fodder productivity throughout the year and for fodder and grain yield (pigeon pea).

B. MPT Management for Soil Improvement

The main technologies in which species/provenances are being tested are hedgerow intercropping, relay cropping and improved fallow. The response of maize grain yield to *Leucaena*, *Flemingia congesta* and *Sesbania sesban* under hedgerow intercropping at Chalimbana has demonstrated enhanced response to fertilizer in the presence of leucaena and *Flemingia congesta*. The experiment on relay cropping is in its first year. Despite poor rains, it is clear that only the first planting date of *Sesbania* was successful under drought stress conditions.

Finally, the use of *Sesbania sesban* in improved fallows for soil fertility improvement is promising judging from high yield of biomass at various trials sites (i.e. Chipata, Chalimbana and Makoka).

C. MPT Management for Fodder

Sesbania sesban, *Sesbania macrantha* and *Leucaena leucocephala* have demonstrated potential fodder production. Certain types of pigeon pea have also shown some potential for both fodder and grain production. New trials during 1989/90 looked at fodder yields throughout the dry season (critical fodder shortage period) under varying cutting frequencies to ensure higher fodder: wood yield ratio.

D. MPT Surveys

MPT surveys were conducted in Malawi, Tanzania and Zambia. The compilation of the survey reports from their respective countries has been completed. Briefly, the surveys looked at indigenous MPTs in the ecozone, their location in the landscape and/or the farm, uses (fruit, medicinal, building etc) and method of propagation. One of the main findings was the wide range of useful and indigenous MPTs and farmers' broad knowledge of these MPTs and their uses. Although farmers recognize the uses of these indigenous MPTs species, hardly any of them planted these species, apparently due to a lack of knowledge on methods of propagation. As a result, an exercise on seed collection of key indigenous species, notably fruits, has been initiated and nurseries/ laboratory work undertaken to look at germination/propagation requirements.

4.3.3. Plans for 1991

The major activities in 1991 will be:

A. Maintenance, data collection and analysis of all on-going experiments at all sites.
B. A regional conference in June in Malawi 1991 to present scientific results.
C. An evaluation of the programme by SACCAR/CIDA/ICRAF in February 1991.

In terms of new proposed experiments the following will be undertaken.

A. Malawi:

In the 1991 crop season, emphasis will be on evaluation, data analysis and reporting of established trials. Field work on collection and testing of native fruit trees germplasm will be continued. The following new experiments will be initiated:

a) Comparison of green manure decomposition rates and effectiveness of fertilizers as supplements.
b) Effect of *Leucaena* mulch application time and methods on fertilizer use efficiency in yield of maize.

B. Tanzania:

As a result of findings from the on-going work the following new trials are planned at Tumbi:

a) Dry season supplementation of goats with pigeon peas, *Sesbania macrantha*, *Sesbania sesban*, *Leucaena* and some Australian species. This trial will be preceded by fodder preference trials.
b) Management of *Sesbania* for fodder yield through the dry season by sequentially harvesting it.

C. Zambia: (Chalimbana)

No new experiments.

D. Zimbabwe:

Two experiments will be implemented at two sites (Makoholi and Domboshawa):

a) Multipurpose trees evaluation for fodder and green manure.
b) Evaluation of pigeon peas for fodder production and soil improvement.

In terms of the country-specific projects the following new activities will be undertaken.

A. Zambia: (Chipata)

The following new trials will be implemented in the year:

a) Growth performance of *Casuarina equisetifolia* as influenced by *Frankia* inoculation.
b) Management of tree and shrub species in a hedgerow for soil fertility improvement.
c) The effect of leguminous trees and shrubs on soil fertility restoration and crop yield and in planted managed fallow.
d) On-farm research trials looking at prototype technologies of improved fallow, hedgerow intercropping and live fences.

D. Tanzania: (Shinyanga)

The following trials will be established in 1991:

a) MPT species and provenance evaluation.
b) MPT management trials for:
    i) Soil fertility
    ii) Fodder
    iii) Fuelwood
    iv) Soil conservation
    v) Live fences
c) Technology testing for improved fallow, fodder banks, live fences and boundary

planting.

E. Malawi: (Chitedze)

The proposed trials which will be undertaken will revolve around on-farm testing of technologies specifically involving:

a) On-farm prototype testing of hedgerow intercropping using *Leucaena leucocephala* with maize.
b) Establishment and management of farmer-managed fodder bank prototypes for providing supplementary fodder in the dry season.
c) Evaluation of effectiveness of live fences in "dimbas" and fodder banks.
d) Test potential of intensifying intercropping of fruit-tree with food crops in the dimbas and home gardens.
e) Study of local management and utilization of *Acacia albida* by small farmers.

4.3.4. Plans for 1992-1993

Phase I of the Southern AFRENA Network will end in 1992. The evaluation undertaken of the network in 1991 will to large extent determine future plans, priorities and direction for the network as well as for country-specific projects. Secondly, the results as presented at the scientific conference in June 1991 will also influence future priorities for agroforestry research in the network.

Therefore, aside from the monitoring and maintenance of existing experiments, it is too early at this stage to accurately define the work programme for 1992-1993.

4.3.5. Resources

In 1990 there were 7 ICRAF scientists working in this network. Two positions are under recruitment for 1991; one for Zimbabwe and one for Shinyanga, Tanzania.

Current donors include CIDA, NORAD, SAREC, IDRC and the government of The Netherlands.

4.4. SEMI-ARID LOWLANDS OF WEST AFRICA AFRENA (SALWA)

4.4.1. Background

The AFRENA programme for the Semi-Arid Lowlands of West Africa (SALWA) was launched in January 1989. There are four participating countries - Burkina Faso, Mali, Niger and Senegal.

The semi-arid zone is defined as the area in which the ratio of mean annual precipitation to potential evapotranspiration is between 0.20 and 0.50. It is essentially the cereal producing region of the semi-arid tropics (SAT) of West Africa.

In addition to the four participating countries, SALWA is also cooperating with regional and international organizations in the region;

Institut du Sahel
CILSS
ICRISAT Sahelian Centre
SAFGRAD

In 1989, MACRO D&D's were conducted in all four participating countries. In total 19 land-use systems were identified and described: 3 in Burkina Faso, 5 in Mali, 6 in Niger and 5 in Senegal. Of these, each country has selected one priority LUS:

A. The agro-silvopastoral system of the northern Sudanian zone of Burkina Faso.
B. The parkland system of croplands with scattered trees in Mali.
C. The Niger river valley system in Niger.
D. The groundnut basin system of Sénégal.

Rainfed agriculture with mixed cropping is the dominant land-use pattern in all four systems.

4.4.2. On-going research

Based on these four land use systems, Micro D&D's were undertaken in each country in 1990. A major outcome of these Micro studies has been to identify the major constraints in the LUS and the proposed AF technologies.

The major problems identified include:

A. Insufficient food crop production due to low moisture availability for crops, low soil fertility, run-off and wind erosion, animal damages to crops etc.
B. Low cash income because of low animal production particularly, due to fodder shortage and because of low tree production (e.g. *Butyrospermum parkii*)
C. Insufficient wood supply.

The major AF technologies to deal with these problems include:

A. Mixed intercropping
B. Trees on contour lines
C. Windbreaks
D. Live fencing
E. Fodder banks
F. Alley cropping

In addition to finalizing the D&D studies, in 1990 work will continue to:

A. Finalize the design of experiments in component interaction trials for the respective technologies.
B. Identification of germplasm sources for candidate species.
C. Identification of sites for the experimental program in each country.

4.4.3. Plans for 1991

In 1991, SALWA will move from research planning/formulation to research implementation in all four countries. The work programme will be finalized at a workshop in December 1990 in Dakar, Sénégal.

The areas of research will involve:

A. Completion and finalization of MICRO D&D
Synthesis of D&D results.

B. Site characterization (1-3 sites per country for 4 countries).

C. Management trials in each country on the following technologies:

a) Mixed intercropping
b) Trees on contour lines
c) Windbreaks
d) Live fencing
e) Fodder Banks
f) Alley Cropping

D. On-farm studies of "parklands"

a) Silvicultural treatments
b) Tree density studies
c) Parkland enrichment.

E. Germplasm acquisition, nursery establishment and screening and evaluation of material.

F. Initiate germplasm improvement of selected species (4-6) - genetics, symbiotic associations etc.

G. MPT Survey and study of genetic variability of selected species in natural stands.

Work on MPT improvement will be done in association with national programmes, ISC, CTFT, ORSTOM and the Regional Tree Seed Improvement Programme, based in Ouagadougou.

To implement the programme, ICRAF will recruit scientific staff to be located in each national programme. In addition staff will be recruited for the germplasm improvement activities - one to be based at ISC and another with the Coordination Office.

Finally, ICRAF will participate with ICRISAT-SC and CTFT in organizing a scientific conference on *Acacia albida* in 1991.

4.4.4. Plans for 1992 - 1993

Subsequent plans will be formulated at the annual network planning and evaluation workshops. Plans for 1992 will largely be determined at the Workshop scheduled for August/September 1991.

It is expected that the network will remain with four participating countries during this period. Based on the experience of other AFRENA's the number of experimental trials will probably increase by 100% from 1991 to 1992 and then roughly maintain that level for the 3 subsequent years. It is therefore expected that there will be 7-10 trials per country by 1993, all dealing with the AF technologies identified for the priority LUS.

It is expected that the MPT germplasm improvement work will expand considerably with concentration on the improvement of 3-5 priority species for the region.

4.4.5. Resources

In 1990 there was one ICRAF scientist in the network, the regional coordinator. In 1991 there will be 5 positions under recruitment; one each for Sénégal, Burkina Faso, Niger and Mali, an one ICRAF scientist to be based at the ICRISAT-SC.

Current donors include IFAD and CIDA.

4.5. HUMID LOWLANDS OF WEST AFRICA AFRENA (HULWA)

4.5.1. Background

The AFRENA programme for the Humid Lowlands of West Africa (HULWA) is partly on-going and partly planned (subject to resources).

Currently there are three ongoing projects - Cameroun, Ghana and MPT screening/evaluation at IITA. When fully operational the network will expand to include six countries with the addition of Côte d'Ivoire, Nigeria, Sierra Leone and Togo.

The major characteristic of the smallholder land use pattern in the Humid Lowlands of West Africa is a combination of cash-tree crops and fallow-based food crop production. The constraints to land production are imposed by prevailing biophysical and socio-economic factors. These include:

A. High erosive rainfalls resulting in soil erosion and nutrient leaching.
B. High temperatures resulting in high rates of decomposition and loss of organic matter.
C. Inherently poor soils, which are susceptible to compaction.
D. Increasing population pressure, rendering traditional shifting cultivation unsustainable.
E. Unstable world prices for major cash crops such as cocoa and coffee.
F. Low levels of livestock production in these LUS.
G. Rapid deforestation.
H. Land tenure practices causing opportunistic land abuse.

