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THE CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH
TECHNICAL ADVISORY COMMITTEE AND CGIAR SECRETARIAT

**REPORT OF THE
SECOND EXTERNAL PROGRAMME AND MANAGEMENT REVIEW
OF THE
INTERNATIONAL CENTRE FOR RESEARCH IN AGROFORESTRY
(ICRAF)**

TAC SECRETARIAT
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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10 July 1998

Dr. Don Winkelmann
Chair
Technical Advisory Committee

Mr. Alexander von der Osten
Executive Secretary
Consultative Group on International Agricultural Research

Dear Dr. Winkelmann and Mr. von der Osten,

I am pleased to transmit to you the Report of the Panel that conducted the Second External Programme and Management Review (EPMR) of the International Centre for Research in Agroforestry (ICRAF).

Since entering the CGIAR System in 1991, ICRAF has worked hard and diligently at transforming itself into a full-fledged and well-managed CGIAR institution. It has now become a major force in research and development in agroforestry. The Panel strongly commends the Board, management and staff for this excellent accomplishment.

ICRAF's global and regional programmes have evolved rapidly since the last EPMR, and they address key needs and important topics. There is good evidence that the programmes are producing useful outputs with prospects for substantial impact in the near future. The Panel believes that ICRAF's activities are closely linked to its mission and goals, and to CGIAR goals. ICRAF's regionalized planning and priority setting processes are consistent with its decentralized matrix structure, and both of these are evolving. To give direction to their development, and to provide a coherent framework for the MTP preparation, the Panel has recommended that ICRAF update its Centre-wide strategy and prepare regional strategies. This should improve the correspondence between ICRAF's programme outputs and regional needs, as well as the generation of international public goods that relate to achieving its goals.

Agroforestry by definition involves mixing trees with crops and animals on farms and in landscapes. Such integrated land use systems are complex, knowledge intensive and situation specific. A research strategy aiming to improve such systems must be accompanied by an effective strategy for partnership with national programmes. The Panel commends ICRAF for fostering a collaborative approach to addressing key agroforestry needs. However, the Panel believes that, as ICRAF evolves, it should pay particular attention to encouraging partnerships with national programmes that are mutually reinforcing, and remain sensitive to the capacity strengthening needs of scientists in national programmes. Although ICRAF has a visible presence in the international research community, it is too early to judge the effectiveness of ICRAF's strategy on partnership with national programmes.

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ICRAF's governance and management functions have become more complex since it joined the CGIAR System. While in general the Board is well led, effective and takes its responsibility seriously, the Panel has concluded that the Board should increase its programme oversight.

Overall, the Panel considers that ICRAF's research, management and governance are of good quality. The leadership of the Centre is dynamic and committed to the Centre goals; and ICRAF's management systems and procedures are sound. The Panel has made recommendations and suggestions where it has seen potential for further improvement.

ICRAF's challenge for the future is to find the right balance in its research and development activities to satisfy multiple constituencies. ICRAF cannot be everything to everyone. The Panel considers that ICRAF is well positioned to meet the challenges ahead and to take advantage of the opportunities to contribute to poverty alleviation, food security and environmental protection and enhancement. We fully endorse the CGIAR's continued strong support for ICRAF.

Despite their different backgrounds and expertise, the Panel members worked as a team with great enthusiasm and sense of purpose. I thank you for assembling such a capable and experienced review team, and express my special personal appreciation to all the Panel members for their untiring effort, willing cooperation and dry sense of humour.

Amir Kassam from the TAC Secretariat, and Pammi Sachdeva from the CGIAR Secretariat served as resource persons and supported the Panel throughout the Review in an effective and exemplary manner. They, with their comprehensive knowledge of the CGIAR System and of the CGIAR external review process, ensured the timely completion of our assignment. To both of them we owe a special debt of gratitude.

ICRAF Board, management and staff cooperated in every way and ensured that our working environment was optimal. We express our thanks to them.

Finally, all the Panel members join me in expressing appreciation for the opportunity to participate in the challenging task of conducting this Review. We hope that the Report will be useful to the CGIAR as well as to ICRAF and its partners.

Yours sincerely,



Jochen Heuveldop
Chair, External Review Panel

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TAC SECRETARIAT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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FOREWORD

This is the Report of an External Review Panel appointed to evaluate the programme and management of the International Centre for Research on Agroforestry (ICRAF). The membership of the Panel and their backgrounds are given in Appendix I. The Terms of Reference for this Second External Programme and Management Review (EPMR) of ICRAF are shown in Appendix II.

In conducting the Review, the Panel has been guided by its Terms of Reference and the Guidelines for the CGIAR review process. The EPMR Panel took an evolutionary approach to the Review of ICRAF. The First EPMR of ICRAF was conducted in 1993, two years after ICRAF joined the CGIAR System. The Centre's response to the recommendations of the 1993 External Review is recorded with Panel's comments in Appendix III, and the Panel assesses ICRAF's actions in the relevant sections of this Report. The Panel chose to approach the evaluation in the light of ICRAF's current programme (Appendix IV), focusing more on strategic and cross-cutting issues rather than the details of each separate programmes or project.

The Panel conducted its business in a frank, participatory and open manner. The information on which the Panel based its assessment and conclusions was gathered in a number of ways. The Panel interviewed most ICRAF senior staff at the headquarters and in the regional programmes, and one member met most Board members individually. The Panel also sought the views of ICRAF's partners through a survey letter to all CGIAR Centres and other institutions collaborating with ICRAF, and to all CGIAR Members and Regional Representatives. Three sub-Panels separately visited ICRAF's regional programmes and partner institutions and scientists in Africa, Latin America and Southeast Asia. Panel members also met with national programme representatives and government officials in Kenya, Malawi, Peru and Indonesia. The itinerary of the Panel is outlined in Appendix VII.

Finally, the Panel examined published and internal documents produced by ICRAF staff and by many collaborators; this material included paper and electronic reports, databases and computer software packages. A list of key documents used by the Panel is shown in Appendix VIII.

SUMMARY AND RECOMMENDATIONS

The Second EPMR of ICRAF comes at a time when the Centre has successfully evolved from a Council to a well-regarded research institution that is poised to play an even more significant role in agroforestry-related research on integrated natural resources management (INRM). Today, ICRAF is a well-functioning Centre, with high quality scientific research programmes, both at headquarters and in the regions, and an efficient management system. The EPMR Panel has focused on key programme and management issues related to the present status and future development of ICRAF and has undertaken a forward-looking strategic evaluation. Our findings and recommendations are summarized below. These highlight aspects related to: ICRAF's evolution; the linkage of ICRAF's programme to its mission and goals; planning and priority setting; the research and development continuum; programme quality, linkages and impact; and governance and management. The Panel has also made a number of suggestions which should be considered in conjunction with the recommendations. We conclude with a statement on ICRAF in the twenty-first century.

ICRAF's Evolution

Although ICRAF as a Council was established in 1977, the need for international agroforestry research became realized some 13 years later when ICRAF was invited to join the CGIAR System. Since its entry into the CGIAR System in May 1991, the ICRAF Board, and senior management have worked hard and diligently at transforming ICRAF into a full-fledged CGIAR Centre with an agenda and mode of operation consistent with the CGIAR mission and goals. The Panel strongly commends the Board, management and staff for this excellent achievement.

The current Director General was appointed just prior to the entry of ICRAF into the CGIAR System, and impressive progress has been achieved in many aspects of the Centre's work under his leadership. In 1993, ICRAF went through its first EPMR, which coincided with the formulation of its first Strategic and Medium-Term Plans. Since then it has created for itself a strategic position within the international agroforestry research community, established a dynamic research programme at the headquarters and in the regions, introduced a project-based matrix management structure, and fostered a wide array of partnership commitments. In April 1998, ICRAF inaugurated a new office and laboratory building. At the time of this Review, ICRAF had 431 employees including 152 professional staff and had established a visible field presence in Africa, Latin America and Southeast Asia where agroforestry is now regarded as a type of land use practice requiring serious attention from the research, extension and academic institutions.

Programmes

The research involves six regional programmes and five global programmes grouped into 24 projects that are focused on a number of research themes. The five global programmes are: Programme 1 - Natural Resources Strategies and Policy; Programme 2 - Domestication of Agroforestry Trees; Programme 3 - Ecosystems Rehabilitation; Programme 4 - Systems Evaluation and Dissemination; and Programme 5 - Capacity and Institutional Strengthening. The six regional programmes focus on: Southern Africa; Eastern and Central Africa; the Sahel; Southeast Asia; Latin America; and Humid West Africa. ICRAF's global and regional programmes have evolved rapidly since the last EPMR, and they address key needs and important topics. There is good evidence that the programmes are producing useful outputs with prospects for substantial impact in the future.

Links of ICRAF's Programme with Mission and Goals

Since the last EPMR, ICRAF has further clarified and focused its activities to help achieve its goals and objectives. It also has focused on activities in which ICRAF believes it has a comparative advantage and can produce international public goods. With its expanded definition of agroforestry, ICRAF has interpreted its mandate broadly, but at the same time, it has focused more clearly on a few priority areas in which it could make a difference. The Panel concluded that ICRAF's programme activities and plans generally are appropriate and relevant.

ICRAF's Programme Planning, Priorities and Strategies

ICRAF is evolving towards a regionalized planning process and mode of operation consistent with a decentralized matrix structure. ICRAF's 1993 Strategic Plan provided a useful framework for its current MTP. ICRAF's regional programmes are, however, an aggregation of discrete projects that, though responsive to programme needs, are not as yet guided by a strategic view of regional requirements. Therefore, the Panel **recommends** that ICRAF should formulate its regional programmes based on an updated Strategic Plan for the Centre and regional strategies. These could then provide a basis for a five-year research plan to accompany ICRAF's three-year rolling MTP. This should improve the correspondence between ICRAF's programme outputs and regional needs, as well as help ensure the generation of international public goods expected from ICRAF.

The Panel commends the work ICRAF has started recently to identify its role within integrated NRM, and for this it has begun developing a problem-oriented integrated NRM research planning concept, based on systems methodologies. To facilitate this process of planning and priority setting, the Panel has proposed a framework with three main components – policy, research and development, and capacity strengthening – that complements ICRAF's five “pillars” of research and development – policy research, domestication of agroforestry trees, soil fertility replenishment, accelerating impact, and capacity and institutional strengthening. This concept should be pursued as it promotes the understanding of longer-term processes, thus representing the basic tool for planning and priority setting and helping to define types of intervention at any point in time.

Achievements and Impacts

ICRAF has already built up a solid record of research and development outputs and achievements that for the most part are of high quality. This is despite the fact that the Centre has been conducting research only for the past seven years. In the Panel's view, the research producing these achievements was completed too recently for the outputs to have created large scale, direct impacts on farmers' welfare, on national policies or on natural resources management practices. However, there are indications from several countries that changes in management practices are taking place that are in line with the results and recommendations flowing from ICRAF research. Farmers have adopted and adapted technology and knowledge advances developed by ICRAF and its partners (e.g., related to stall feeding or zero grazing; improved fallows; germplasm improvement for domesticated tree species; and biomass transfer technologies).

At the policy level, some changes in laws and regulations that favour poor, rural inhabitants have been made that benefited from, or at least are consistent with, ICRAF research-based advice (e.g., in Indonesia where ICRAF/ORSTOM research on farmer management of the forest margins has led to significant policy change. ICRAF's advances in research methods are also being widely disseminated and used by various research groups. Activities in training, education and information sharing have been greatly appreciated by its partners. The Panel has also been favourably impressed by the accomplishments and potential of the ASB and AHI Systemwide ecoregional programmes coordinated by ICRAF and expects that these programmes will continue to receive the support of collaborators and donors.

The ultimate extent of ICRAF's achievements and impact will, of course, depend not only on improvements in capacity of scientists and institutions and on the application of technology in farmers' fields, but also on the broader priorities and policy changes adopted by governments. For this reason, the Panel is pleased to note that a major concern in ICRAF is the institutionalization of agroforestry in partner countries – an area in which ICRAF has not yet had as great a success as in the case of its research and development activities at the farm and community levels. Again, the panel stresses that this is a task that requires the inputs of many other actors besides ICRAF.

Quality

A key question to be addressed in any review of CGIAR Centres is the quality of their programmes - which the Panel interpreted broadly to include quality of inputs, problem formulation, methods and implementation, and outputs. Quality assurance mechanisms and processes are also important.

The Panel has commented on various aspects of quality: the detrimental effects of time pressures; the availability and effective utilization of high quality staff and facilities; the scientific and methodological rigour required; disciplinary coverage; and measures of, and mechanisms for, ensuring outstanding quality of outputs.

ICRAF scientists are engaged in strategic and applied research that utilizes both the biophysical and social sciences. It has embarked on placing the knowledge gained in a

systems context, and on field testing on farmers' fields the technologies developed. ICRAF is to be commended for giving attention to the testing of farmer participatory research methods to link research and extension. Much energy, commitment and goodwill on the part of the NARS collaborators have gone into this effort. With such a rapid development, there are bound to be areas where some change in approach or style of interaction are needed, but we believe ICRAF has the capacity and the will to undertake these.

The staff at ICRAF are both committed to their duties and generally of high calibre. The skills required and the type of personality that best carries out certain activities vary but ICRAF has in general got this mix right. All staff need to be cognizant of ICRAF's role in capacity strengthening and how this can be carried out. There is a continuing need to be aware of the benefits of genuine collaboration particularly with the NARS. In light of this, the panel strongly suggests that all IRS and senior nationally recruited staff take part in regular training courses on creating working partnerships, of working in teams and on recognizing the influence of personality and cultural differences in relationships.

The post harvest aspects of the products from domesticated trees is another area where disciplinary strength is lacking. Since these are usually product specific, the panel **recommends** that such expertise be obtained through consultancies or from NARS who may be able to address this issue. The Panel has pointed to the need for policy research as an important part of the strategic planning process. This disciplinary support is not currently available in all regions. ICRAF otherwise has a good mix of disciplines and skills amongst its IRS and should explore ways of complementing its needs by closer collaboration with the NARS or by secondments from ARIs.

The methodologies that ICRAF is using in its research have generally been at the cutting edge. The panel found very few instances where more rigour may have been warranted. Early in this five year review period, ICRAF has undertaken careful reviews of some of its research in the regions and has shown a commendable ruthlessness in stopping experiments that may have been poorly designed. At the same time, ICRAF has shown a capacity to move into new and promising research.

In terms of outputs, ICRAF has made a commendable effort to publish its results in refereed scientific journals, conference proceedings, book chapters, reports and more popular press articles. There has been a dramatic increase in peer reviewed articles from 22 in 1993 to 109 in 1997 and a change in articles per senior scientist from 0.2 to 1.1 per year which is above the norm for the CGIAR System. The quality, quantity and diversity of other outputs -- such as policy research, systems development and capacity strengthening -- is also, in general, commendable.

The Research to Development Continuum

ICRAF is evolving into an institution that gives explicit and equal emphasis to research and to the development activities needed to make sure that the research results are as effectively, efficiently and rapidly as possible put into use on farmers' fields and in ministers' offices. ICRAF focuses on generating effective development pathways or road maps for how it and its partners can get from research to development along a research-to-development continuum that yet remains to be defined in concrete terms. The Panel has made some

recommendations for strengthening ICRAF's research on dissemination methods and techniques, market development, and strategic planning for value added activity (including post-harvest technologies).

One of the casualties of this rapid development of the R & D continuum has been the time available to develop genuinely collaborative research projects within the Centre. Not surprisingly, this has been less of an issue for some of the regions where the small number of IRS has promoted team building and a problem oriented approach. The issue of too many partnerships between ICRAF' and others was brought up to the Panel as a potential concern. The Panel is of the view that the quality, and not the number of partnerships, ought to be given high priority in the future. The Panel has recommended that ICRAF utilize its past experience with partnerships to generate lessons that could feed into a revised set of operational policy and guidelines for its collaborative work with partners.

ICRAF Linkages and Capacity Strengthening

ICRAF's capacity strengthening programme has had notable achievements over the past five years. As agroforestry technologies are constantly advanced by the research both at ICRAF and elsewhere, capacity strengthening will need to remain a high priority for ICRAF. The demand for training activities has increased and will continue to increase and diversify. The Panel endorses ICRAF's plans to transfer some of the basic training activities to the NARS, and to focus on more specialized courses on integrated NRM. Further, the Panel has recommended that ICRAF supplement its training programme with a visiting scientists scheme so as to enable post graduate students and mid-career scientists from NARS partner institutions to work with ICRAF's leading scientists for specified periods of time.

Governance and Management

ICRAF's governance and management functions have become more complex since it joined the CGIAR System. While in general the Board is well-led, effective and takes its responsibility seriously, the Panel is of the view that should strengthen its programme oversight and should institute a formal procedure to schedule and commission Centre Commissioned External Reviews.

The process of transforming ICRAF from a Council to a full-fledged CGIAR institution would not have been possible without the dedicated leadership provided by the Board and senior management team, particularly ICRAF's dynamic and committed Director General, who has provided overall guidance and shouldered much of day-to-day responsibility of good stewardship.

ICRAF's management systems and procedures are generally sound, and its operations are efficiently managed. The Panel noted the improvement in the financial system with the installation of an upgraded computer system.

The Panel has commented on the high ratio of unrestricted to restricted funds, and the low level of overhead recovery from project funds. Although the Centre is in good financial

shape, the trend towards decreasing percentage of unrestricted funding is worrisome and needs concerted corrective action by both the Centre and its many donors.

In the human resources management area, the Panel commends the Centre for substantial improvements since the last EPMR, and **recommends** that the Board and management review the current policy of awarding 10 year initial contracts. With regard to financial management, the Panel also notes the Centre's plans for mobilizing additional financial resources, from various non-CGIAR sources including private foundations and corporations.

In terms of management of research, the Panel has suggested that the continued evolution of the regionalized matrix be guided by a deliberate effort to learn from past experience in various regions; that interactions and collaboration between the regions and headquarters be adjusted accordingly; and that collaboration with external partners, including other CGIAR Centres, be nurtured carefully and sensitively to produce valuable mutual benefits.

ICRAF in the Twenty-First Century

In the Panel's opinion, ICRAF is moving in the right direction to make further significant impact in the future, not only in terms of "improved trees on the farmers' fields," but also in terms of the broader environmental and economic issues that face the world. ICRAF is broadening its focus to view agroforestry at the landscape and watershed levels, which immediately brings in a number of issues not before addressed to any extent by ICRAF. Such issues relate to the off-site impacts associated with changes on farmers' fields, with the policy issues that national governments have to address in order to reduce rural poverty, with all the issues associated with research, research dissemination, and research adoption in different institutional contexts, and with the issues associated with integrated natural resources management that address people-environment interactions in a dynamic and holistic fashion, recognizing the linkages that exist between people.

ICRAF is moving towards development and adaptation of an integrated natural resources management paradigm, one that recognizes the temporal, spatial, institutional and disciplinary linkages that are so important in the process of pursuing sustainable development. ICRAF's role in this overall process is clear: It brings to bear the state of the art expertise that exists in the world dealing with the contributions of agroforestry to sustainable development. Yet, ICRAF cannot and does not operate in isolation. Effective pursuit of integrated natural resources management requires effective partnerships.

The Panel believes that with appropriate support, and with appropriate response, planning and partnering on the part of ICRAF, it can make a significant difference in the global move towards a more sustainable development, and a world of reduced poverty, increased food security, and environmental stability and improvement.

LIST OF RECOMMENDATIONS

CHAPTER 3 – PLANNING AND PRIORITY SETTING IN ICRAF: LINKS TO REGIONALIZATION AND PROGRAMME QUALITY ISSUES

1. The Panel **recommends** that ICRAF review and update its 1993 Strategic Plan, develop both strategic and medium-term plans for each of the Programmes and Regional Offices and use these as the basis for annual planning.
2. The Panel **recommends** that ICRAF do a systematic analysis within the year of the factors associated with successful and unsuccessful operation in the regions that draws out the lessons for an updated set of guidelines for management of the regional programmes.
3. The Panel **recommends** that all IRS and senior nationally recruited staff take part in regular training courses on creating working partnerships, of working in teams and on recognizing the influence of personality and of cultural differences in relationships.
4. The Panel **recommends** that ICRAF further develop the research and training needed in the area of vegetative propagation and nursery management and establishment.

CHAPTER 4 - THE RESEARCH-DEVELOPMENT CONTINUUM: ICRAF LINKAGES AND CAPACITY STRENGTHENING

5. The Panel **recommends** that ICRAF develop an area of identifiable activity and develop greater capacity at headquarters related to research on dissemination methods and techniques within Programme 4.
6. The Panel **recommends** that ICRAF pursue the establishment of activity and expertise at headquarters in the areas of market development research and strategic planning for value added activities (including the process of identifying, choosing and developing appropriate post-harvest technologies).
7. The Panel **recommends** that ICRAF craft a strategy, operational policies and associated guidelines on partnerships that go beyond its current policy guidelines and that these new statements be based on the results of a thorough analysis of ICRAF's partnership experience. Special attention should be given to the pathway for NARS strengthening and to ways to handle differences in organizational culture.
8. The Panel **recommends** that ICRAF establish a visiting scientist scheme to attract postgraduate researchers and mid-career scientists to work with the Centre's cutting edge scientists.

CHAPTER 5 - GOVERNANCE AND MANAGEMENT

9. The Panel **recommends** that:
 - a) The board strengthen its programme oversight by increasing the frequency of Programme Committee meetings, becoming more proactive in setting its agenda and seeking appropriate documentation from management; and
 - b) The board institute a formal procedure to schedule and commission Centre-Commissioned External Reviews and to discuss these, other external review reports and management's responses.
10. The Panel **recommends** that management restrict initial contracts to between three and five years, with the possibility of renewal and without the current ceiling of ten years.