Potential technologies which have been identified to deal with these constraints are:

A. Hedgerow intercropping
B. Alley farming
C. Simple improved fallow
D. Home gardens or compound farms
E. Mixed intercropping
F. Fodder banks
G. Live fencing
H. Agroforestry in tree plantations
I. Live staking
J. Orchards

4.5.2. On-going research

Ongoing research activities in HULWA are confined to Cameroun and Ghana.

A. Cameroun:

This project, is focusing its research to develop technologies to address declining soil fertility and fodder shortage in the humid lowlands of Cameroun. The major AF technologies under investigation since 1987 are:

a) Hedgerow intercropping
b) Alley farming
c) Simple improved fallow

In support of these management trials MPT screening and evaluation trials and on-farm research is underway. In 1990 the programme expanded from two sites (Yaounde and Sangmelina) to a third site (Ebolowa).

B. Ghana:

This project has focused attention on MACRO and MICRO D&Ds. In 1990 the MICRO D&D was undertaken and the analysis is currently underway. This will form the basis for planning the experimental research programme in 1991. The major constraints identified were:

a) Soil fertility and erosion problems
b) Livestock feeding and management problems
c) Lack of poles and fuelwood.

The major technologies identified to address these problems are:

a) Cover crops under oilpalm, citrus and coconuts
b) Alley farming
c) Fodder banks
d) Live fencing
e) Live staking.

4.5.3. Plans for 1991

In 1991 it is planned that research planning and formulation activities will commence in the four additional participating countries of HULWA - Côte d'Ivoire, Nigeria, Sierra Leone and Togo.

Major activities will be:

A. Promotional visits.
B. Literature review of past/ongoing research on LUS.
C. MACRO D&D.

I. CAMEROUN

In Cameroun, the research programme will focus on:

A. Monitoring, collection and analysis of data from ongoing experiments at 3 sites, both on-station and on-farm.

a) On-Station:

i) Vigour/Phenology to identify adapted and suitable exotic local MPTs.

ii) Hedgerow Intercropping

- Identify suitable mulch type and fertilizer level for sustained crop production.
- Appropriate hedge arrangements to minimize loss of crop land.
- Develop hedge management techniques.
- Methods to minimize cost of hedgerow intercropping research.

iii) Alley Farming

- Determine effective fallow management for improved crop/animal production.

iv) Simple Improved Fallow

- Identify suitable shrub and fallow length for improved crop production.
- Determine how soil improving shrubs can be included in farming

systems.
• Develop appropriate residue management techniques.

b) On-Farm:

i) Hedgerow Intercropping

• Identify low input technology to maintain soil fertility.

ii) Simple Improved Fallow

• Test prototype on farmers fields.

iii) Home gardens improvement.

B. Establishment of 4 new experiments:

a) Rehabilitation of eroded Ultisols in erosion plots using legume tree/shrubs.
b) Enhance diversity and productivity of home gardens.
c) Cocoa production diversification.
d) Improved small ruminant production system.

II. GHANA

In Ghana, the ICRAF/Ghana collaboration in research planning and formulation will end. Different activities planned to start in 1991 are as follows:

A. MPT - survey and local seed collection
B. MPT - screening
C. Propagation studies
D. Technology management trials (on-station and on-farm research)

Further on activities related to the promotion and institutionalisation will continue in 1991.

III. MPT GERMPLASM IMPROVEMENT

In 1990 a collaborative project with IITA and Oregon State University (OSU) will commence on selection and evaluation o MPT germplasm for acid soils of the humid lowlands tropics.

The specific activities planned for 1991 are:

A. General and technology specific screening.
B. Provenance evaluation.
C. Botanical surveys and evaluation of indigenous tree species.
D. Updating of the IITA arboretum.

4.5.4. Plans for 1992 - 1993

It is anticipated that all activities in HULWA will be consolidated into a Network in 1992. A coordination office will be established in the region to coordinate the Network activities. Specific activities in the respective countries will be:

A. MICRO D&D exercises in Sierra Leone, Nigeria, Côte d'Ivoire and Togo.
B. Site characterization, germplasm acquisition and nursery establishment in Sierra Leone, Nigeria, Côte d'Ivoire and Togo.
C. Design of experiments in participating countries.
D. Monitoring and analyses of experiments in Ghana - with new on-farm experiments established in 1993.

E. Selection and evaluation of MPT germplasm at IITA. Activities being initiated on:

a) Genetic variation studies in natural and cultivated populations.
b) MPT propagation and establishment research.
c) Tree-root symbiotic interaction studies.
d) Breeding research and 3-5 selected species.

F. In Cameroun, monitoring of on-going trials will be maintained in the mid-term. No immediate plans to expand with new trials except with on-farm experiments.

4.5.5. Resources

In 1990 there were 3 ICRAF scientists in the programme; 2 based in Cameroon and one based at IITA on MPT screening. In 1991 there will be one scientist recruited to initiate, plan and coordinate the network.

Current donors are IDRC, USAID and the Government of Switzerland.

4.6. SOUTH ASIA PROGRAMME

Currently ICRAF has collaborative arrangements with two countries in South Asia, India and Bangladesh. In both cases ICRAF is assisting the respective programmes in research planning and priority setting, information, documentation and training.

4.6.1. Background

I. INDIA

In 1983 the Indian Council of Agricultural Research (ICAR) launched the All-India Coordinated Research Project in Agroforestry (AICRPAF). Today, the agroforestry work of 31 centres in the country is coordinated by an Assistant Director in ICAR and supported by the National Research Centre for Agroforestry (NRCAF) in Jhansi. Through this programme, India probably has the largest agroforestry research programme in the world and, clearly, ICRAF's association with it is important.

II. BANGLADESH

Due to high population pressure, dwindling forest cover and lack of fuelwood and low soil fertility, the Bangladesh Agricultural Research Council (BARC) launched an agroforestry research programme and requested ICRAF's assistance to establish a strategy and research priorities. As such ICRAF has been involved in support through:

A. Information/documentation training
B. MICRO D&D

4.6.2. Ongoing activities

I. INDIA

ICRAF has been assisting in the application of research methods and tools for agroforestry research planning, specifically the D&D methodology. In 1989/90 a MICRO D&D was undertaken in Jhansi. ICRAF also participated in the regular AICRPAF meeting and provides ongoing support for information and documentation.

II. BANGLADESH

A. Identification and analysis of agroforestry documentation in Bangladesh.

a) Training of BARC's documentalist at ICRAF.
b) Identification of agroforestry documentation relevant to Bangladesh in ICRAF's library.
c) Acquisition and sending of agroforestry documentation to Bangladesh.
d) Production of an annotated bibliography on agroforestry in Bangladesh.

B. Training

a) 4 Bangladeshi scientists at ICRAF/DSO training course in 1990.
b) 30 Bangladeshi scientists in Bangladesh in October, 1990.

C. Two MICRO D&Ds.

a) Forestry department site: February, 1990 (report near completion).
b) Agricultural site: February, 1991.

4.6.3. Plans for 1992-1993

ICRAF will develop regional "liaison offices" for activities outside of Africa, which will focus on the type of support that has been provided to India and Bangladesh:

A. Research planning.
B. Training.
C. Information/documentation.

In order to consolidate and coordinate ICRAF's activities in South Asia, and to ensure that ICRAF benefits from the information and results from the region, plans are underway to establish a liaison office in the region in late 1992 or 1993. This would comprise 3 ICRAF professional staff.

4.6.4. Resources

In 1990 the programme in South Asia had two part-time ICRAF scientists assigned to coordinate activities in India and in Bangladesh.

Current donors are IDRC and the Ford Foundation.

5. RESEARCH PROGRAMMES

5.1. Introduction

ICRAF is involved in three types of research:

- strategic
- applied
- adaptive

Most of the research conducted in the AFRENAs is applied and adaptive, whereas strategic research is undertaken in the Research Programmes.

The applied/adaptive research programme in the AFRENA's, and ICRAF's awareness of other agroforestry

research activities has largely identified a series of issues requiring strategic research to gain a better understanding of "why" certain interactions take place between components. ICRAF has selected a few areas that are important and where ICRAF feels that we need to maintain a leading role and develop a comparative advantage.

It must be emphasized that in a relatively new science such as agroforestry not only do we need to examine the "why" in terms of cause and effect, but also we need to develop tools, approaches and methods to enable scientists to better understand and quantify these complex interactions. Although methodology development is not a goal in itself, there is an element of it in all of the strategic research programmes at ICRAF, whether it is tree breeding or on-farm research.

ICRAF also acknowledges that, even though we have identified certain Strategic research areas, we will never have the resources or expertise to undertake all that is required in those areas. Therefore, collaborative arrangements with institutions of excellence is also necessary in the strategic research programmes, for example with IARC's universities and specialized institutes.

ICRAF recognizes that, increasingly, there will be high priority areas of research that ICRAF will need answers to, but where we cannot develop adequate programmes of research. In these instances ICRAF will contract research with centres of excellence to undertake the work.

Finally, not only does the applied research activities shape the strategic research agenda at ICRAF, but one of the most important clients for the result of ICRAF strategic research will be those same applied programmes, the AFRENA's. In addition, ICRAF will continue to partly fulfil its global mandate by ensuring the results of strategic research are made available widely through reports and publications.

Based on past experience and during the course of intensive discussion during the development of ICRAF's Strategy 2000, the following four (4) broadly defined research programmes were identified:

1. Agroforestry and Land Use Systems.
2. Component Interactions in Agroforestry Systems.
3. Multipurpose Tree Improvement for Agroforestry Systems.
4. Agroforestry Policy and Institutional Issues.

Knowledge generated through these four programmes will substantially enable ICRAF and scientists and practitioners of agroforestry around the world to accomplish the goal of generating/developing agroforestry technologies.

Programme 1 essentially enables us to get a better understanding of the potential role of agroforestry to improve land use systems. It provides us with the framework for planning and setting research priorities.

Programme 2 examines in detail the complex interactions between components in the agroforestry technology: tree-crop and tree-animal. The interactions, of course, involve people and therefore the examination is not restricted to the biophysical interactions but also the socio-economic interactions as well. As such the programme is developing tools, methods and understanding of interactions through on-station research and on-farm research.

Programme 3, MPT germplasm improvement, is examining one of the most important components in an agroforestry technology - the tree. Most MPT species have been neglected in the past by foresters and relatively little is known about their performance and characteristics. This programme therefore aims to improve system or technology performance and productivity by improving on the species performance.

Programme 4 essentially looks at the policy and institutional environment for agroforestry technology, essentially by examining in detail the major constraints to adoption which fall beyond the control and resources of the individual household. In short, agroforestry technology adoption will be significantly influenced by the policy and institutional environment at the national level.

5.2. PROGRAMME 1: AGROFORESTRY AND LAND-USE SYSTEMS

Justification: Elements in the understanding of land-use systems include the role played by multipurpose trees and shrubs (MPTs), the problems experienced by land users and the opportunities for solving them as well as the trends in productivity and sustainability over time. ICRAF has developed a range of tools and data bases to facilitate a better understanding of land use systems as a point of departure for identifying appropriate research programmes to improve productivity of land-use systems through agroforestry. This programme is therefore focal in that it serves as the point of departure for future agroforestry research activities.