CHAPTER 1 - INTRODUCTION

1.1 The Need for International Research in Agroforestry

Smallholder households in much of the tropics depend on integrated mixed production systems to meet their demands for food, fodder and other non-food items, as well as for cash from sale of various tree and non-tree products. It is through the same agroforestry systems that households attempt to maintain the resource base of their farms and minimize production risks. Indeed, the evidence of the importance of integrated crop-livestock-tree production systems in sustaining smallholder farming communities is becoming stronger.

Smallholder producers at subsistence and semi-subsistence levels (the poor for whom the CGIAR attempts to alleviate poverty) attempt to optimize the output of a set of biological products within the constraints imposed by traditional knowledge, labour availability, the environment, the need to maintain a minimum level of natural fertility, and pests and diseases. Smallholder mixed production systems aim at capturing maximum synergies, in space and time, between the different components. However, these systems have traditionally relied on indigenous experiential knowledge as the main source of innovative change in production practices. In the absence of inputs to replenish and enhance soil fertility, and of scientific knowledge for managing synergistic ecological relationships at higher levels of outputs, smallholder production has either stabilized at a low level, or, as is the case in Sub-Saharan Africa, has declined.

In the case of those smallholder shifting cultivation systems in the humid tropics, that do not benefit from the resource-enhancing processes inherent in the agroforestry-based mixed systems, land degradation has become a major environmental, social and economic concern. In the lowland semi-arid areas and in the moist uplands and highlands, particularly where rapid horizontal expansion has occurred, lack of experience and knowledge about land development, water and landscape management and erosion control have led to large scale land degradation with negative off-site downstream consequences.

While the biological potential of smallholder agroforestry systems is well recognized, these systems are complex, knowledge-intensive and require land management skills that go beyond the farm boundaries into landscape and watershed management. Until recently, there has been a visible lack of concerted scientific research effort to generate knowledge and technologies to raise productivity and output and to help foster an enabling policy environment. Consequently, improvements in agricultural productivity or use and management of natural resources in smallholder agroforestry systems in the tropics have not thus far been able to play a significant role in poverty alleviation processes, in the enhancement of the resource base, or in large-scale landscape and watershed management.

Agroforestry can be an attractive alternative to shifting cultivation or slash-and-burn agriculture in those areas where these production systems have become unsustainable due to high population densities. Agroforestry technologies may be appropriate for the rehabilitation of degraded lands and for the improvement of secondary forest fallows and derived grasslands. In sub-humid and semi-arid savannas, overgrazing, continuous cropping without fertilizer

inputs and other practices by resource-poor farmers are causing massive soil fertility depletion. Agroforestry technologies have the potential to help reverse these processes and provide smallholders with food, fodder, fuelwood and other sources of income. However, the previous ICRAF EPMP Panel pointed out that agroforestry research in general had not yet validated many of the claims made for site improvement, increased productivity and yield, and sustainability that can result from application of its technologies. Similarly, many of the disadvantages, such as competition between trees and food crops for light, water and nutrients remained unquantified at that time. However, ICRAF's research work during this review period, particularly in the area of component interactions and systems evaluation, has provided considerable evidence of the potential of agroforestry systems and the advantages associated with them.

While agroforestry systems have evolved over centuries, and there is long history of household gardens, agroforestry as a formalized research approach to land use management, and to maximize benefits from tree-based systems, is a recent development. When ICRAF was established as a Council in 1977, there were few national-level research programmes on enhancing the productivity and natural resources management of agroforestry-based mixed systems. This situation has improved significantly due to ICRAF's efforts in concert with those of its national partners. By 1989, the need for a concerted international research effort to generate agroforestry technologies and policy oriented information and to strengthen national agroforestry research programmes had become a high priority. At the same time, the potential comparative advantage of an international institution such as ICRAF in generating international public goods, and of national programmes in adding local value, had begun to be recognized.

At the time of the 1993 EPMP of ICRAF, few new technologies had emerged from agroforestry research that had been widely adopted by farmers. There had been a tendency to concentrate on the ecophysiological and theoretical aspects of agroforestry, with attempts to develop technology packages on-station, without sufficient complementary research on the social, economic and policy matters, as well as on-farm variability and farmers capacity that will ultimately determine adoption by, and impact on, the poor.

During the past five years, the importance of trees in smallholder mixed systems has become even more evident. In the opinion of the Panel, roughly two-thirds of the rural poor (i.e., some 600 million people in the developing regions) live in the less favoured rainfed areas and a large majority rely for their livelihood directly on smallholder mixed systems mostly involving agroforestry. The remaining one-third, who are mostly the landless rural poor, work mainly in the favoured rainfed and irrigated agricultural areas either as share croppers or agricultural labourers. These people, as well as the majority of the urban poor, benefit in varying degrees from different kinds of agroforestry products arising from the smallholder agroforestry systems. The situation is not expected to change significantly in the foreseeable future.

Large absolute increases in the numbers of poor small farmers and of urban poor expected over the next few decades, will increase the pressure on the land resource base for greater productivity and output from smallholder agroforestry systems. As highlighted in ICRAF's current MTP, these can be mitigated through improvements in tree resources that aim at boosting the two major functions fulfilled by trees on farms and in landscape: (i) provision of products that can be marketed for cash or used domestically; and (ii) provision of services that increase crop yields and environmental resilience. The Panel concurs with ICRAF that

these constitute the two global challenges for the agroforestry research and community.

In the light of all of the above, the Panel believes that the case for international research in agroforestry is stronger than ever before. There is need for verification of the benefits and costs of alternative technologies under different conditions; of adoption, obstacles and potentials; of the possibilities for agroforestry to contribute to global environmental benefits; and of agroforestry to help in the fight to reduce existing poverty and prevent future poverty for many millions of smallholder farmers in the tropics attempting as best possible to eke out a living from oftentimes marginal lands under continuous cropping.

1.2 Evolution and Current Status

ICRAF was admitted to the CGIAR System in May 1991. ICRAF's third Director General was appointed just prior to that entry. Joining the CGIAR System called for a transformation from an advocacy Council to an international research Centre with an agenda and mode of operation consistent with the CGIAR mission, goals, priorities and strategies.

The First CGIAR-Commissioned External Programme and Management Review (EPMR), conducted in 1993, supported the development of quality science while maintaining ICRAF's strong partnership with NARS. The Review concluded that "ICRAF stands at the centre of the most important land use issues in the tropics, a secure foundation for its future development."

Since that time, ICRAF has experienced a profound process of change, transforming itself into a global research Centre. These changes are reflected in a major growth in resources (from US\$14 million in 1993 to US \$23.5 million in 1997), new staff (65% of the current professional staff entered after 1993); operations in six ecoregions in Africa, Latin America and Southeast Asia; and up-to-date research facilities at headquarters.

ICRAF today is a full-fledged CGIAR Centre that uses development-oriented science to foster the use of trees on farms. The Centre's current MTP (1998-2000) focuses on five "pillars" of research and development that bring together activities in six ecoregions and give global coherence and perspective to ICRAF's work through five global programmes. The five pillars are: policy research, domestication of agroforestry trees, and soil fertility replenishment, accelerating impact and capacity and institutional strengthening. The Research Division oversees three programmes (Natural Resources Strategies and Policy; Domestication of Agroforestry Trees; Ecosystems Rehabilitation) related to the first three pillars respectively, while the newly created Development Division oversees two programmes (Systems Evaluation and Dissemination; Capacity and Institutional Strengthening) related to the last two.

The five programmes operate in six ecoregions as well as at headquarters, thus addressing the poverty and environmental issues centred around the two major global challenges mentioned earlier. The ecoregions of Southern Africa, Eastern and Central Africa and the Sahel tackle the issue of overcoming exacerbated land degradation through agroforestry in those parts of Africa where decreasing per-capita food production and poverty are acute. The other three in the humid tropics of Southeast Asia, Latin America and West Africa, focus on the search for alternatives to slash-and-burn agriculture at the margins of the world's tropical moist forests, where major global environmental damage occurs amidst rural poverty. ICRAF

is also the convening centre for two CGIAR Systemwide ecoregional programmes: Alternatives to Slash and Burn (ASB) and the African Highlands Initiative (AHI). Together, the programmes and regions provide the range of biophysical, environmental and socioeconomic conditions that enables ICRAF to produce international public goods from agroforestry research in partnership with a variety of collaborators.

A significant evolution is taking place in the management and work environment of the Centre. In management, the changes include the creation of a Development Division, regionalisation, more delegation to middle management, an activity-based budget management system and management training to foster the evolution towards a team-based learning institution. There is a wide range of disciplines represented in its body of scientists, including anthropology, landscape ecology, forest ecology and ethnobotany. ICRAF's research and development agenda focuses on multidisciplinary, systems thinking with emphasis on the analysis of the trade-offs between environmental resilience and income production at several spatial and temporal scales. Participatory approaches focusing on partnerships with many kinds of institutions continue to be the guiding principle of its operations.

1.3 Responses to the last EPMR and Centre-Commissioned External Reviews

ICRAF's First EPMR in 1993 made 10 recommendations. ICRAF's responses to these recommendations, together with Panel comments, are in Appendix III. The Panel assessed the various actions taken by ICRAF in the appropriate sections of this Report and concludes that ICRAF has largely or fully implemented seven recommendations and partially implemented two. One recommendation was not implemented for justifiable reasons.

In conducting this Review, the Panel was requested to interpret its Terms of Reference in the light of the new approach to EPMRs. The new approach comprises a single integrated system with two components: (i) a set of Centre Commissioned External Reviews (CCERs); and (ii) the CGIAR external review of the Centre. The Panel understood that CCERs are normally commissioned by Centre Boards and expected to generate high quality information that would serve as inputs to the EPMRs, thus allowing the latter panel to concentrate on the most important strategic issues facing the Centre. All the ICRAF CCERs so far have been commissioned either by the Centre management or by programme staff.

Since 1994, ICRAF has undertaken the following ten Centre Commissioned External Reviews (CCERs), covering both programme and management areas.

1. External Evaluation of the Project Alternatives to Slash and Burn, February 1995.
2. External Evaluation of the Kenya National Agroforestry Project for the Coffee-Based Land Use Systems (Embu), June 1995.
3. Evaluation of the African Highlands Initiative, May 1996.
4. External Review of the Finance and Administration Division, October 1996.
5. A Field Survey on ICRAF's Research/MPT Nurseries, Their Present Status and Potential Regarding Improvement of Quality and Quantity, March 1997.
6. Progress Report on STAP Selective Reviews: Alternatives to Slash and Burn, Phase I, March 1997.

7. Domestication of Indigenous Fruit Trees of the Miombo Woodlands in Southern Africa – Improvement of Propagation and Plant Production Facilities, June 1997.
8. Review of Research and Community Nurseries in Mexico and Peru, December 1997.
9. Internally Commissioned External Review of Present Situation and Recommendations for the Future Related to the Preparation of 5-Year Workplan, 1998-2002 and Annual Workplan, 1998 for Programme 2 Activities at ICRAF Headquarters, January 1998.
10. Internally Commissioned External Review of Programme 3 – Ecosystem Rehabilitation, April 1998.

These reviews supplement a number of other external assessments undertaken by donors, covering specific activities or projects of interest to the particular donor. In addition, reports of several self-assessments were made available to the Panel. Collectively, these CCERs, donor reviews and self-assessments have provided ICRAF staff and management with useful external and internal perspectives on their work and have contributed to the gradual strengthening of research programmes and institution-wide operations.

The Panel has carefully examined the ICRAF-commissioned external reviews and management's response to the comments and recommendations made. As might be expected, the reviews are of variable scope and quality, partly due to limitations of the terms of reference, the resources and time allocated, as well as the expertise and experience of the reviewers. The Panel is generally satisfied, however, with both the independence of the external review teams and the constructive responses of ICRAF's staff and management to the suggestions and recommendations made. The Panel has used these reports as background material for undertaking its own assessment. However, because of the forward-looking, strategic nature of the current EPMR, and the somewhat narrow scope of many of the CCERs, the Panel has not commented in detail on most of the CCERs. The Panel noted that, thus far, no CCERs have been commissioned by the ICRAF Board, and the Panel comments further on this aspect in Chapter 4.

CHAPTER 2 - THE CONTEXT: ICRAF'S MISSION AND GOALS

This Chapter provides an overall context for the specific strategic assessment of cross-cutting programme issues in Chapter 3, and management issues, in Chapter 4. The discussion in this Chapter addresses questions related to the mission and goals of ICRAF; how they relate to the overall CGIAR goals; how they relate to the needs in agroforestry to meet the goals; the constraints on meeting those needs; and how ICRAF's programme contributes to overcoming the constraints.

2.1 ICRAF's Mission and Goals -

The activities of all the Centres in the CGIAR are undertaken in accord with their own mandates, which are consistent with the mission of the CGIAR: *to contribute, through its research, to promoting sustainable agriculture for food security in developing countries*. Their activities also are directly related to meeting their own goals and the fundamental one of the CGIAR: *to alleviate poverty and protect natural resources so as to achieve sustainable food security*.

ICRAF's evolving strategy for agroforestry integrates improvements that boost the functions trees as providers of products and trees as providers of services, with improvements in policy and institutional arrangements that aim at widespread adoption of agroforestry by farmers. The focus and mission of ICRAF is the same as in 1993 and before. They are entirely consistent with those of the CGIAR. Thus, in the words of ICRAF, its overall mission is:

To increase the social, economic and nutritional well-being of peoples in developing countries through the use of research and related activities to integrate woody perennials in farming and related land-use systems in order to increase productivity, profitability, sustainability, diversity of output and the conservation of natural resources.

ICRAF's goals reflect this mission and also are consistent with the CGIAR goals. More specifically, ICRAF's envisions its contribution to improving human welfare in terms of the following goals:

- Reduce current, and prevent future poverty (poverty alleviation goal);
- Increase food and nutritional security;
- Enhance environmental resilience (increasing soil conservation, increasing soil fertility, enhancing carbon sequestration, protecting watersheds, preserving biodiversity and decreasing greenhouse gas emissions);

In the above, the terms "reduction" and "prevention" have been added in relation to the fundamental CGIAR "poverty alleviation" goal. This is done to recognize that much of ICRAF's work is aimed not only at alleviating present poverty, but also at *preventing* future poverty, both among currently living farmers and for future populations. This latter work is focused on diversifying farm outputs to reduce risks and increase incomes, and on natural

resources management systems work aimed at preventing deterioration in the future of presently adequate conditions, thus preventing or reducing the chances of farmers sinking into increasing levels of poverty and misery.

The first column of Figure 2.1 lists the goals of ICRAF, as they relate to its contributions to its and the CGIAR's goals through generation and dissemination of knowledge, technologies and institutional innovations for increasing the contribution of agroforestry to development.

2.2 Meeting the Goals: Needs and Constraints

Over the years, understanding has increased concerning what specifically is needed in agroforestry to meet the goals set by ICRAF (which are consistent for the most part with the goals of its partners). Similarly, the constraints that stand in the way of meeting those needs are quite clear in most instances. Thus, based on this understanding, and as indicated in column 2 of Figure 2.1, the Panel sees the types of farmer related needs that ICRAF could address as including the following:

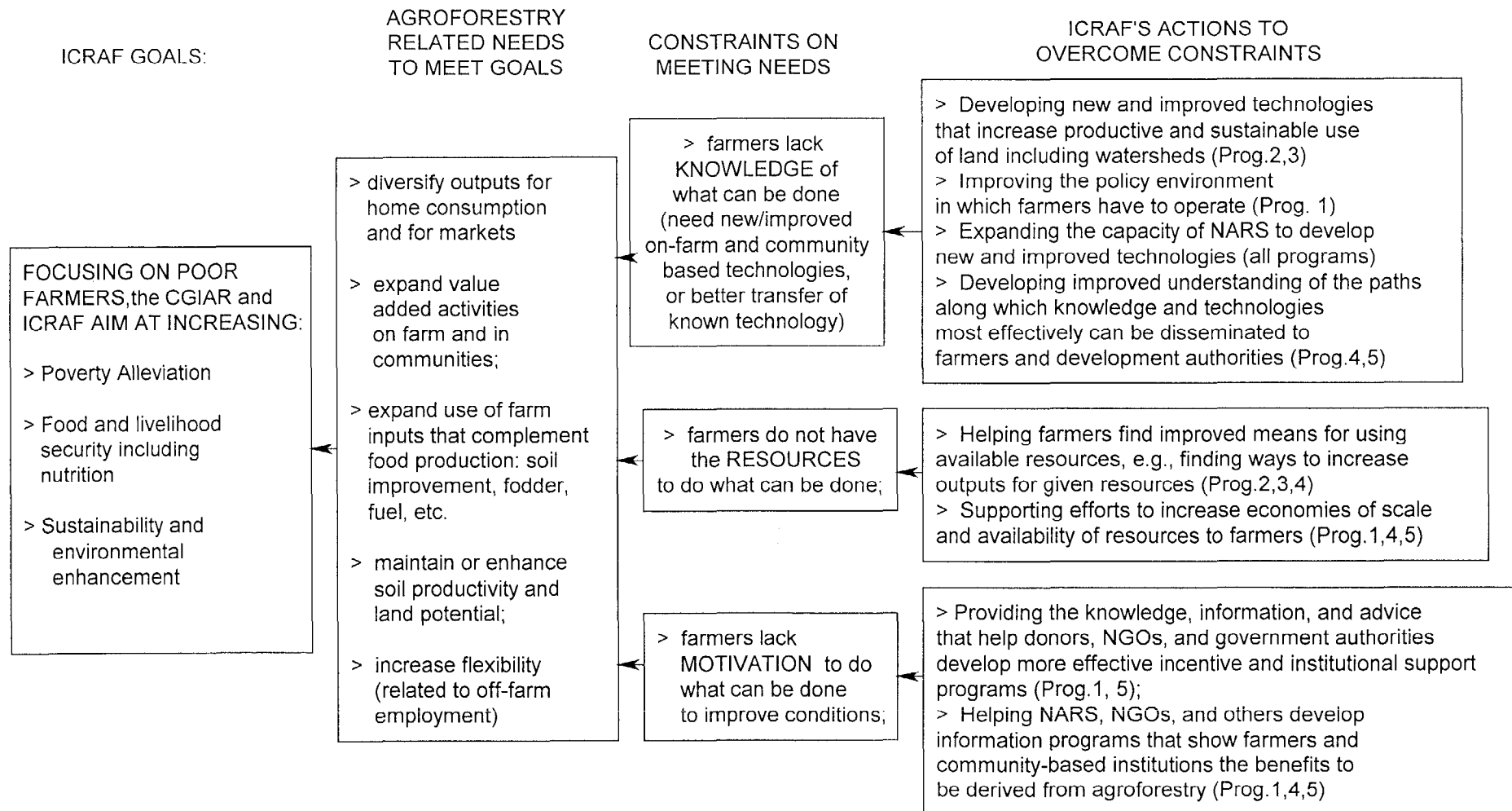
- diversify and expand outputs for home consumption and for markets;
- expand value added activities on farm and in communities;
- improve the efficient utilization of indigenous resources through agroforestry systems and, where appropriate, to strategically use external inputs to enhance the utilization of indigenous resources.
- maintain or enhance soil productivity and land potential; and
- increase flexibility (needed because family members leave for off-farm employment to gain income for the family).

The Panel interprets ICRAF as addressing three types of constraints to meeting these direct farmer needs. These are:

- > constraints on researcher and government authorities, due to lack of **knowledge** of how farming systems can be improved through agroforestry in terms of both efficiency and effectiveness, as well as farmer access to that knowledge;
- > constraints on government and farmer access to the **resources** needed to implement needed and desired changes; and
- > constraints on government **motivation** to create the conditions necessary for farmers to have access to knowledge and resources, and farmer **motivation** to undertake the needed investments of his or her time, funds and land.

The constraints are indicated in column 3 of Figure 2.1

FIGURE 2.1 ICRAF Goals in Relation to Agroforestry Needs, Constraints, and ICRAF's Program



ICRAF's actions are aimed at overcoming the constraints that stand in the way of agroforestry contributing more effectively to the goals of poverty reduction and food and nutritional security, all in a sustainable manner

2.3 Overcoming Constraints to Meeting Agroforestry Needs: ICRAF's Contributions

ICRAF has set itself a broad, comprehensive set of objectives related to its contribution to overcoming the constraints. It also has a comprehensive strategy for meeting the goals. ICRAF recognizes well that to meet its goals, it has to focus on helping to overcome the constraints that stand in the way of widespread improvements in agroforestry for sustainable development and take advantage of the opportunities that arise to work on the constraints with its partners. The Panel interprets ICRAF's strategy in this regard as involving the following elements:

To overcome **knowledge** constraints, ICRAF (Programmes listed in parentheses) is involved in:

- characterization and diagnosis of constraints and opportunities for agroforestry research and development (Programmes 1, 4);
- developing new knowledge and technologies that increase productive and sustainable use of land, including at the farm and watershed levels (Programmes 2, 3, 4);
- determining desirable changes in the policy environment in which farmers have to operate (Programmes 1, 4);
- expanding the capacity of NARS to develop new and improved technologies (all Programmes); and
- developing improved understanding of the paths along which knowledge and technologies most effectively can be disseminated to farmers and development authorities, i.e., effective development pathways (Programmes 4, 5);
- improving knowledge delivery systems (e.g., curriculum development) to incorporate multidisciplinary approaches to agroforestry (Programme 5).

To overcome **resource** constraints, ICRAF is involved in:

- helping farmers find improved means for using available resources, e.g., finding ways to increase outputs for given resources (primarily Programmes 2, 3, 4); and
- supporting efforts to increase economies of scale and availability of resources to farmers, e.g., through changes in programmes that create access to capital, improved seed, fertilizers and other farm inputs (all Programmes);
- determining desirable changes in the policy environment (Programmes 1, 4).