Objectives: To contribute to sustainable increases in the output of land-use systems by understanding how such systems operate in assessing their potential for development through agroforestry.

The following projects constitute the current and planned activities in Programme 1.

5.2.1. Technology Register

Objectives:

i) To assemble, synthesize and make available current knowledge about agroforestry grouped according to technologies.

ii) To provide a service for research to assist agroforestry development, and to provide scientific continuity within ICRAF.

Activities:

The assembling and synthesis of agroforestry information and the establishment of a computerized retrieval system.

It is expected that this project will start in 1991, ending in 1993 after which it will be maintained on an on-going basis.

5.2.2. Land Evaluation for Agroforestry

5.2.2.1. Environmental Conditions for Agroforestry

The objectives of this project are to indicate which agroforestry technologies and systems are appropriate for which environmental conditions. This will involve a review of published information in liaison with FAO's land evaluation activities. This is an on-going project which is anticipated to end in 1991.

5.2.2.2. Environmental Impact

The objectives of this project are to mark sites for specific studies of the environmental impact (farm - internal and external) of agroforestry systems. Studies will be undertaken at AFRENA sites in southern and eastern Africa and where possible, ex post studies of agroforestry systems will be undertaken. This project is expected to start in 1991.

5.2.2.3. Economic and Social Evaluation

The objectives of this project are to apply economic analysis to agroforestry systems, with particular reference to those being advocated as development alternatives. The project will also provide basic data and improved methods for economic analysis of agroforestry in the context of land-use systems.

Where possible, ex post studies of agroforestry systems will be undertaken. Comparisons will be undertaken with:

i) Existing land-use systems; and
ii) Non-agroforestry improved land-use.

This is a new activity which is scheduled to commence in 1991.

5.2.2.4. Agroforestry and Sustainability

The objective of this project is to continue to explore and disseminate knowledge about the potential of agroforestry to contribute to sustainable land-use. This project consists of an internal multidisciplinary task force of ICRAF scientists which started in 1989. In 1991, analysis of the interface between pastoral use and cultivation with respect to pressure on rangelands as relevant to agroforestry will be undertaken.

5.2.3. Models and data bases

5.2.3.1. Agroforestry Systems Inventory (AFSI)

The objectives of this project are to expand and synthesize knowledge about agroforestry to studies of existing systems both traditional as well as modern. ICRAF initiated this project in 1983. In 1990, the University of North Wales, Bangor has agreed to take over this project and maintain it on a regular basis with ongoing input from ICRAF.

5.2.3.2. Soil Changes under Agroforestry (SCUAF)

This is an ongoing project which is scheduled to end in 1991. The remaining work on the project will be to add a phosphorous cycling module to SCUAF with associated improvements.

5.2.3.3. Geographic Information System (GIS)

The immediate objective here is to undertake a feasibility study of GIS based on E.A. AFRENA. This activity will be taken with cognizance of existing established GIS systems at UNEP and ILRAD.

5.2.3.4. Modelling workshop

The objectives are to ascertain which models are of value to ICRAF's research and, where necessary, to adapt these for agroforestry. It is expected that this workshop will take place in late 1991 or 1992.

5.2.4. Reviews, science and practice of agroforestry

A review on animals and agroforestry is in its final draft and expected to be published in 1991. Two additional reviews are under discussion:

. agroforestry and fuelwood
. fruit trees in agroforestry.

5.2.5. Research Planning Methods

The objectives of this project are to strengthen ICRAF's method of research planning in general and initially in the areas of:

i) Soils information;
ii) On-farm research planning.

This projects is essentially aimed at assessing the effectiveness of the diagnostic and design (D&D) approach to research planning in agroforestry and to identify areas of improvement.

5.2.6. Resources

In 1990 there were 3 ICRAF scientists in this programme. This will be increased by two in 1991; a scientist for the technology register and an economist.

Current donor is ICRAF core.

5.3. PROGRAMME 2: COMPONENT INTERACTION IN AGROFORESTRY SYSTEMS

Justification: Agroforestry has considerable potential for contributing to the sustainability of production systems. However, its contribution maybe radically affected by the offtake of other outputs such as fuelwood, building materials and fodder. Ultimately, it is farmers who decide what combinations of products and services they want from their trees in the long and short term. ICRAF's role is to assist in better decision making by developing and applying methods for more efficient use of resources. The objective here is to provide the understanding of interactions between system components in order to enhance positive and reduce the negative interactions.

Objective: To contribute to sustainable increases in the output of agroforestry systems by understanding and improving the biophysical and socio-economic interactions between system components with a view to increasing the management options available to resource poor farmers.

This programme is divided into two sub-programmes:

(A) On-Station Research;
(B) On-Farm Research.

Each of these sub-programmes has a number of distinct projects which are described below.

5.3.1. Programme 2A: On-Station Research

5.3.1.1. Development of guidelines for agroforestry field experimentation.

Objectives:

i) Develop innovative approaches to design for field experimentation in agroforestry including development of space-efficient layouts.
ii) Develop statistical and agronomic guidelines with the design and conduct of field experiments on issues covering blocking techniques, replication, plot size, layout of trials on sloping lands, sampling etc.
iii) Provide guidelines on data analysis and evaluation of agroforestry technologies.
iv) Develop cost-effective MPT screening and evaluation methods for different agroforestry technologies.
v) Adapt and/or develop appropriate methods for measuring soil and canopy parameters.

The major activities in this project include:

i) Synthesis of experience and results generated from different field sites (mainly AFRENA's).
ii) Field experiments to measure soil variability and to work out the optimum plot size for different agroforestry technologies and for measuring specific parameters.
iii) Field experiments comparing different plot size for measuring soil erosion.
iv) Analysis of different data sets to test the applicability of conventional and ANOVA methods and examine the need for alternative methods of analysis.

v) Comparison of different sampling techniques and sample sizes.
vi) Adaptation of existing computer software packages and/or the development of new ones for data analysis.

This project is expected to start in 1991 and will be ongoing through 1993.

5.3.1.2. Growth and Resource Utilization Studies in Agroforestry Systems

Objectives:

i) To monitor above and below ground interactions at tree/crop interfaces and to evaluate the productivity of systems containing such interfaces.
ii) To study the effect of different management variables on tree/crop interactions for growth resources.
iii) To monitor microclimate changes in agroforestry systems and the results and effects on pests/diseases and yields.
iv) To develop resource utilization models for selected agroforestry systems.

The main activities in this project include:

i) Intensive monitoring of carefully selected treatments of some agroforestry systems for quantifying interactions for growth resources.
ii) Field trials to study the effect of management variables on resource use.

This project will start in 1991 and will be the responsibility of the plant physiologist/micro climatologists who will be recruited in 1990.

5.3.1.3. Soil Fertility Studies

Objectives:

i) To further the understanding of mechanisms by which promising agroforestry technologies improve soil fertility and identify opportunities for maximising their benefits. Priority will be given to areas where current research is weak, is of direct relevance to the AFRENAs and in which ICRAF has, or can develop, a comparative advantage.

ii) Strengthen national capacity to conduct strategic research through the provision of technical assistance and resources and by facilitating collaboration with centres of expertise.

iii) Synthesis of applied and adaptive soil fertility research results from the AFRENAs to establish general trends in response domains for agroforestry technologies designed to improve soil fertility.

iv) To examine the scope of exploiting micro bio-symbionts.

The major activities planned for this programme include:

i) Conduct a careful rationalisation of strategic research priorities and formulation of detailed research proposals based on:

- Reference to AFRENAs needs
- Weakness of current strategic research
- Current research in other institutions.

This will be followed by the setting up of necessary collaborative links with institutions of expertise.

ii) Start a synthesis of the results of adaptive and applied soil fertility research in the AFRENAs and elsewhere.

iii) Initiate field trials to study responses to *Frankia* and mycorrhizal inoculations.

iv) Review the analytical facilities available and quality-control at each of the AFRENA sites where soil fertility studies are conducted and suggest ways of overcoming problems of laboratory analysis.

v) Establish contacts with collaborating institutions/universities to undertake strategic research requiring sophisticated analysis.

This project will start in 1991 and, given its long term nature, will be an ongoing activity at ICRAF. The project will be headed by a senior scientist (soil fertility expert) to be recruited in early 1991.

5.3.1.4. Soil Conservation Potential of Agroforestry technologies

Objectives:

i) To monitor runoff and soil and nutrient loss under different agroforestry technologies in comparison with non-agroforestry options

ii) To monitor the long-term effects of agroforestry soil conservation technologies in respect of soil, water, soil fertility, and other sustainability indicators.

iii) To quantify the effects of tree, crop and soil management variables in agroforestry technologies on soil conservation.

iv) To evaluate the economic potential of different agroforestry technologies under investigation.

v) To generate input data from models relating to land degradation or sustainable agriculture.

The major activities to be undertaken on this project include:

i) Monitoring runoff, soil loss and soil water balance and long term fertility changes in selected ongoing experiments at the field station and at some AFRENA sites.

ii) Field experimentation designed specifically to test the soil conservation potential of relevant agroforestry technologies.

iii) Economic evaluation of the potential technologies and comparison with traditional technologies.

iv) Refinement of resource utilization models based on field experiments. This project is an ongoing activity and will continue in 1991 and through 1993.

5.3.1.5. Pest and Disease Management in Agroforestry

Objectives:

i) To monitor pests and diseases occurring in different trees/crop associations that AFRENA sites are working on.

ii) Undertake a major review on the pest and disease problems associated with agroforestry systems to form a basis for any future research in this area.

iii) To identify key pests and diseases that are likely to be increased or decreased due to agroforestry systems and study how different biophysical factors affect the pests and pest/ parasite complex as a means of efficient management.

iv) To study weed competition to tree establishment and early growth in different agroforestry systems and monitor weed shifts associated with any particular system over time.

v) To study the potential dangers of MPTs becoming weeds.

The main activities to be undertaken in this project include:

i) Monitoring and documenting the pests and diseases occurring in different tree/crop associations in the AFRENA sites.

ii) Review the pests and disease problem associated with agroforestry systems.

iii) Initiate limited studies to study the weed competition on tree establishment and early growth.

iv) Monitor weeds in different existing agroforestry technologies and identify possible shifts in the weed flora as a consequence of long term effects.

v) Observations of MPTs flowering behaviour and their seed germination patterns.

This project will start in 1991. ICRAF is expecting a research associate to be assigned to ICRAF who will initiate much of the work at the Field Station in 1991. ICRAF is expecting to finalise an agreement with CABI which would include visits by entomologists to AFRENA sites. This project will start in 1991 and become fully developed in 1992 and 1993.

5.3.1.6. Agroforestry in livestock interactions

Objectives:

i) Evaluate the fodder production potentials of selected MPTs.

ii) Identify anti-nutritional characters inherent in some tree fodders.

iii) Evaluate economic returns from different agroforestry technologies involving livestock components.

iv) To review livestock research methods and arrive at appropriate strategies for ICRAF to engage itself in livestock research in agroforestry.