To overcome **motivation** constraints, ICRAF is involved in:

- providing the knowledge, information and advice that help donors, NGOs and government authorities develop more effective policy and incentive and institutional support programmes (primarily Programmes 1, 5); and
- helping NARS, NGOs and others develop information programmes that show farmers and community-based institutions the benefits to be derived from agroforestry (primarily Programmes 1, 4, 5);

- determining desirable changes in the policy environment (Programmes 1, 4).

ICRAF recognizes that the listed constraints and actions to deal with them are not independent of each other, nor is it an exhaustive list. They interact in nearly all cases and in different ways. Thus ICRAF takes a systems approach that focuses in an integrated fashion on natural resources management, technology development and institutional and policy issues. Comments on this approach are provided in Chapter 3.

2.4 ICRAF's Achievements and Impacts

ICRAF already has built up a solid set of research and development outputs and achievements that fit within the general framework laid out in Figure 2.1; although the center moved from one focused on information dissemination to a full fledged research center only within the past 7 years.

Thus, in the Panel's view, the research producing these achievements was completed too recently for the outputs to have created large scale, direct impacts on farmers' welfare, on national policy change, and on changes related to natural resources management practices. However, there are indications from some countries, particularly in eastern, central, and southern Africa, that management changes are taking place that are in line with the results and recommendations flowing from ICRAF research. Some farmers are adopting and adapting technology and knowledge advances developed by ICRAF and its partners (e.g., related to stall feeding or zero-grazing, improved fallows, soil fertility replenishment, biomass transfers, rotational woodlots, erosion control, domesticated species improvements, and intercropping technologies).

Also, at the policy level, some changes in laws and regulations that favor poor, rural inhabitants have been made that benefitted from, or at least are consistent with ICRAF research-based advice (e.g., in Indonesia where ICRAF/ORSTOM research on farmer management of the forest margins led to policy research and advocacy for policy change. The eventual result was a Ministry of Forestry Decree recognizing community rights over and management of some 29,000 ha of state forest land).

ICRAF's advances in research methods have been widely disseminated and used by various research groups (as indicated by publication in peer reviewed journals, evidence from reading and citation lists, joint publications with scientists from the south, etc.). Also, some activities, e.g., in training and education, and to some extent research, already have been successfully picked up by partner countries, indicating the relevance of the activities as well as partner satisfaction with them. Thus, these transfers provide indirect evidence of accomplishment. ICRAF's training programs have brought agroforestry research capacity to numerous NARS and individual researchers within them; and evidence exists that these scientists now are using the gained knowledge from ICRAF in their own research.

At the same time, resources for agroforestry research in NARS of Africa have not been increasing (in real terms), and have been declining in many countries. Thus, the potentials for expanded impacts associated with dissemination of results are hampered by the lack of local resources for research. This is a problem that needs to be addressed not only by ICRAF and other IARCs, but also most notably by the donor community at large, and most importantly by the national governments themselves. It is a familiar situation - improved local research

capacity - hands on training, overseas education, etc., but no increase in the resources which are needed to allow such capacity to be utilized effectively on a sustainable basis back home.

Obviously, the ultimate extent of ICRAF's achievements and impacts will depend not only on improvements demonstrated in farmers' fields, but also on the broader priority and policy changes in governments. For this reason, the Panel is pleased to note that a major concern in ICRAF is the institutionalization of agroforestry in partner countries - an area in which ICRAF has not yet had as great achievement as in the case of its research and development activities at the farm and community levels. Again, the Panel stresses that this is a task that goes beyond ICRAF. There is need for much broader support for policy and resource shifts that support improved sustainable development approaches - production with protection of the resource base on which all production depends - that involve, among other things, expanded agroforestry inputs.

Before looking in more detail at ICRAF's achievements or accomplishments, the Panel wishes to emphasize - as has ICRAF itself in numerous places- that attribution of achievements and impacts directly to ICRAF's work is not possible, nor is it particularly desirable in the sense that ICRAF is a Center that works through partnerships and collaboration; and in partnerships credit for the good (and blame for the bad) achievements needs to be shared

2.4.1 ICRAF's Accomplishments

ICRAF's accomplishments can be classified in a number of ways. In the present discussion, the Panel uses the following categories of accomplishments:

- improved *technology* (modelling and understanding of biophysical and social interactions and their implications for agroforestry technology – agroforestry systems interactions, soil fertility replenishment, etc.
- improved trees for agroforestry - *genetic resources* related research, species and provenance selection, domestication accomplishments, seed availability, etc.
- improved understanding and application of natural resources *management* systems
- research *methods* improvements
- *policy* advice and analysis methods – long-term ecological/economic models for ex ante impact assessment- methods for assessing adoption potential
- training and *capacity strengthening*.

Main accomplishments are listed in Table 2.1 according to this classification. Obviously, the Panel also could have presented accomplishments by regions; and, in fact, in Table 2.1, the notations in parentheses indicate when a given accomplishment refers primarily to a regional output or to a global programme output. In a sense, however, there is strong overlaps and synthesis between the two types of programmes, and the allocation is somewhat arbitrary. It reflects ICRAF's own attribution of outputs to programs.

2.4.2 ICRAF's Impacts

The above categories of accomplishments can, in turn, be related through impacts - actual and intended - to the underlying mission and goals of ICRAF, as indicated earlier in this chapter.

ICRAF views its potential impacts at different levels of aggregation:

- > At the **global** level -
leading in the transformation of agroforestry from a largely descriptive field of study to a multidisciplinary applied science; developing a more effective tree domestication paradigm; developing various methodologies and improving on others; impacts on the international development agenda, e.g., through ICRAF's work and leadership in soil fertility replenishment concepts and approaches; its leadership in the alternatives to slash and burn initiative; quantifying some of the global benefits of agroforestry;
- > At the **national** level -
helping to get agroforestry integrated into a number of NARS, NGO, and university programs in the tropics; training national professionals (around 360 per year); helping to get NARS moving from largely on-station research to the broader and more integrative NRM approach with heavy emphasis on on-farm work and social science input; assisting ministries to integrate ICRAF generated concepts and ideas into national programs and policies; accomplishments occur particularly through regional networks;
- > At the **farmer and community** level -
helping to improve an increasing number of farm family incomes through the integration of agroforestry improvements into farming systems, the development of improved communication and marketing systems for agroforestry ideas and products, the development of community and farmer associations of various types that help promote and make feasible various land use improvements, and the training of extension workers and members of NGOs in agroforestry. Types of ICRAF impacts at the farm level include:

Farmer income increases over time due to:

- > higher and more stable yields of crops and tree products.
- > improved dairy systems
- > more productive use of farmer's land

Farmer cost reductions

- > reduced purchased input, eg., fertilizer requirements
- > reduced failure in crop production and other production activities
- > improved technology of adoption, which reduces risk and potential losses

Improved sustainability of farm income:

- > improved sustainability and soil fertility , e.g., through nutrient recycling, nitrogen fixation, reduced loss of topsoil, addition of rock phosphate;

ICRAF is taking seriously the need to develop information on impacts. In April of this year they hosted a system-wide workshop on impacts at NRM research.

2.4.3 Panel Assessment of Achievements and Impacts.

The Panel considers ICRAF's outputs and achievements to be solid ones that for the most part contribute directly to achieving its goals. Certainly, as would be expected, the quality of outputs in terms of potentials for impact vary widely. As indicated in Table 2.1, ICRAF has had solid output in all six categories of accomplishments listed in Section 2.1.

The Panel found that ICRAF's achievements and outputs are beginning to be translated into impacts in terms of its goals - poverty alleviation, food security, environmental enhancement. Some quantitative evidence exists on expanding farmer adoption and adaptation of ICRAF and partner research results, e.g., in the Southern Africa region. Yet, the Panel hesitates to go beyond anecdotal examples, since ICRAF and its actual research work (as distinct from its earlier functions as an information disseminating agency) are still too young to expect significant impacts at the ultimate beneficiary level, namely, positive impacts at the level of poor farmers and other rural (and to some extent urban) inhabitants. The danger in putting forth quantitative evidence on impacts at this early stage is that it will be taken out of context of the short time period of research that the impacts represent.

2.5 ICRAF's Current Programmes: Summary and Assessment

ICRAF manages its research and development programmes using a matrix system that involves six (soon to be five) regional programmes and five global programmes - each of the latter incorporating one of what ICRAF calls its five "pillars." Thus, the three pillars on the research side are: domestication of trees; soil fertility replenishment; and policy. On the development side, the two pillars are acceleration of impacts and institution capacity building.

The corresponding programmes are:

Programme 1: Natural Resources Strategies and Policy

Programme 2: Domestication of Agroforestry Trees

Programme 3: Ecosystem Rehabilitation

Programme 4: Systems Evaluation and Dissemination

Programme 5: Capacity and Institutional strengthening

Recognizing that its success depends on a longer term presence in, and in-depth knowledge of, the regions and ecosystems that it has chosen to work in, ICRAF established six regional programmes, including:

- Subhumid highlands of eastern and central Africa (ECA)
- Subhumid plateau of southern Africa (SA)
- Semi-arid lowlands of West Africa (SALWA)
- Humid tropics of Latin America (LA)
- Humid tropics of Southeast Asia (SEA)

- Humid tropics of West Africa (HULWA) (soon to be eliminated as an ICRAF region)