The following activities are planned to be undertaken in this project:

i) Field experiments evaluating fodder biomass production.

ii) Reviews of fodder potential of MPTs for livestock production.

iii) Laboratory analysis of quality/antiquality components.

iv) Feeding experiments to evaluate:
- Palatability
- Intake
- Livestock responses

v) Review of livestock research methods.

Some initial work will be undertaken in 1991 at a selected number of AFRENA sites. In 1992 and 1993 it is envisaged that a larger collaborative programme will be jointly developed with ILCA.

5.3.1.7. Resources

In 1990 there were four ICRAF scientists assigned to this programme. In 1991, three new positions will be under recruitment; a crop physiologist, a soil fertility specialist and a biometrician.

Current donors are SIDA and ICRAF core.

5.3.2. Programme 2B: On-Farm Research

The second part of Programme 2 deals with component interactions for on-farm research (OFR) in agroforestry.

Justification: From its establishment, ICRAF has been involved in on-farm research (OFR). This has generated valuable experience on methods which constitute a solid base for organizing and implementing the OFR. There is also a large body of knowledge and skills on on-farm/farming systems research which can be drawn upon for methodological adaptations to agroforestry.

Objectives: The general objective of this programme is to plan and implement ICRAFs strategic OFR. The specific objectives are:

i) Design, adapt and/or test cost effective methodologies to meet the needs of the AFRENAs.

ii) Conduct research, mainly with AFRENAs, to improve existing agroforestry technology, design new ones and test/validate them under farmers environment and management conditions.

iii) To strengthen national capability and AFRENAs by providing guidance, training and networking support.

iv) Monitor, evaluate and synthesize on-farm research progress and achievements within and across regional programmes with respect to technology design and testing, research methodology and identification of future research and training priorities.

v) To coordinate research with other international agricultural research institutions, regional organizations and other centres of excellence.

5.3.2.1. Guidelines for on-farm research

Objectives:

The objective of this project is to develop guidelines for on-farm research in the following areas:

- Setting research priorities and objectives.
- Field surveys
- Experimental trials
- Socio-economic research.

The major activities will include:

i) A review of field programmes experience and relevant secondary information.

ii) Formulation of "best bet" guidelines.

iii) Field implementation and testing.

iv) The conduct of research review and planning workshops.

It is expected that this project will lead to the development of guidelines for:

i) The choice of appropriate research designs, methods and measurements for on-farm research.

ii) Farmer participatory methods for effective involvement and design, implementation and analysis of research.

iii) Institutional coordination among research, extension and other factors at the project site level.

5.3.2.2. Analysis of interactions and impact of agroforestry practices

Objectives:

The general objectives is to develop "hard facts" on well known and established agroforestry practices and use of farmers knowledge for improved and new technology designs.

The major activities in this project will include a synthesis of local available information, multi visit surveys and technical monitoring and case-study systems and components on the following agroforestry practices:

- Scattered Acacia albida on crop land in southern Africa.
- Home garden and live fencing in Kenya, Cameroun and Ghana.
- Banana/tree system in three countries of eastern and central Africa AFRENA.
- Boundary planting, live fencing, woodlots, fodder bank combinations in farming systems in Kenya.
- Agroforestry/fodder systems in Tanzania.

5.3.2.3. Analysis of Agroforestry Alternatives to Address Farmers Problems

Objectives:

i) The main objective of this project is to undertake a comparative analysis of technology alternatives across different ecozones.

ii) Definition of homogenous "response/recommendation" domains.

iii) Technology inputs and outputs and opportunity costs in targeted farming systems.

iv) An identification of agroforestry adoption potentials and constraints.

The major activities in this project will include:

i) Ex-ante analysis of technology design based on climatic, soil and farmer management factors.

ii) A review of scientific information in this field.

iii) Synthesis of on-station and on-farm trials results and field surveys.

5.3.2.4. MPT component

Objectives:

To understand the critical and interrelated problems of successful introduction and early management of the tree species in agroforestry technologies. Specifically the objectives are to examine:

i) Propagation techniques using direct seeding, micro nursery, stumps, seedlings or cuttings as well as soil preparation methods.

ii) Site and soil preparation for single or multiple trees, timing according to climatic and labour factors as well as use of supplementary inputs.

iii) Planting techniques, land use niches, physical barriers and early management options to protect trees against typical pests and diseases.

iv) Screening of MPTs for growth and development in site specific environments for farmers.

The major activities envisaged under this project are:

i) Review of relevant programme experience and secondary information;

ii) Selected field surveys; and

iii) Formal and informal trials at various locations.

5.3.2.5. Resources

In 1990 there were six ICRAF scientists on this programme. In 1991 there will be one position under recruitment; an agricultural economist.

Current donors include the Rockefeller Foundation, Ford Foundation and IDRC.

5.4. PROGRAMME 3: MULTIPURPOSE TREE IMPROVEMENT FOR AGROFORESTRY SYSTEMS

Justification: Many multipurpose tree species with agroforestry potential exist in the form of wild and selected populations which are expected to exhibit considerable natural variability. Such populations can be expected to respond well to selection and breeding resulting in greater improvements and yield attributes such as adaptability to management and site factors and other attributes such as disease/pests resistance.

Existing tree breeding programmes are oriented towards large scale plantation forestry production systems. Their goals are conceived narrowly as being increased wood production. Many potentially useful multipurpose trees for agroforestry are currently accorded little or no priority in these breeding programmes. Moreover, improvement of multipurpose trees in agroforestry systems calls for radical changes in defining breeding objectives as more attention needs to be given to multi-trait breeding objectives and other products such as fodder and mulch.

ICRAF's multipurpose tree improvement programme is designed to support and backstop related AFRENA research projects. At the same time research collaboration involves, and is undertaken with, a range of other national and international research institutions and centres.

Objectives:

i) To improve through silvicultural and breeding research the performance of a carefully selected set of multipurpose tree species with identified agroforestry potential in specified agro-ecological zones

and farming systems.

ii) To assemble and to synthesize information and data on the roles of multipurpose trees in agroforestry development and to document the same in appropriate data bases.

iii) To play a leading role in the development of guidelines and methods for experimentation with multipurpose trees and agroforestry.

5.4.1. MPTS Database and Seed Directory

Objectives:

The large number of MPTs species, the low level of knowledge about most of them and the difficulties of accessing the dispersed information in the literature has made the consolidation, permanent updating and standardization in a comparable fashion of this information necessary to provide access of this widely recorded information to many individuals and institutions that are involved in agroforestry.

Activities:

The major activities have included the conceptualization and design of a database, acquisition of appropriate hardware and software, extraction of relevant information from selected literature, collection of original site-specific MPTS data, programming mean, editing of received information and entering of data into the database, analysis of information and general maintenance of the data base. analysis + conclusions!

It is expected that the database will be fully operational in 1991 and will require maintenance thereafter. A second edition of the MPTs Seed Directory, a by-product of the database, will be published in early 1991.

5.4.2. MPT Provenance Evaluation

Objectives:

i) To evaluate adaptation and growth performance of well documented provenances of a few promising multipurpose trees at a range of sites with different climatic and soil conditions.
ii) To study the provenance x environment interaction.

Activities:

i) To establish field trials with common germplasm at several sites.
ii) Synthesize results between sites within ecozones and between ecozones.

This project is expected to start in January 1991.

5.4.3. Tree Breeding Research on Agro-ecological basis

Objectives:

i) To improve genetic quality of a few selected species for breeding.
ii) To select and evaluate superior genotypes.
iii) To constitute and preserve breeding populations.

Activities:

i) Selection of superior genotypes.
ii) Progeny testing.

iii) Hybridization breeding.
iv) Ex-situ germplasm conservation.

This project started in 1988 and has built up a facility in Maseno, western Kenya. Research is conducted on improvement of four MPT species in the E.A. AFRENA programme. The project will work closely with the S.A. AFRENA project and with the IITA-based tree improvement project for HULWA. It is also the intention to include the SALWA tree improvement work with ISC in this project.

5.4.4. Genetic Variations Studies in Natural and Cultivated Populations

Objectives:

i) To get a better understanding of the genetic variation base of multipurpose trees.
ii) To conduct a systematic study of existing variation amongst selected species.

Activities:

i) Evaluation of existing genetic variation through isozyme techniques.
ii) Study of population structure and genetic systems.
iii) Provenance, landrace and cultivar characterizations.
iv) *Ex-situ* conservation of threatened germplasm.

A collaborative study with CSIRO on *Grevillea robusta* started in 1989. This will continue and be expanded in 1991.

5.4.5. Multipurpose Tree Propagation and Establishment Research

Objectives:

i) To develop conventional and micro-propagation techniques for field trees.
ii) To development of mass multiplication and cheap establishment techniques.
iii) To enable the establishment of seed or tree genebanks.

Activities:

i) Multiplication of selected superior phenotypes.
ii) Establishment of tree banks and genebanks.
iii) Construction of laboratory, glass house and propagation facilities.

Some special studies that will be undertaken as part of Project 5 will be tree/root symbionts interactions. Specifically the studies will aim:

i) To establish and maintain Rhizobium and Mycorrhizal inocula that effectively form symbiosis with superior tree genotypes.
ii) To characterise soil and biological factors constraining the development of symbiotic interactions between improved MPT germplasm and selected strains of both Rhizobia and Mycorrhizae.

The intended activities to be undertaken will be:

i) Comprehensive sampling for soils, roots, nodules and development of Mycorrhizae inocula.
ii) Establish cheap and easy inoculation techniques for nursery and field application of Mycorrhizae/Rhizobia.

In addition to the strategic research projects outlined above, ICRAF is involved in a large programme of applied research dealing with a better understanding of MPT performance. This research can be categorized as:

i) MPT general screening trials and technology specific screening trials at AFRENA sites. Currently more than 200 MPT species and accessions are being tested in more than 15 sites.

ii) MPT surveys to study farmer preference and value ranking for indigenous and exotic species. These MPT surveys are undertaken in close association with AFRENA sites. Surveys have been undertaken in Cameroun, Zambia, Malawi and Tanzania. Surveys are being planned for SALWA and eastern Africa.

Although these activities are not undertaken by Programme 3, the information and results from this research assists in the definition of plans and priorities for the projects in Programme 3.

5.4.6. Resources

In 1990 there were three ICRAF scientists assigned to this programme. There will be seven scientists recruited to this programme in 1991 including a seed technologist, two breeders, a silviculturalist, a database manager and a biometrician.

Current donors include BMZ/GTZ and AIDAB

5.5. PROGRAMME 4: AGROFORESTRY POLICY AND INSTITUTIONAL ISSUES

Justification: The adoption of agroforestry technologies is influenced by Government policies and particularly by the support provided through national research and development systems. Agroforestry has the potential to contribute to sustainable land-use. However, appropriate policies in areas such as pricing and land tenure will be required. Devising and implementing such policies is difficult especially where pressure on natural resources is growing rapidly. In addition, agroforestry has no institutional home (or, in some cases, several but competing homes) which has complicated the organizational arrangements for conducting multidisciplinary and interinstitutional, problem focused research.

Objective: To contribute to sustainable increases in the output of agroforestry systems by helping to develop more effective policies in the agroforestry sector and better ways to organize and manage agroforestry research and development activities.

5.5.1. Institutionalization of Agroforestry

Objectives:

To monitor and assess the effectiveness of AFRENAs, to strengthen national capacity to undertake agroforestry research and the establishment of an institutional framework to plan and implement agroforestry research. The second objective is to develop a framework to understand the process and factors for institutionalizing agroforestry research, education and development at the national level.

This project will start in 1991. This will be a collaborative project with ISNAR. A former ICRAF scientist and an ISNAR scientist will undertake a state-of-the art review on the institutionalization of agroforestry, with particular attention to the AFRENA's, which will serve as the basis for a workshop to establish a research agenda for this component of Programme 4. It is expected that a full scale research programme based on the recommendations of the workshop will begin in 1992.

5.5.2. Agroforestry Policy

In 1992 ICRAF will identify collaborating partners to undertake a review of the major policy issues

affecting the adoption of agroforestry. A baseline document will be prepared to form the basis of a small workshop to review and identify the major issues for further research. This will form ICRAF's research agenda for this component of Programme 4. It is expected that a research programme will start implementation in 1992 or 1993.

5.5.3. Resources

In 1990 and 1991 there will only be part-time ICRAF staff input into this programme. Donor funding needs to be identified.

6. DISSEMINATION PROGRAMMES

6.1 Introduction

As an international institution, ICRAF plays a significant role in the collection, analysis, processing and dissemination of information on research results and methods. Four major programmes are devoted to dissemination: Training, Education, Information and Documentation, and Communications. All four programmes reflect ICRAF's commitment to strengthen national research capacities and support global agroforestry research and development efforts. In recognition that much of the information the Council handles is generated by the work of collaborative partners, dissemination activities at ICRAF are closely linked to these collaborative research programmes, the focus being on the exchange of information rather than its one-way flow.

Dissemination programmes are coordinated by a multidisciplinary professional team of specialists in training, education and information sciences, most of whom are also involved in research programmes. Similarly, ICRAF scientists in research programmes have responsibilities in the implementation of dissemination activities.

A wealth of agroforestry information and knowledge continue to become available from institutions in collaborative programmes as well as globally. Several mechanisms have been put in place in order to channel this information and knowledge into ICRAF's dissemination programmes, i.e., regional planning workshops in AFRENAs; scientific conferences and technical workshops at the international level; training at international, regional and in-country levels; annual programme reviews; monitoring and evaluation activities, and others.

The sections below will outline programmes and projects in terms of justification, objective, activities planned for 1991 and projections for 1992-93, and resources.

6.2 PROGRAMME 5: TRAINING

Justification - One of the most severe limitations to the establishment of a lasting capacity for agroforestry research and development in developing countries is a shortage of human resources with knowledge and skills in the multidisciplinary systems approach required in managing land use developments. Because agroforestry is a new science, the shortage of trained staff is more acute than in established areas such as agriculture and forestry.

Objective - To increase knowledge and skills required by scientists, field workers, policy makers and others working in agroforestry by offering a range of training and professional development opportunities at ICRAF and elsewhere.

Activities - ICRAF's training programme currently offers group training activities, such as courses, workshops, conferences and field trips; individual training and professional development in the form of student attachments, degree fellowships and visiting scientists; and support in the development of training materials. General agroforestry introductory courses are offered to a global audience on a regular basis (once

or twice per annum) in French as well as in English. Specialized or regional courses are often jointly organized with collaborative institutions.

In 1990, major accomplishments can be summarized as follows:

-Three hundred scientists, technicians, trainers, policy makers, research managers and extension specialists participated in short-term training courses on agroforestry research concepts and methods which were directly organized by ICRAF and collaborative institutions (8) and by others with ICRAF's inputs (4), i.e. AFNETA.

-ICRAF's approach to the strengthening of national institutions in research as well as training was reflected in the number of training courses which were organized outside Headquarters (8 out of 12 courses took place at field sites). The train-the-trainers approach figured prominently in several courses.
-Agroforestry National Workshops were organized by collaborative national institutions in Rwanda, Ghana, Nigeria and Malawi in an effort to take stock of on-going agroforestry activities at country levels.

-International and regional scientific and technical meetings (8) provided the opportunity to assess the state of the art in various agroforestry related fields.

-Twenty-one research fellows and visiting scientists undertook agroforestry research and/or study alongside ICRAF staff at AFRENA sites and Headquarters.

-Lecture notes with visual aids were developed for the introductory course on agroforestry (24 in English and 14 in French) and for the field technicians course (17 in English).

Human Resources - The programme has at present two professional staff members, one international and one national. There are two international positions vacant - the programme coordinator, who is expected to come on board in late 1990-early 1991, and a training officer in 1991.

The training programme has seven projects:

- Group Training
  - Project T-1 Training for Researchers and Development Planners
  - Project T-2 Training for Field Research Technicians
  - Project T-3 Other Group Training and Professional Development
- Individual Training
  - Project T-4 Research Fellowships
  - Project T-5 Degree Fellowships
  - Project T-6 Other Individual Training and Professional Development
- Training Materials
  - Project T-7 Agroforestry Teaching Materials

6.2.1. Project T-1: Training for Researchers and Development Planners

Objective - To increase knowledge and skills of scientists, development planners and policy makers in the formulation and implementation of agroforestry research leading to the generation of appropriate agroforestry technology.

Plans 1991 - Six training courses will be organized on Agroforestry Research for Development - Concepts, Practices and Methods. Two of them will be offered to a global audience at ICRAF Headquarters and field sites in Kenya and four courses will be jointly organized and implemented with collaborative national and international institutions at AFRENA sites in Southern Africa (1), East Africa (1) and Humid Lowlands of West Africa (2).

The course content will include 5 main modules: I-Introduction to Agroforestry, II-Agroforestry Technologies, III-Diagnosis and Design (DV- Agroforestry Research for Technology Development, and

V-Evaluation of Agroforestry Systems. Training methods to be used are lectures, demonstrations, field practicals and visits, group discussions and individual presentations by participants. Courses will be offered in French and in English. The Kenya courses will be 3-weeks long while the AFRENA ones will be 2-weeks long.

The expected outcomes are (i) approximately 225 scientists directly trained by the project, (ii) development and testing of training materials for future wider dissemination and use, and (iii) a multiplying effect of i. and ii. in national institutions.

The tentative schedule of activities is as follows:

- AFRENA E.& C. Africa, Ethiopia, March 1991
- International ICRAF/DSO Course, Kenya, May 1991
- AFRENA HULWA, Cameroon, August 1991
- AFRENA HULWA, in-region, September 1991
- AFRENA S.A., Tanzania, October 1991
- International Multi-donor Course, Kenya, November 1991

Plans 1992-1993 - ICRAF will continue to offer the introductory course on Agroforestry Research for Development to a global audience on an annual basis, one course fully sponsored by ICRAF and a second one on the basis of individual participants sponsorship if the 1991 experience proves successful.

Resources - Staff participating in the planning and implementation of the courses include the Programme Coordinator, two training officers and ICRAF scientific staff.
Donors are DSO, CIDA and others. Funding for courses in AFRENAs E.A. and HULWA are on request. The second international course planned in 1991 will be organized for candidates with individual sponsorship support provided by various donor agencies (this explains why we refer to it as a multi-donor course). Participants attending the training course in Southern Africa will undertake a regional field trip immediately after the course; both activities -course and field trip- are budgeted together.

6.2.2. Project T-2: Training for Field Research Technicians

Objective - To increase field technicians knowledge and skills on agroforestry field experimental methods with a special emphasis on measurements, observations, data collection and handling.

Plans 1991 - Two training courses, entitled Agroforestry Field Experimental Methods and Data Management, are planned for 1991. One will be offered in English at the ICRAF Field Station in Machakos (November 1991) for participants from AFRENAs Southern and Eastern Africa and the other will be offered in French for SALWA countries (venue and dates not yet confirmed).

Both courses will be 4-weeks long. Content will cover three main modules: I-Preparation of Agroforestry Field Experiments, II-Implementation and Maintenance of Agroforestry Field Experiments, and III-Observations, Measurements, Data Collection in Agroforestry Experiments. Training methods will emphasize a practical hands-on approach.

The expected outcomes are (i) 30 field technicians trained, (ii) training materials developed and tested, (iii) improved data handling and management at agroforestry projects in AFRENAs.

Plans 1992-1993 - ICRAF will offer at least a training course for field technicians per year during 1992 and 1993 at ICRAF Field Station. After testing the course design and teaching materials in 1991, emphasis will be put on a train the trainers approach and the organization of similar courses in AFRENA countries. This type of training will probably be discontinued at ICRAF Headquarters as of 1993.

Resources - Coordinator Research Programme 2A, Coordinator Training Materials, Regional Coordinator SALWA and ICRAF scientific staff. Donors are IDRC and CIDA.

6.2.3. Project T-3: Other Group Training Activities

Objective - To increase knowledge and skills on agroforestry methods, practices and information handling.

Plans 1991 - Five specialized training courses are planned for 1991. Three will be developed and implemented by ICRAF and two will be organized by other IARCs in Africa with substantial inputs from ICRAF.

The ICRAF organized courses will be on topics related to the Analysis and Interpretation of Agroforestry Results Using Datachain and Genstat-SAS Computer Software; MPT Germplasm Collection and Evaluation; and, Agroforestry Information Management. The first two courses aim at research personnel from anglophone AFRENA countries while the third course will be for information specialists in francophone SALWA countries.

ICRAF collaboration with other IARCs training programmes in Africa include: (i) the organization of a 3-day course-cum-workshop planned by IITA, ILCA and ICRAF for policy makers from countries participating in the Alley Farming Network for Tropical Africa (AFNETA). The course will take place at ICRAF Headquarters in May 1991; and (ii) a course on scientific writing and editing at present being developed by WARDA, SAFGRAD and ICRAF for countries in West Africa. Neither of these activities are reflected in the ICRAF budget.

Eight international and/or regional seminars, workshops and scientific conferences are planned by ICRAF's research and dissemination programmes. They will focus on aspects related to MPT mycorrhizae and rhizobium in agroforestry, MPT assessment methods, Acacia albida, institutional issues in agroforestry, MPT evaluation, socio-economic analysis in agroforestry, development of teaching materials in agroforestry and agroforestry curriculum development for degree programmes. The meetings will take place at ICRAF Headquarters, AFRENA sites and elsewhere, i.e., the MPT assessment workshop will be held in Thailand.