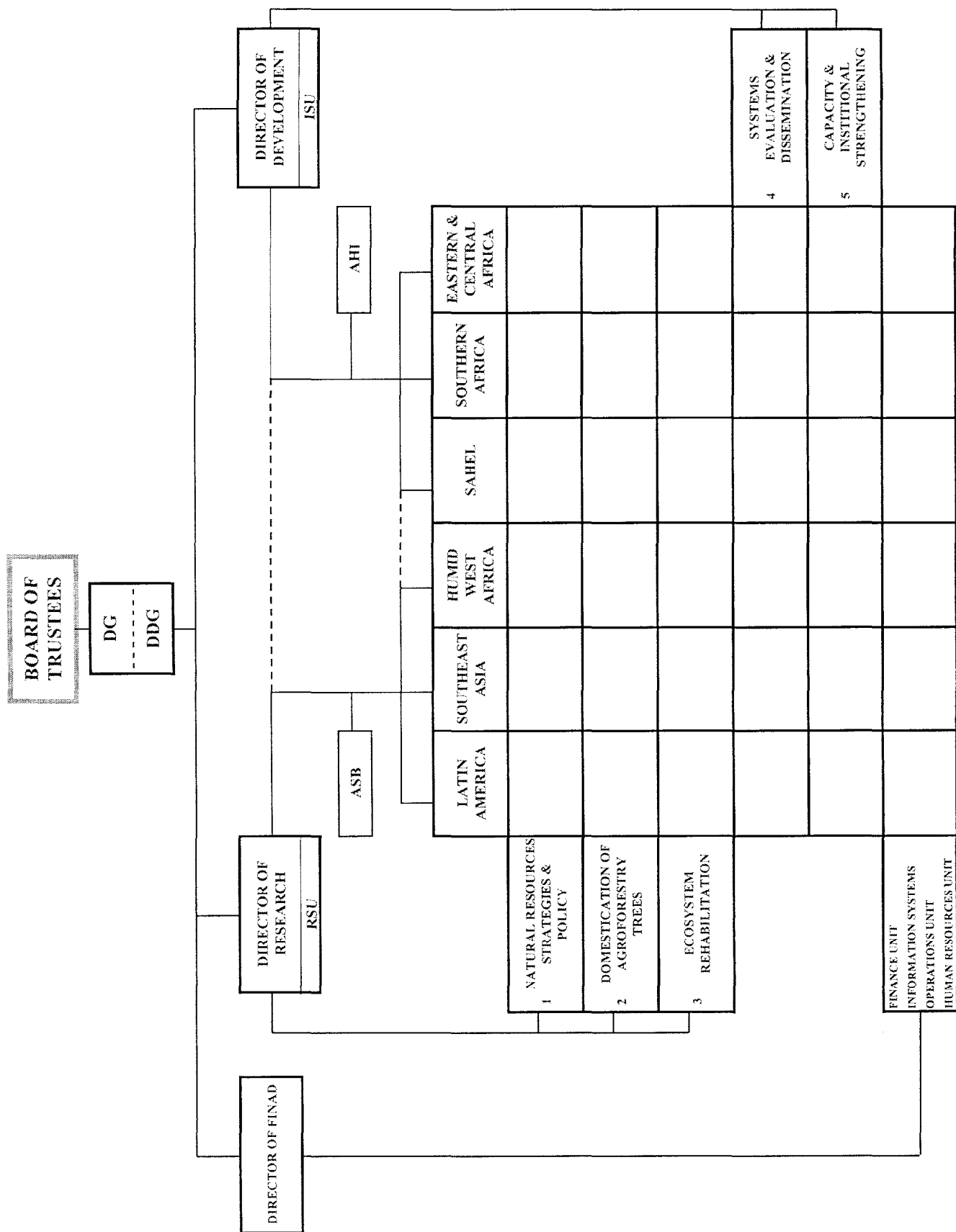
The regional programmes are at varying levels of strength at present, and the HULWA region is being closed down as a regional programme, with its activity related to tree domestication becoming a line item within Global Programme 2. The Panel's assessment of the regional approach of ICRAF is provided in Section 3.2, with comments on the planning functions cutting across programmes and regions provided in Section 3.1.

The five global programmes and six regional programmes are managed in a matrix format, as indicated in Figure 2.2, with global programmes serving more in an advisory and support role to the regions, which have the decision making authority over their projects under the direction of their respective Division Directors. This regionalizing of programs has involved shifts in responsibilities for planning and implementation of activities from headquarters-based Programme Leaders to Regional Coordinators. As a result, and as noted in an April, 1998 Board-Management document, the job descriptions, decision-making authority, accountability (for staff supervision and evaluation, work planning and budgets, output monitoring and reporting, etc.) and fund raising responsibilities have recently been modified. Recognizing that the new system will take some time to get established, the Management and Board plan to monitor progress carefully and modify the matrix arrangements as needed.

In addition to their inputs into the region, the global programmes produce a number of cross regional strategic outputs which are utilized in more than one region, and that constitute a significant portion of the IPGs produced by ICRAF. As indicated in Figure 2.2, the Director of Research manages three global programmes and three regional programmes (soon to be 2), in addition to one of the Systemwide programmes - Alternatives to Slash and Burn (ASB) - and the Research Support Unit (RSU). Likewise, the Director of Development manages two global programmes and three regional programmes, in addition to one Systemwide programme - the African Highlands Initiative - and the Information Support Unit (ISU).

Tables 2.2 and 2.3 provide an overview of the five global programmes and six regional programmes, their objectives and aims, and the Panel's assessment of issues and strengths associated with each. More detailed assessments of cross-cutting issues related to the programmes are provided in Chapters 3 and 4.

Figure 1: ICRAF OPERATIONAL STRUCTURE 1998-2000



2.6 Linking ICRAF's Programme Activities to its Goals: The Panel's Overall Assessment.

Over the past five years, since the last EPMR, ICRAF has further clarified and focused its activities to reflect its goals and objectives (as indicated above). It also has focused its priorities more on activities in which ICRAF believes that it has a comparative advantage and that can produce international public goods -- a main aim of all the international Centres within the CGIAR. In a sense, with its broadened definition of agroforestry (see Chapter 1) ICRAF has broadened the scope of its mandate rather than narrowing it. At the same time, however, it appears that within this broadened context, the Centre has focused more clearly on a few priority areas of activity in which the Centre believes that it can make a difference.

Based on the Panel's review of ICRAF activities and performance since the previous EPMR, and based on its assessment of ICRAF plans for the near future, the Panel concludes that ICRAF's activities and plans generally are on target in terms of its goals. At the same time, the Panel has identified some cross cutting, programmatic issues -- in some cases voids -- on which it believes ICRAF needs to reflect and possibly take some action. Thus, in the following Chapter 3, the Panel draws the Centre's and the CGIAR's attention to these issues and needs; and the Panel provides some recommendations and suggestions for changes -- for the most part small ones, but ones that might produce measureable, longer term improvements and benefits for ICRAF and its partners.

Thus assesment of, and discussion on, ICRAF's planning and prioritization process within and among programmes is provided in Section 3.1; on its move to regionalization in Section 2.2; on the balance between, and integration of research and development in Section 4.1, on programme quality in Section 3.3, and on partnerships and linkages in Section 4.2. Section 4.3 provides the Panel's assessment of ICRAF's capacity strengthening activities. More details on the individual global, regional, Systemwide, and support programmes are provided in Appendix IV, and comments on ICRAF's matrix management issues are provided in Chapter 5.

Table 2.1 Selected ICRAF Achievements by Theme

TYPE OF ACHIEVEMENT	RESEARCH ACHIEVEMENTS WITH PARTNERS (By Themes)
IMPROVED MODELING AND UNDERSTANDING OF BIOPHYSICAL AND SOCIAL INTERACTIONS	· Quantification of carbon stocks/sequestration, greenhouse gas emissions, and above and below ground biodiversity for different land uses in Brazil, Cameroon, Indonesia and Peru. (r5, r4, r6) · Improved understanding of nutrient cycling potential of agroforestry systems. (r5,r2,r4,r6) · Characterization of ASB and AHI benchmark sites for use in identifying research priorities. (r5, r4, r6) · Phosphorus as capital investment in soil fertility (r2). Links between nitrogen concentration in topsoil in relation to maize yield responses in various agroforestry systems. (r1, r2) · Biomass transfer with <i>Tithonia diversifolia</i> found to have significant effect on maize and other crop yields. (r2) · Minjingu phosphate rock as effective as triple superphosphate as capital investment in soil fertility (r2,p3,p4). · Improved understanding of tree-soil-crop interactions in peach palm and multistorey systems. (r5,r6). · Improved understanding of above and below ground interactions between rubber, other trees and vertebrate pests in rubber agroforests. (r6) · Developed the concept of soil fertility replenishment as an investment in natural resource capital for smallholder farmers in sub-Saharan Africa. (p3,p1,p4) · Analytical framework developed for quantifying tree–crop–environment interactions in agroforestry systems, and the data produced within ICRAF (jointly with collaborators) was summarised and available globally using this framework. (p3,p4) · The WaNuLCAS (water, nutrient and light capture in agroforestry systems) model was developed to determine resource capture and use, and predict productivity and environmental impacts of both simultaneous and sequential agroforestry systems. (p3) · Methods were developed for determining water use by trees (e.g., heat pulse method), and for quantitative determination of below-ground interactions between trees and crops (e.g., fractal methods). Using these and other techniques, the programme quantified complete water balances of typical tree/crop intercropping and contour hedgerow intercropping systems, and established limits to production in humid, subhumid semi-arid tropical climates. The programme also evaluated tree species and established criteria for identifying species for simultaneous agroforestry systems in water-limiting environments. (p3, p4) · The programme determined how and where short-duration planted tree or shrub fallows work agronomically and where they do not work; quantified the nutrient cycling processes (nutrient accumulation, transfers, offtake and losses) and nutrient budgets of fallow-crop rotations, which helped to determine the potentials/limitations of tree fallows for soil fertility improvement in different soil and climatic conditions; and identified characteristics of trees best suited for short-duration fallows. (p3,p4) · Available information was synthesised, and reviews prepared on the contribution of trees in general to soil fertility improvement. Global knowledge on short-duration fallows for soil fertility improvement was collated, and future research needs identified. (p3, p4) · It was found that traditional soil analysis methods do not reflect nutrient availability to crops in low-input organic (agroforestry)-based agriculture. The programme developed appropriate indicators of nitrogen and phosphorus availability to crops in these systems. (p3) · The programme accumulated long-term (>15 years) data quantitative information on soil chemical, physical and biological processes under annual systems and perennial and complex agroforestry systems, their productivity (biological and economic) and environmental benefits in the humid tropics of Latin America, which helped evaluate alternatives to slash-and-burn systems in the humid tropics. (p3) · The programme quantified the processes by which barrier hedgerow and mulch systems contribute to soil and water conservation on sloping lands in different climatic conditions. A spatial distribution model was developed for predictive evaluation of agroforestry systems for soil conservation at different scales. (p3) · In collaboration with Programme 1, a theoretical framework was developed for examining multi-functionality of aggregate vs. integrate land-use options at forest margins in the humid tropics, from the point of productivity and environmental benefits. Preliminary guidelines have been developed for scaling up results from plot to landscape under circumstances of lateral resource capture. (p3) · A tree–tree interaction model was developed for studying response of individual trees to neighbours and the environment in multispecies complex agroforestry systems, which should be helpful in understanding population dynamics, growth patterns etc. of trees, and in eventually developing management practices for complex agroforests. (p3) · The Programme has trained 28 MSc and 13 PhD students from 21 universities in 7 countries. (p3)

TREE DOMESTICATION AND IMPROVED GENETIC RESOURCES FOR AGROFORESTRY SYSTEMS	· Provenances of many species tested and information generated. (r1) · Agroforestry trees evaluated for use in systems. (r1) · Improved understanding of fruit trees. (r1) · Psyllid tolerant species of <i>Leucaena</i> tested. (r1) · <i>Calliandra calothyrsus</i> provenances identified for fodder technologies for small dairy farmers, including as high protein fodder. (r1,r2) · Discovery of 24 promising provenances of <i>Sesbania sesban</i> out of 106 tested. (r1) · Identification of high biomass, fast growing acacias for fuel and tobacco curing in Tanzania. (r1) · Identification of upper storey trees for pole production on farms, including <i>Alnus acuminata</i> and <i>Grevillea robusta</i> in higher elevations. Farmer preference over eucalyptus species because of high compatibility with crops. (r2) · Identification of indigenous fodder tree species for central Kenya highlands. (r2) · Appropriate species for live hedges and fodder banks. (r3) · Established the basis for selection of trees for domestication research through robust priority-setting (all regions). · Identification of fast growing nitrogen fixing species suitable for acid and aluminum-toxic soils and which can be used in improved fallow mgt. (r4) · Establishment of germplasm gene bank of priority species and links to cloning and vegetative propagation for on-farm trials. (p 2) · Identification of promising tree species for live fences and pasture rehabilitation. (r5) · Exploration and collection of <i>Sesbania sesban</i> (in a highly collaborative mode) with partners in southern Africa. (p2) · Germplasm collections for <i>Adansonia digitata</i>, <i>Bactris gasipaes</i>, <i>Calycophyllum spruceanum</i>, <i>Crotalaria goodiiiformis</i>, <i>Dacryodes edulis</i>, <i>Grevillea robusta</i>, <i>Guazuma crinita</i>, <i>Inga edulis</i>, <i>Irvingia gabonensis</i>, <i>Irvingia wombolu</i>, <i>Markhamia lutea</i>, <i>Melia volkensii</i>, <i>Pausinystalia johimbe</i>, <i>Prosopis africana</i>, <i>Prunus africana</i>, <i>Pterocarpus erinaceus</i>, <i>Sclerocarya birrea</i>, <i>Swietenia macrophylla</i>, <i>Tamarindus indica</i>, <i>Tephrosia vogelii</i> and <i>Uapaca kirkiana</i>. (p2) · Seed documentation database (SYSTEM+) was customised for handling, storage, ordering and dispatch of germplasm held in ICRAF. (p2). · Took part in the Review of CGIAR genebanks under FAO agreement. (p2) · Negotiated with the Oxford Forestry Institute to handle the long-term storage of orthodox seeds at the Royal Botanic Gardens, UK. (p2) · Genetic Resource Unit went on-line with the CGIAR SINGER (System-wide Information Network on Genetic Resources). (p2) · By 1998, approximately 100 ha of seed orchards had been established for: <i>Calliandra calothyrsus</i>, <i>Crotalaria grahamiana</i>, <i>Gliricidia sepium</i>, <i>Grevillea robusta</i>, <i>Leucaena diversifolia</i>, <i>Leucaena esculenta</i>, <i>Leucaena pallida</i>, <i>Leucaena trichandra</i>, <i>Moringa oleifera</i>, <i>Prunus africana</i>, <i>Sesbania sesban</i>, <i>Swietenia macrophylla</i> and <i>Tephrosia vogelii</i>. (p2) · In 1997, the Genetic Resource Unit dispatched 970 kg of seed for use in trials of ICRAF scientists and national partners. (p2) · Molecular studies using random amplified polymorphic DNAs (RAPDs) carried out for (1) nine provenances of <i>Prunus africana</i> showed clonal population differentiation and provenances to target for collection and conservation; (2) <i>Sesbania sesban</i> and close relatives showed pronounced provenance differentiation, subspecies rank and indicating a selfing mating system; (3) <i>Calycophyllum spruceanum</i> showed weak provenance differentiation although some population structuring due to river tributaries. (Consequently, material can be moved around Ucayali River basin in Peru without fears of genetic contamination); (4) <i>Irvingia</i> spp. showed a lack of interspecific hybridisation between two main species and some mislabelling of material in live genebanks. (p2) · Preliminary seed physiology and storage conditions were determined for the intermediate/recalcitrant species of <i>Prunus africana</i> and <i>Sclerocarya birrea</i>. (p2) · Vegetative propagation protocols were developed for <i>Calliandra calothyrsus</i>, <i>Bauhinia rufescens</i>, <i>Prosopis africana</i>, <i>Pterocarpus erinaceus</i>, <i>Melia volkensii</i> and <i>Prunus africana</i>. (p2) · Germplasm demand and supply, and delivery pathways, were determined. (p2) · Decision frameworks were developed for domestication of agroforestry trees and demonstration of strategy formulation for individual species. (p2) · <i>Leucaena</i> taxa were evaluated across-site to identify productive species with psyllid resistance for use at ICRAF sites. (p2) · Quick assay methods were developed for carbohydrate analysis in vegetative propagules. (p2) · Guidelines for the systematic and rigorous setting of priorities amongst tree species were developed, tested and published with Programme 1 and ISNAR in 1995. (p2) · In September 1997, the <i>Tree Seed Suppliers Directory</i> was published. (p2) · The programme developed nursery improvement and operation modules. (p2)
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IMPROVED UNDERSTANDING AND APPLICATIONS OF NATURAL RESOURCES MANAGEMENT SYSTEMS	· Improved fallows. (r1,r2,r4) · Fodder bank mgt. options for dairy systems. (r1,r2) · Rotational woodlots for wood, fodder and soil improvement (r1) · Economic analysis has shown that high labor requirements for biomass transfer systems mainly profitable when used on high value crops (e.g., vegetables with high market demand). (r2) · Demonstration of the effectiveness of alternative contour hedge technologies (using trees and grasses) in soil erosion control. (r2) · Demonstration that tree species planted on upper side of terraces can help restore fertility to upper sides. (r2) · Increased understanding of Parkland agroforestry systems found throughout the Sahel (parkland typology, mgt. techniques, mkt. potentials for NTFPs, tree-crop interactions). (r3) · Appropriate conditions for live hedges and fodder banks better understood. (r3) · Rotational fallow mgt. techniques for soil mgt., weed control, and wood production. (r4) · Improved understanding of home garden systems. (r4) · Economic studies over 15 years provides perspective on diversified income potential and labor efficiency of 5 different multistrata land use systems. (r5) · Potentials for integrating livestock-tree systems using understory of herbaceous legumes were documented. (r5) · Understanding rubber agroforests in terms of the segregate/integrate criterion at plot and landscape levels. (r6) · Empirical testing of the WaNuLCAS model for imperata grasslands. (r6) · Diagnosis of farmer objectives and constraints to adoption of agroforestry practices indicated that lack of sources of high-quality tree seed germplasm and quality nursery stock are the main limiting factors. (r5) · Understanding of how farmers use and manage tree germplasm based on tree functions and germplasm sources (r5, others?) · Integrating livestock-tree systems, using under storey of herbaceous legumes and grazing livestock with upper storey trees can be done without reducing fruit production of trees and with beneficial nutrient cycling effect of legumes. Live weight gains of cattle were greatly superior to those achieved with the traditional (no trees) pastoral systems. (r5) · Quantification of consequences of land-use change in Sumatra for carbon stocks, greenhouse gas emissions, and below-ground biodiversity. (r6, p3) · Land degradation processes at selected benchmark sites, quantified and diagnosed and natural resource management options assessed at different scales in space and time. (p1) · Farm-scale ecological-economic simulation models were developed for evaluating the adoption potential and sustainability of existing and improved soil management practices. A case study was completed at farm-scale in eastern Africa. (p1) · Economic and ecological indicators of sustainability at the farming system, watershed and regional scales developed and published. (p1) · Two case studies of social and economic impact assessment: (1) northern Tanzania in an area where there was strong spontaneous on-farm tree planting over the past 50 years, and (2) Embu, Kenya, with same rationale and methods, at site where ICRAF intervened with improved agroforestry tree species. (p1) · Farm-scale evaluations (biophysical, social, economic, farmer assessments) have been made for the following techniques: hedgerow intercropping (eastern and southern Africa, Southeast Asia), improved fallows (eastern and southern Africa) biomass transfer (eastern and southern Africa) and live fencing (southern Africa, Sahel in collaboration with Programme 4. (p1) · 37 participatory assessments of the adoption potential of agroforestry systems completed in ECA, SA, HULWA and the Sahel (p4).
RESEARCH METHODS IMPROVEMENTS	· Development of methods/processes for identification of most promising tree species (all regions) (p1 and 2). · Development and acceptance of methods for tree domestication. (r5) · On-farm participatory research approach developed and now widely accepted by NARS. (r5) · Developed a natural resources management research paradigm applied to agroforestry. (p1) · New methods (multiscalar characterisation, decision-support systems, ecological-economic models) have been developed and implemented in Latin America, Southeast Asia, HULWA and Eastern Africa. (p1) · Geo-referenced databases have been built for most characterisation parameters for all ASB and AHI sites and for southern Africa. (p1) · Diagnostic model for evaluating deforestation risk in the Congo and Amazon River basins (in publication). (p1) · Software for spatial characterisation has been developed and disseminated to ICRAF collaborators in Africa and Latin America. (p1) · Farm-scale ecological-economic simulation models were developed for evaluating the adoption potential and sustainability of existing and improved soil management practices. (p1) · A prototype spatial econometric model built with the World Bank and the Regional Centre for Tropical Biology of the Southeast Asian Ministries of Education Organisation to analyse determinants of land-use changes. (p1)

	· Participatory research methods developed for OFT trial typology, monitoring on farm trials, questionnaire development, assessing ranking of tree species, agroforestry systems and farm enterprises (p4) · Methods developed for assessing the feasibility, profitability and acceptability of agroforestry practices (p4) · Village level workshops utilized for the identification of biophysical and socioeconomic impact indicators (p1,p4) · Methods developed for the improved design and analyses of agroforestry experiments (RSU, p4) · Concept and practice of adaptive research and dissemination teams at benchmark locations, developed and instigated in all regions (p4) · Conceptual framework for the generation of IPG through adaptive research and dissemination developed (p4)
POLICY ADVICE AND ANALYSIS METHODS	· In collaboration with CIFOR, ANU and FINNIDA, an economic assessment of policy distortions and market imperfections found that the case is yet to be made for direct policy intervention to promote tree planting on grasslands by smallholders in Southeast Asia, even when carbon sequestration services are included. (p1) · A qualitative causal-loop model of forces driving deforestation in Sumatra was developed and was used to identify priorities for quantitative research activities and policy analyses. (p1) · In collaboration with IFPRI and other partners, econometric models were built to examine the effects of land and tree tenure on land use, resource management, and tree planting and links with population pressure farmers in eastern and southern Africa and the buffer zone of a major national park in Sumatra, Indonesia. Policy recommendations disseminated at national and local levels. (p1)
TRAINING AND CAPACITY BUILDING	· Workshops at the international, national, and local levels within Africa focused on improving policy making for natural resource management. (p1) · ICRAF and Thai agency working groups explored strategies for reforming agency operations to comply with the new Thai constitution and local government legislation mandating participation by local communities in natural resource management. Findings of the first major workshop were published and disseminated by the Royal Forest Department. (p1) · Convened or co-convened six international and regional workshops and trained more than 20 postgraduates students from a wide variety of universities. (p1) · The programme published a vegetative propagation course on the World Wide Web. (p2) · Tree domestication training courses for 12–20 participants were held in 1993, 1994, 1996 and 1997. (p2) · A training course for vegetative propagation was held for 17 participants in February 1998. (p2) · The Programme trained 6 MSc and 3 PhD students from 9 universities and 5 countries, who contributed to the research output. (p2) · A workshop on biodiversity was co-hosted in Nairobi with the African Centre for Technology Studies, the International Union for Nature Conservation, World Resources Institute and World-wide Fund for Nature in November 1997. (p2) · An international workshop on domestication and commercialisation of nontimber forest products in agroforestry systems was convened in February 1996, resulting in FAO Nontimber Forest Products Publication no. 9 (1997), now the basic reference of tree domestication. (p2) · Co-hosted a workshop on <i>Prunus africana</i> at ICRAF with the World-wide Fund for Nature, United Nations Scientific and Cultural Organisation and National Museums of Kenya in March 1997. (p2) · Convened an international policy workshop on tree germplasm demand and supply in October 1997. (p2) the programme has facilitated and co-ordinated a total of 46 group training courses organized for the benefit of 1148 participants throughout the regions a training database on group training courses, participants and individual ICRAF trainees has been developed and shared the programme has established mechanisms to develop course content and deliver effective training. · The programme has facilitated and co-ordinated a total of 46 group training courses organised for the benefit of 1148 participants throughout the regions. · A training database on group training courses, participants and individual ICRAF trainees has been developed and shared. · A series of agroforestry training materials in support of introductory and specialist courses (catalogue available) has been finalised. · The programme has established mechanisms to develop course content and deliver effective training. · Stakeholders in agroforestry education (mainly policy makers, universities and colleges) have been mobilised to act together on improvement of agricultural and natural resources education and training. · Useful tools (methods) and mechanisms were developed to assist colleges and universities. They include: methods on development or review of curricula to incorporate agroforestry; mechanisms to enhance inter-institutional collaboration; and mechanisms to strengthen and sustain the participation of universities in agroforestry research. · A pool of educators with agroforestry competence has been generated in Africa and is providing resource people and managing training courses.