A number of Agroforestry National Seminars (approximately 7) are being planned by collaborative national institutions in Southern Africa, Eastern Africa and the Humid Lowlands of West Africa. Expected ICRAF's inputs vary - in some cases ICRAF staff share responsibilities in the overall organization of the event while in others they only make individual presentations or provide information and documentation support. These activities are not reflected in the ICRAF budget.

Plans 1992-1993 - It is envisaged that new specialized courses will be developed in response to AFRENA training needs. Seminars and conferences will continue to be organized as a mechanism to disseminate existing knowledge and gather new information being generated in developed and developing countries worldwide.
Resources - ICRAF staff
Donors - See distribution below.

Training Courses	Schedule	Donor
Datachain	ND	R
MPT evaluation	September	BMZ/GTZ
Information management	ND	SALWA
Seminars/Workshops		
Socio-economics	February	IDRC
Acacia albida	February	R
MPT mycorrhizae	March	R
MPT evaluation	May	BMZ/GTZ
MPT assessment	June	R
Institutional issues	September	R
Teaching materials	ND	R
Curriculum	ND	R

ND = not defined R = funding requested

6.2.4. Project T-4: Research Fellowships

Objective - To provide professionals in developing countries with an opportunity to conduct agroforestry research alongside ICRAF scientific staff.

Plans 1991 - Five research fellows will start agroforestry research work at ICRAF Headquarters and AFRENA sites in 1991. Three GTZ sponsored fellowships were announced in 1990 in national institutions in developing countries. The duration of the fellowships vary between 10 and 12 months. Selected candidates will undertake work on fruit trees in agroforestry and on pests and diseases in agroforestry. The other two fellowship holders will join on-going activities within the on-farm agroforestry research project and the ICRAF Field Station Machakos.

Plans 1992-1993 - Research Fellowships are offered on an ad-hoc basis pending available donor funding support. ICRAF has at present carrying capacity to handle approximately 5 fellow scientists per year at Headquarters and double that number at AFRENA sites.

Resources - ICRAF staff. Donors are GTZ, the Ford Foundation, SIDA

6.2.5. Project T-5: Degree Fellowships

Objective - To strengthen agroforestry research capabilities in AFRENA institutions by providing opportunities for postgraduate M.Sc. and Ph.D. programmes to national scientists involved in agroforestry projects.

Plans 1991 - ICRAF is not a degree granting institution. Activities within this project are to: (i) assist AFRENA institutions in the identification of fellowships sponsored by different donors, (ii) support AFRENA institutions during the nomination and selection of appropriate candidates; (iii) conduct surveys of institutions of higher education in developing as well as developed countries to identify existing degree programmes that match the human resource development needs of AFRENA institutions; (iv) assist candidates in seeking admission to universities; (v) supervise students' research work in the AFRENA sites; and (vi) assist students' supervisors from universities overseas when they travel to the AFRENA agroforestry projects while students are conducting thesis research work.

Eleven AFRENA scientists are expected to start postgraduate programmes in 1991, four in Southern Africa sponsored by CIDA, five in Eastern Africa sponsored by IDRC and two in the Humid Lowlands of West Africa (Cameroon) where sponsorship is on request.

Plans 1992-1993 - ICRAF will continue to coordinate the degree fellowships project according to available funding support from donors.

Resources - Regional coordinators, ICRAF staff in programme 5, AFRENA scientists. Donors are CIDA and IDRC

6.2.6. Project T-6: Other Individual Training and Professional Development

Objective - To strengthen agroforestry research and development capability in national institutions in developing countries by providing opportunities to undertake agroforestry research and study work alongside ICRAF scientific staff, either at AFRENA sites or at ICRAF Field Station Machakos.

Plans 1991 - ICRAF coordinates and monitors different types of individual training and professional development schemes. It is expected that in 1991, at least twelve students will undertake agroforestry study/work at AFRENA and ICRAF sites. Some students are awarded scholarships but in most instances they are simply attached to on-going activities and, thus, research/study costs are borne by the agroforestry projects.

Plans 1992-1993 - ICRAF will continue to coordinate this project according to available funding resources from sponsors.

Resources - Regional coordinators, ICRAF staff in programme 5, other ICRAF scientific staff.

Individual Training	Site	Donor
1 Ph.D. student	Field Station Machakos	ICRAF/SIDA

2	Polytechnic	ICRAF Headquarters	N/A
4	On-the-job training	AFRENA S.A.	CIDA
3	B.Sc. student	AFRENA HULWA Cameroon	N/A

6.2.7. Project T-7: Agroforestry Teaching Materials

Objective - To develop and test comprehensive packages of teaching materials, both written and audio-visual, in support of training and education activities in agroforestry conducted by ICRAF as well as others.

Plans 1991 - This is a continuous activity at ICRAF which is primarily linked to training courses and also to the general dissemination of agroforestry information. ICRAF prepared in 1989 a 4.5 years proposal for USD 1.2 million which is under discussion with a donor In 1991, training packages will continue to be developed and tested in support of the introductory training courses on agroforestry research for development (Project T-1), courses for field technicians (Project T-2) and curriculum development activities (Project T-6). Written and audio-visual materials will be designed in cooperation with research programmes, i.e. MPT, on-farm and on-station research, AFRENAs, and others.

Plans 1992-1993 - Activities will continue according to availability of resources.

Resources - Coordinator Project T-7, ICRAF staff. Donors are DSO (on request), IDRC, CIDA, others

6.3. PROGRAMME 6: EDUCATION

Justification - Agricultural, forestry and livestock scientists are often educated in separate disciplines, although they are increasingly expected to work together during their subsequent careers. Experience of ICRAF and the AFRENAs has shown that the development and dissemination of agroforestry technologies is often constrained by lack of professional and technical staff who can integrate all the disciplines that need to be integrated in agroforestry. Incorporating agroforestry into national educational curricula would help solve this problem and could be achieved without costly additions or drastic restructuring. By helping to shape the attitudes and approaches of young scientists at the outset of their careers, ICRAF could achieve a considerable impact on the future productivity of agroforestry research and development.

ICRAF's comparative advantage in undertaking this programme lies in its worldwide contacts with institutions of higher education and the tools, methods and approaches already produced for agroforestry research and development. This work will increasingly be supplemented by the development of instructional materials.

Objective - To increase the supply of professional and technical agroforesters by helping institutions of higher learning and technical colleges to incorporate agroforestry into their curricula

Activities - Activities in this programme are carried out in collaboration with a limited number of universities and technical colleges in Africa. The programme concentrates on agroforestry curriculum design and instruction, on the development of teaching materials for degree courses, together with Project 7 in Training, and on the exchange of information on agroforestry education and training opportunities. Work is at present on-going in three major areas: Agroforestry in Undergraduate and Postgraduate Programmes (Project E-1), Agroforestry in Certificate and Diploma Programmes (Project E-2) and the formulation of an African Network for Agroforestry Education/ANAFE (Project E-3).

In 1990, major accomplishments were:

-Development of four curricula models for agroforestry at the postgraduate M.Sc. level, i.e., M.Sc. agroforestry degree, M.Sc. agriculture major agroforestry, M.Sc. forestry major agroforestry and M.Sc. animal science major agroforestry.

-Three regional workshops on agroforestry curriculum development were conducted in Kenya (2) and Ghana (1).

-Consultative meetings were held with twelve universities in Eastern and Southern Africa (Ethiopia, Kenya,

Tanzania) and in West Africa (Cameroon, Ghana, Nigeria).

-Ten university lecturers were trained in agroforestry research for development.

-Technical support was provided to the M.Sc. agroforestry programme developed at the University of Science and Technology in Kumasi, Ghana.

-Contacts were established with eleven technical colleges in Eastern and Southern Africa and visits undertaken to most of them.

-A draft model course in agroforestry at certificate/diploma level was developed in cooperation with Londiani College of Forestry in Kenya.

Human Resources - The programme has at present two staff members, a senior visiting scientists whose project ends in February 1991 and an associate expert with a project time span till March 1992. Both staff are supported by SIDA (salary and operations) under restricted project funds. A full time programme coordinator is expected to join ICRAF in 1991.

6.3.1. Project E-1: Agroforestry in Undergraduate and Postgraduate Programmes

Objective - To institutionalize agroforestry in agriculture, forestry, animal science and related degree programmes in African universities.

Plans 1991 - The following activities are planned for 1991: (i) monitor and follow-up agroforestry teaching and research in universities where agroforestry is being incorporated in curricula; (ii) training of at least ten university lecturers; (iii) identify institutional mechanisms to link universities and agroforestry research projects in the AFRENAs; and (iii) organization of a regional workshop on curriculum development, in cooperation with Project E-2.

Plans 1992-1993 - To continue activities started in 1990/91. Additional funding support is required to at least maintain the level of activities started with SIDA support.

Resources - A senior visiting scientist as project coordinator, coordinator of Agroforestry Teaching Materials Project T-7, other ICRAF staff. Donors are SIDA, ICRAF core.

6.3.2. Project E-2: Agroforestry in Certificate and Diploma Programmes

Objective - To incorporate agroforestry in existing agriculture and forestry certificate and diploma programmes in technical colleges in Eastern and Southern Africa.

Plans 1991 - The following activities are planned for 1991: (i) finalize the development of guidelines for agroforestry teaching (process initiated at regional workshop in November 1990); (ii) develop model courses for agroforestry teaching for agricultural-based and forestry-based programmes; (iii) organize training for teachers; (iv) organize second regional workshop on agroforestry curriculum development, in cooperation with Project E-1; and (v) monitor and follow-up agroforestry teaching in technical colleges in the region.

Plans 1992-1993 - Activities will continue according to available resources

Resources - An associate expert as project coordinator, coordinator of Agroforestry Teaching Materials Project T-7, other ICRAF staff. Donor is SIDA

6.3.3. Project E-3: African Network for Agroforestry Education (ANAFE)

Objective - To institutionalize agroforestry in education programmes by establishing a regional education network like ANAFE, that will promote sharing of information, expertise and other resources among universities and technical colleges in Africa.

Plans 1991 - Having developed a 4-year proposal for ANAFE in collaboration with African universities during 1990, major emphasis will concentrate in 1991 on fund raising for establishing the network and the identification of institutional mechanisms, i.e., twinning arrangements between universities and technical colleges in the region as well as with similar institutions in developed countries.

Plans 1992-1993 - Activities will be undertaken according to available resources.

Resources - Project Coordinator is required for 1991-1992.

6.4. PROGRAMME 7: INFORMATION AND DOCUMENTATION

Justification - Relevant, up-to-date information is a vital prerequisite for planning and implementing agroforestry research and development. Much of this information is not widely available and the audiences for it are highly diverse. For these reasons ICRAF has made special efforts to locate and classify information related to agroforestry and to identify and serve the appropriate audiences. The Council also has a special role in helping national programmes and institutions gain access to this information.

Objective - To contribute to agroforestry research and development through the collection, analysis and dissemination of relevant information.

Plans 1991 - ICRAF's international status makes it possible to act as a global clearing-house for agroforestry information. On-going activities are related to the acquisition, storage, manipulation and the provision of information services to a wide audience of researchers and others from its own library or from other sources.

In 1990, major accomplishments include:

-Three hundred issues of journals and four hundred books scanned for information plus three thousand documents analyzed, bringing the total data base records to 17,600.

-Free subscriptions of Agroforestry Systems Journal were awarded to one hundred and four libraries in developing countries.

-Four bi-monthly accessions list were prepared with at least three hundred and fifty records each

-Two information specialists, from Bangladesh and Kenya, were trained at ICRAF Headquarters.

Human Resources - The programme has at present four professional staff members and three vacancies. The positions to be filled are: Programme Coordinator (international) in late 1990 or early 1991; Librarian (international) for 1991 and French documentalist (seconded or national) also in 1991.

The Information and Documentation programme has five projects:

- Project I-1 Library
- Project I-2 INFODOC Services
- Project I-3 INFODOC Products
- Project I-4 Agroforestry Systems & Agroforestry Abstract Journals
- Project I-5 Support to Information Management Systems in Agroforestry

6.4.1. Project I-1: Library

Objective - To contribute to agroforestry research and development through the collection, analysis and dissemination of information.

Plans 1991 - Planned activities include: book and reprint orders which in 1991 are estimated at 600 books and 4000 reprints, subscriptions to at least 100 periodicals, cataloguing and library management.

Plans 1992-1993 - To increase project outputs and number of beneficiaries according to available resources.

Resources - ICRAF core

6.4.2. Project I-2: INFODOC Services

Objective - To provide agroforestry information support to a global audience through services like the specialized dissemination of information (SDI), question and answer and literature searches.

Plans 1991 - There are a number of activities required in order to provide an efficient dissemination of information support. They include identification and selection, acquisition and analysis of information.

Plans 1992-1993 - To increase project outputs as well as number of recipients according to available resources.

Donor - ICRAF core

6.4.3. Project I-3: INFODOC Products

Objective - To retrieve agroforestry and agroforestry related information available from different sources worldwide and to make this information available to national institutions.

Plans 1991 - Activities will be undertaken in the identification of relevant materials, acquisition, analysis, abstracting, editing and printing. The final project outcomes will be in the form of bibliographies, bi-monthly accessions lists, directories and agroforestry authority word lists.

Plans 1992-1993 - To increase project outputs and number of recipients according to available resources.

Donor - ICRAF core

6.4.4. Project I-4: Agroforestry Systems and Agroforestry Abstracts Journals

Objective - To disseminate agroforestry information through specialized journal publications.

Plans 1991 - Project activities will include: identification of new institutions and/or individuals to receive free subscriptions of the AFS (119) and AFA (500) journals; obtain review articles through liaison with scientists in agroforestry and related fields world-wide; and collaborate with CABI in the identification of relevant references for the Agroforestry Abstracts Journal.

Plans 1992-1993 - To increase project outputs and number of recipients according to available resources.

Donor - ICRAF core

6.4.5. Project I-5: Support to Agroforestry Information Management Systems

Objectives - To strengthen the agroforestry information management systems in collaborative national institutions in Africa.

Plans 1991 - Two project proposals will be developed with the aim to assist selected national institutions to improve their information and documentation services and products in agroforestry in Eastern and Southern Africa.

Plans 1992-1993 - Continue with project activities as per project proposals and available resources.

Donor IDRC (on request).

6.5. PROGRAMME 8: COMMUNICATIONS

Justification - ICRAFs Communications programme ensures that the results of its own and others' research reach the global community of scientists and other specialists concerned with agroforestry research and development. Existing staff and facilities make possible the analysis and synthesis of information from a range of sources and the production and distribution of publications and other information products in forms specially tailored to different audiences, i.e., policy makers, scientists and technicians, trainers and educators, and others.

Objective - To contribute to agroforestry research and development by producing and disseminating relevant information.

Plans 1991 - Activities of the communications unit include writing, editing, translating, printing, distribution and sale of publications and audiovisual productions and services and graphics. Publications and audiovisual material are translated into French as resources allow.

In 1990, major accomplishments were:

- Annual report in English and French

- Agroforestry Today Magazine, four issues in English and four in French

- ICRAF Strategy 2000 in English

- Working papers (7), brochures (3), posters (2), monographs (2), journal articles (2), conference proceedings (1), annotated bibliography (1)

Human Resources - At present there are five professionals in the team, two international and three national. Hiring a second translator is a priority for recruitment when resources allow.

The programme will continue to support ICRAF's research, training and information programmes. Emphasis will concentrate on the production of Agroforestry Today, training manuals and visual materials (posters, slide sets) and publications describing the results of network research for distribution to various audiences in English and French.

Distribution and sale of publications will continue to support the agroforestry information needs in national institutions.

Plans 1992-1993 - Activities will continue according to available resources, which are mainly ICRAF core

The programme keeps a record of the production costs of each publication. Two of ICRAF's major and regular publications are Agroforestry Today and the Annual Report. The breakdown of costs for both is presented below.

	Agroforestry Today	Annual Report
Percentage of professional staff time:		
Editing and Writing	50%	35%
Translating	70%	30%
Distribution	5%	5%
Graphics and photos	55%	35%
Printing and distribution costs (in USD):		
Printing	30,321	25,744
Distribution	35,582	9,345

7. OFFICE OF THE DIRECTOR GENERAL AND FINANCE & ADMINISTRATION

In a complex organization such as ICRAF, working in a mainly collaborative mode in an interdisciplinary scientific field, management and administrative back-up become crucially important.

Normally, however, it is enough to show the cost of the office of the Director General and of Finance & Administration in the budget appendix of a Programme of Work document such as this, since the roles and functions of the two are more or less obvious and of a non-programme, supporting nature. (With one important exception this is true also for ICRAF and therefore this section will be kept very short).

The office of the Director General also includes the Senior Director for Programmes and the supporting staff in this office. As such, the Office of the Director General mainly deals with corporate management, planning and programme coordination. However, in ICRAF's new structure, provision has also been made for a separate Planning Unit responsible for assisting the Director General in strategic planning and programme monitoring activities. This function will include some discreet programme/project activities carried out by consultants, visiting scientists and, eventually, a permanent planning/monitoring staff. At the moment, and during 1991 and 1992 two activities are underway:

i) a synthesis analysis of the role of agroforestry in arid areas of Kenya (and Africa), carried out by an experienced scientist/development expert and funded by NORAD; and,

ii) an analysis of strategic research priorities related to plant sciences and the tree/crop interface, carried out by the former Director of the Research Development Division (Dr. P. Huxley).

There are at the moment quite a number of plans for other strategic studies of this nature. Eventually, a senior scientist position will be established to coordinate the overall monitoring and evaluation of ICRAF's programme impact.

The Finance & Administration Division is now fully staffed with international staff filling three positions of Heads of Finance, Personnel and Operations as recommended in the EPMR in 1989. By 1991, all national professional and support staff position will also be in place.

ABBREVIATIONS

ADB	African Development Bank
AFRENA	Agroforestry Research Networks for Africa
AICRPAF	All India Coordinated Research Project in Agroforestry
ANAFE	African Network for Agroforestry Education
BARC	Bangladesh Agricultural Research Council
BMZ	Bundesministerium für Wirtschaftliche Zusammenarbeit
CGIAR	Consultative Group for International Agricultural Research
CIDA	Canadian International Development Agency
CILSS	Comité Inter Etats pour la Lutte contre la Sécheresse au Sahel
CTFT	Centre Technique Forestier Tropical
D&D	Diagnosis and Design
EPMR	External Programme and Management Review
FF	Ford Foundation
GTZ	Gesellschaft für Technische Zusammenarbeit
HULWA	Humid Lowlands of West Africa
ICAR	Indian Council for Agricultural Research
ICRAF	International Council for Research in Agroforestry
ICRISAT-SC	International Crops Research Institute for the Semi-Arid Tropics -Sahelian Centre
ILCA	International Livestock Centre for Africa
IDRC	International Development Research Centre
IFAD	International Fund for Agricultural Development
IITA	International Institute for Tropical Agriculture
INSAH	Institut du Sahel
IRAZ	Institut de Recherches Agronomiques et Zootechniques
ISC	ICRISAT Sahelian Centre
KARI	Kenya Agricultural Research Institute
KEFRI	Kenya Forestry Research Institute
LUS	Land Use System
MPT(S)	Multipurpose Tree (and Shrub)
NORAD	Norwegian Agency for International Development
NRCAF	National Research Centre of Agroforestry
OFR	On-Farm Research
ORSTOM	Office de Recherches Scientifiques et Techniques d'Outre-Mer
OSR	On-Station Research
OSU	Oregon State University
PC	Programme Committee
PWB	Programme of Work and Budget
Q&A	Question and Answer
RF	Rockefeller Foundation
SADCC	Southern Africa Development Coordination Committee
SAFGRAD	Semi Arid Food Grains Research and Development Programme
SALWA	Semi-arid Lowlands of West Africa
SAREC	Swedish Agency for Research Cooperation with Developing Countries
SDI	Selected Distribution of Information
SIDA	Swedish International Development Agency

EXCH.RATE KSH. 23

ICRAF 1991 BUDGET
WITH 1990 ACTUAL EXPENDITURE
(IN US$'000)

	CORE			PROJECTS			CONSOLIDATED		
	1990 ACTUAL	1991 BUDGET	VARIANCE %	1990 ACTUAL	1991 BUDGET	VARIANCE %	1990 ACTUAL	1991 BUDGET	VARIANCE %
INCOME									
GRANTS	3,971	4,566	14.98	6,189	10,817	74.78	10,160	15,383	51.41
RECHARGES	1,153	1,719	32.93	(1,153)	(1,719)	49.09	0	0	0.00
SUNDRY	330	380	13.04	0	0	0.00	330	380	15.00
TOTAL INCOME	5,454	6,665	18.16	5,036	9,098	80.66	10,490	15,763	50.26
EXPENDITURE	4965	6,415	22.60	5036	10200	102.54	10,001	16,615	66.13
CONTINGENCY	86	0	(100.00)	0	0	0.00	86	0	(100.00)
TOTAL EXPENDITURE	5,051	6,415	21.26	5,036	10,200	102.54	10,087	16,615	64.72
SURPLUS	403	250	(61.52)	0	(1,102)	0.00	403	(853)	(311.54)
TRANSFER TO W/C RESERVE	250	250	0.00			0.00	250	250	0.00
BALANCE TO CORE FUNDS	153	0	(100.00)	0	(1,102)	0.00	153	(1,102)	(820.26)

agreed, not acceptable (this is draft)

$12 M confirmed

PROGRAMME/PROJECT EXPENDITURES FOR 1991 AND FORECASTS FOR 1992 AND 1993

PROGRAMME		PROJECT(S)	1991	1992	1993	SOURCE OF FUNDS 1991 **
PR.1	AGROFORESTRY & LAND USE SYSTEMS	TECHNOLOGY REGISTER	138,000			CORE
		LAND EVALUATION	221,000			CORE
		MODELS & DATABASES	30,500			CORE
		REVIEWS	152,500			CORE
		RESEARCH PLANNING	76,500			CORE
		TOTAL	618,500	711,275	817,966	
PR.2A	ON STATION RESEARCH	FIELD STATION - MACHAKOS	775,000			CORE, SIDA
		TOTAL	775,000	891,250	1,024,938	
PR.2B	ON FARM RESEARCH	ON FARM RESEARCH KENYA	517,322			CORE, ROCKEFELLER SIDA, FORD
		SOCIO-ECONOMIC RESEARCH	80,000			IDRC
		TOTAL	597,322	686,920	789,958	
PR.3	MULTIPURPOSE TREE IMPROVEMENT	MPT IMPROVEMENT	1,053,000			GTZ, BMZ, CORE
		TOTAL	1,053,000	1,210,950	1,392,593	
PR.4	INSTITUTIONALIZATION OF AF		60,000			CORE
		TOTAL	60,000	69,000	79,350	
PR.5	TRAINING	T1 - TRAINING FOR RESEARCHERS	917,057			CORE,IDRC,ADB,DSO CIDA,OTHERS
		T2 - TRAINING FOR FIELD TECHNICIANS	115,000			IDRC,CIDA
		T3 - OTHER GROUP TRAINING	376,750			BMZ,GTZ,CIDA,IDRC CORE,DSO,SIDA
		T4 - RESEARCH FELLOWSHIPS	264,380			GTZ, FORD
		T5 - DEGREE FELLOWSHIPS	204,000			CIDA,IDRC
		T6 - OTHER INDIVIDUAL TRAINING	58,000			CIDA, CORE
		T7 - AF TEACHING MATERIALS	588,500			DSO
		TOTAL	2,523,687	2,902,240	3,337,576	

PROGRAMME/PROJECT EXPENDITURES FOR 1991 AND FORECASTS FOR 1992 AND 1993

PROGRAMME	PROJECT(S)	1991	1992	1993	SOURCE OF FUNDS 1991
PR.6 EDUCATION	E1 - AF IN UNDER/POST-GRADUATE PROGR.	149,491			CORE,(SIDA)
	E2 - AF IN CERTIFICATE/DIPLOMA PROGR.	35,000			(SIDA)
	E3 - AFRICAN NETWORK (ANAFE)	107,600			UNKNOWN YET
	TOTAL	292,091	335,905	386,290	
PR.7 INFORMATION & DOCUMENTATION	I1 - LIBRARY	288,108			CORE
	I2 - INFODOC SERVICES	94,400			CORE
	I3 - INFODOC PRODUCTS	56,400			CORE
	I4 - AF SYSTEMS/AF ABSTRACTS	72,000			CORE
	TOTAL	510,908	587,544	675,676	
PR.8 COMMUNICATIONS	C1 - DOCUMENTATION	615,500			CORE
	TOTAL	615,500	707,825	813,999	
PR.9 SOUTHERN AFRICA AFRENA	CAA - SADCC/ICRAF ZONAL	1,413,768			CIDA
	CSA - ZAMBIA COUNTRY PROJECT	317,211			SAREC
	XXX - TANZANIA COUNTRY PROJECT	297,645			NORAD
	CFM - MALAWI COUNTRY PROJECT	154,200			ROCKEFELLER
	TOTAL	2,182,824	2,510,248	2,886,785	
PR.10 EAST AFRICA AFRENA	CBA - ZONAL	1,140,971			USAID,(SWISS SDC)
	XXX - EMBU/KENYA PROJECT	110,000			SIDA
	XXX - ETHIOPIA COUNTRY PROJECT	321,900			UNKNOWN
	TOTAL	1,572,871	1,808,802	2,080,122	
PR.11 SALWA	CSM - SALWA PROGRAM	1,565,270			IFAD,CIDA
	TOTAL	1,565,270	1,800,061	2,070,070	

PROGRAMME/PROJECT EXPENDITURES FOR 1991 AND FORECASTS FOR 1992 AND 1993

PROGRAMME	PROJECT(S)	1991	1992	1993	SOURCE OF FUNDS 1991 **
PR.12 HUMID LOWLANDS OF WEST AFRICA	XXX - HULWA PROGRAMME	623,300			ADB
	CWA/CSE - CAMEROUN	291,008			IDRC,CORE, (SDC)
	CSU - OSU/IITA/NIGERIA	171,000			USAID
	TOTAL	1,085,308	1,248,104	1,435,320	
PR.13 SOUTH ASIA	CTP - INDIA	13,300			IDRC
	CTB - BANGLADESH	40,310			FORD
	TOTAL	53,610	61,652	70,899	
MANAGEMENT & ADMINISTRATION	DIRECTOR - GENERAL	841,959			CORE,NORAD
	BOARD OF TRUSTEES	154,000			CORE
	FINANCE & ADMINISTRATION	1,665,360			CORE
	RESEARCH + RSSU	517,000			CORE
	TRAINING & INFORMATION	284,000			CORE
	TOTAL	3,462,319	3,981,667	4,578,917	
GRAND TOTAL		16,968,210	19,513,442	22,440,458	

ICRAF RESTRICTED & UNRESTRICTED FUNDING FOR 1990 AND FORECAST FOR 1991

RESTRICTED FUNDS 1990 – 1991

US$'000

DONOR	STATUS	PROJECT	1991 (FORECAST) (Confirmed)	1991 (FORECAST) (Requested)
BMZ/GTZ	C	PR.5 - T4 - NAIROBI FELLOWSHIPS	51,240	
BMZ/GTZ	C	PR.3 - MPT IMPROVEMENT	105,000	
BMZ/GTZ	C	PR.5 - T4 - NAIROBI FELLOWSHIPS	51,240	
BMZ/GTZ	C	PR.5 - T4 - MALAWI FELLOWSHIP	35,000	
CIDA	C	PR.11 - SALWA	1,067,400	
CIDA	C	PR.9 - S.A.AFRENA	1,816,514	
DSO	C	PR.5 - T1 - DSO COURSE	236,500	
FORD	C	PR.13 - BANGLADESH	40,310	
FORD	C	PR.2B - ON FARM RESEARCH	15,900	
IDRC	C	PR.2B - ON FARM RESEARCH	80,000	
IDRC	C	PR.13 - INDIA	13,300	
IDRC	C	PR.12 - CAMEROUN	77,022	
IDRC	C	PR.5 - T2 - TECHNICIAN TRAINING COURSE	55,000	
IFAD	C	PR.11 - SALWA	500,000	259,120
NORAD	C	DG OFFICE - E.BARROW	124,759	
NORAD	C	PR.9 - TANZANIA	433,000	
ROCKEFELLER	C	PR.9 - MALAWI	160,000	
ROCKEFELLER	C	PR.2B - ON FARM RESEARCH	183,163	
SAREC	C	PR.9 - ZAMBIA	311,000	
SDC	C	PR.10 - SWISS RESEARCH ASSOCIATE	74,938	
SDC	C	PR.12 - SWISS RESEARCH ASSOCIATE	86,965	
SIDA	C	PR.2A - ON STATION RESEARCH	350,000	
SIDA	C	PR.2B - ON FARM RESEARCH	35,000	
SIDA	C	PR.6 - E2 - B.HANSSON	35,000	
SIDA	C	PR.10 - EMBU/KENYA PROJECT	110,000	
SIDA	C	PR.6 - E1 - AF IN UNDER/POST GRADUATE	25,600	
USAID	C	PR.10 - E.A. AFRENA	710,689	355,344
USAID	C	PR.12 - OSU/IITA/NIGERIA	171,000	
ADB	R	PR.12 - HULWA		820,000
BMZ/GTZ	R	PR.3 - MPT IMPROVEMENT		772,000
DSO	R	PR.5 - T3 - DSO TRAINING MATERIAL WORKSHOP		50,000
DSO	R	PR.5 - T7 - TRAINING MATERIALS IN AF.		588,500
FORD	R	PR.5 - T4 - FELLOWSHIP Z.ABEDIN		126,900
IDRC	R	PR.5 - T1 - CAMEROUN		25,000
IDRC	R	PR.5 - T5 - CAMEROUN FELLOWS (4)		20,000
MULTIDONOR	R	PR.5 - T1 - COURSE		236,500
SIDA	R	PR.5 - T3 - C.V. DEVELOPMENT		50,000
UNKNOWN	R	PR.10 - ETHIOPIA PROJECT		386,000
UNKNOWN	R	PR.4 - INSTITUTIONALIZATION OF AF.		60,000
UNKNOWN	R	PR.6 - E3 - ANAFE		107,600
		GRAND TOTAL	6,955,540	3,856,964

confirmed

ICRAF RESTRICTED & UNRESTRICTED FUNDING FOR 1990 AND FORECAST FOR 1991

UNRESTRICTED FUNDS 1990 - 1991
US$'000

DONOR	1990 (Budget)	1991 **/ (Forecast)
Canada (CIDA)	825	
Netherlands	399	
Switzerland	290	
Norway	308	
Ford Foundation	150	
World Bank	460	
Sweden(SAREC)	244	
Finland(FINNIDA)	284	
African Development Ban	250	
France	68	
Australia(AIDAB)	185	
Japan	410	
U.K. (ODA)	98	
SUNDRY	330	
TOTAL	4,301	4,946

**/ No assumptions made on individual donor's contributions for 1991. Only a 15% overall increase (compared to an average increase of approximately 20% in the period 1986-1990).

PROFESSIONAL STAFF RESOURCES AT ICRAF
1990 AND 1991

PROGRAMME	INTERNATIONAL 1990	INTERNATIONAL 1991	NATIONAL 1990	NATIONAL 1991	SECONDED 1990	SECONDED 1991	TOTAL 1990	TOTAL 1991
E.A.AFRENA	4	5	0	0	3	3	7	8
S.A.AFRENA	6	8	0	0	1	2	7	10
SALWA	1	7	0	0	0	0	1	7
HULWA	2	3	0	0	1	1	3	4
PROGRAMME 1	3	5	0	3	0	0	3	8
PROGRAMME 2	5	8	5	8	4	4	14	20
PROGRAMME 3 ← NPPs	1	4	2	4	2	0	5	8
Policy- PROGRAMME 4 →	0	0	0	0	0	0	0	0
DIRECTOR RESEARCH	2	2	2	3	0	0	4	5
PROGRAMME 5	1	3	1	1	0	0	2	4
PROGRAMME 6	1	2	0	0	1	1	2	3
PROGRAMME 7	1	2	4	5	0	1	5	8
PROGRAMME 8	3	4	3	3	0	0	6	7
DIRECTOR TID	1	1	1	1	0	0	2	2
DIRECTOR GENERAL	4	4	1	3	0	0	5	7
FINANCE & ADMINISTRATION	4	5	2	3	0	0	6	8
TOTAL	39	63	21	34	12	12	72	109

+24

+37 (50%)

NOTE: In addition to ICRAF staff and staff directly seconded to, and administered by ICRAF, there are several dozen scientists in collaborating institutions contributing to the work in the AFRENAS.