	· ANAFE has evolved into the largest network of educators in Africa. It has also developed mechanisms for self-funding. · A global database on agroforestry training and educational institutions and programmes has been developed, produced, and shared widely. · Postgraduate education majoring in agroforestry has been established at 10 universities in Africa: Sokoine University of Agriculture, Tanzania; Moi University, Kenya; University of Science and Technology, Ghana; University of Ibadan, Nigeria; University of Yaoundé, Cameroon; University of Ouagadougou, Burkina Faso; University of Zimbabwe; Bunda College of Agriculture, University of Malawi; University of Stellenbosch, South Africa; and Makerere University, Uganda.
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Notes:

r1 = Southern Africa

r2 = Highlands of eastern and central Africa

r3 = Semi-arid lowlands of west Africa

r4 = Humid tropics of west Africa

r5 = Humid tropics of Latin America

r6 = Humid tropics of SE Asia

p1 = Programme 1: Natural Resources Strategies and Policy

p2 = Programme 2: Domestication of Agroforestry Trees

p3 = Programme 3: Ecosystem Rehabilitation

p4 = Programme 4: Systems Evaluation and Dissemination

p5 = Programme 5: Capacity and Institutional strengthening

TABLE 2.2 ICRAF Global Programmes: Objectives and Intended Outputs and Panel Overview Assessment

GLOBAL PROGRAMME	OBJECTIVES AND AIMS	PANEL ASSESSMENT AND SUGGESTIONS
Programme 1: Natural Resources Strategies and Policy	First to identify the constraints affecting farmers by— ➤ characterizing land use, agroecosystem dynamics and poverty levels, to identify the driving forces of poverty and resource degradation in ICRAF's ecoregions ➤ identifying and predicting the role that trees can play in agroecosystems undergoing agricultural intensification ➤ analysing the policy and institutional constraints to agroforestry adoption in the six ecoregions, and designing alternative policy instruments and implementation mechanisms to facilitate adoption and secondly to— ➤ assess <i>ex post</i> the ecological, economic and social impact of agroforestry adoption.	> ICRAF's decision to have activity that focuses on research impact assessment is endorsed; given that it deals with all ICRAF activity, some means of cost sharing with other programs should be explored when the impact work involves other programs; since ICRAF GIS capacity is located in Programme 1, the same suggestion also holds for GIS work done for other programs > ICRAF's intention to move more into national and regional level policy research related to agroforestry adoption and programme implementation is endorsed; > Agroforestry related policy work is needed in the Latin American and Salwa regions; and ICRAF is encouraged to pursue alternative options, including collaborative mechanisms for attaching policy research expertise to these regional programs; > The programme needs to develop a sound strategic plan once the new head of Programme 1 is on board at ICRAF HQ; as ICRAF recognizes, the planning should take into account the results of an intended ICER of the program, which also will be scheduled when the new head arrives; > Links to both CGIAR and other policy research institutions should be thought through carefully and rationalized; > the programme should consider developing perspective planning activity involving longer term forecasting of future conditions and the longer term role of ICRAF within such alternative perspectives.

<u>Programme 2:</u> Domestication of Agroforestry Trees	➤ develop a framework for the identification, production, management and adoption of improved agroforestry trees; ➤ formulate and refine strategies for the domestication of priority species; ➤ determine further priority species for domestication by participatory assessment of farmer needs, species used and economic valuation of species—also considering aspects of the researchability of problems, pathways for germplasm delivery and the extent of potentially useful intraspecies variation ➤ collect germplasm of priority species for on-station and on-farm evaluation and selection, as well as laboratory studies where appropriate; ➤ proactively multiply and disseminate germplasm (seed and vegetative propagules)	> The Panel suggests that Programme 2 integrate more with other Programmes (e.g., 1, 3, and 4) and get involved with broader issues related to trees on farms and at watershed scales; in the process, it needs to make sure that it responds sensitively to the priorities and needs of NARS partners; > a strong strategic plan is needed for this programme that takes into account the contextual issues which should drive the choice of activities > Panel endorses management's decision not to move further upstream in terms of ICRAF facilities in biotech work over the next planning period; > should consider linking with ILRI for molecular genetic characterization work that ICRAF needs done; > Capacity in vegetative propagation, nursery management , and multiplication techniques should be increased; > needs to work with the development division to develop capacity for market studies and potential value added (post harvest technology) development;
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<u>Programme 3: Ecosystem Rehabilitation</u>	➤ develop predictive understandings about— ➤ the interaction between inorganic and organic sources of nutrients for various soil fertility replenishment strategies; ➤ biophysical interactions among trees and crops at different spatial and temporal scales and their interactions with the environment, in terms of water and nutrients; ➤ the effects of improved agroforestry practices on above- and below-ground biodiversity, carbon sequestration and greenhouse gas emissions; ➤ the long-term resilience of the natural resource base, at plot and landscape scales	> Programme 3 ICER raises a number of critical issues; management and programme leader need to respond; the Panel's view on the ICER itself is discussed in section 3.2 of the text. > This programme needs to develop a strong strategic plan that links its activities to the broader environment in which it will operate; it needs to rethink its role in soils work viz a viz its work in component interactions; it needs to consider disciplinary balance: biophysics, climate, and water areas need consideration; > It needs to establish the basis for securing significant outside funding, since it currently is supported mainly by unrestricted core resources; > The programme needs to sort out staffing issues, including collaboration with institutes such as ICIPE in the area of pest management; > needs to develop capacity to monitor and enhance nitrogen fixation; > needs to link more closely with ILRI and CIMMYT networks on soil fertility replenishment;
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<u>Programme 4: Systems Evaluation and Dissemination</u>	➤ provide a coordinated, monitored and analytical mechanism for the participatory evaluation of promising agroforestry practices; ➤ find best-bet management options and define their biophysical limits for further applied research; ➤ help integrate these successful agroforestry practices with other agroforestry and non-agroforestry land-use practices in farmers' fields and the landscapes, to resemble successional agroecosystems; ➤ act as a catalytic and action-oriented group for the wider dissemination of such agroecosystems in pilot areas, working in close collaboration with governments, NGOs and development projects; ➤ provide feedback to and generate analytical information for a wide range of audiences on successes, constraints, farmer adaptation, adoption and impact of agroforestry research;	> This programme has developed an interesting balance of conceptual and practical field work and has a useful approach to linking very site specific work with the eventual production of IPGs based on synthesis of results from numerous field sites; > The programme could benefit from thinking through more systematically the nature and intensity of its relations with other IARCs working in the agricultural systems area, e.g., ILRI, CIMMYT, CIAT, IITA, IFPRI; > The programme should consider to what extent it could improve its output and impact by getting involved in more work at the landscape level, bringing in more explicit consideration of external forces affecting farmer decisions; in this regard, the program, working with Programme 1, might benefit from thinking through more completely the opportunities for complementarity in activities with Programmes 1, 3, and 4;
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<u>Programme 5: Capacity and Institutional Strengthening</u>	➤ enhance the skills of researchers, technicians, policy-makers, development workers and NGOs through group and individual training and the development of teaching materials; ➤ incorporate the multidisciplinary systems approach to agroforestry curricula in tertiary education institutions, at postgraduate, undergraduate and certificate levels; ➤ develop the capacity of national programmes to access and manage relevant up-to-date information—a vital requisite for planning and implementing research and development projects; ➤ continue the development of a global information base on the science and practice of agroforestry through four principal mechanisms: providing library and documentation services, publishing research and dissemination results, enhancing public awareness of agroforestry, and strengthening agroforestry information services in NARS;	> the Panel endorses ICRAF's decision to hand over basic agroforestry training activities (its basic course) to the NARS; the relations with NARS and the links with the other programs (including integrating researchers from these programs into training) are good; > this programme needs to urgently pursue an assessment of the effects of past training and capacity strengthening activities; > the programme needs a strategic planning exercise involving its own personnel and representatives from the other programs to plan out how the synergies and complementarities between the research and development activities of the center and training and capacity strengthening activities can be more fully recognized and utilized; > the programme needs to make more explicit the knowledge base on which its activity is based, i.e., what knowledge bases beyond ICRAF are being tapped and how could the programme tap into other bases more effectively, including links with ISNAR; > the programme should consider the extent to which its needs assessment activities are adequate; > the programme should pursue more actively alternative sources of support for an expanded fellowship, visiting scientist, and internship program; > the Panel believes that the Programme (and ICRAF as a whole) needs to systematically consider the appropriate levels of training in which ICRAF should become involved; > the Programme should become more involved in backstopping production of region-relevant training materials; > should make use of proposed work from DSO project (involving quality control) to improve training effectiveness; > where feasible, ICRAF should increase the use of modern electronic technology in training and capacity strengthening;
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TABLE 2.3 ICRAF Regional Programmes: Objectives and Intended Outputs, and Panel Assessment

REGIONAL PROGRAMME	OBJECTIVES AND AIMS	PANEL ASSESSMENT AND SUGGESTIONS
Subhumid highlands of Eastern and Central Africa (ECA)	➤ Facilitate sustainable agricultural production through improved natural resources management, especially the replenishment of phosphorus and nitrogen capital in the soil; ➤ develop economic–ecological models to help address policies affecting soil fertility replenishment; ➤ identify the priority tree species for domestication, with emphasis on high-value products; ➤ domesticate the priority trees for production of wood, timber and fruit, extracts, such as derived from <i>Prunus africana</i>; ➤ improve soil conservation and management on sloping lands at the landscape scale; ➤ improve fodder production for smallholder periurban dairy systems; ➤ provide capacity building and institutional support to ASARECA, member NARS and other partners.	> The programme needs to consider with its partners in the region the desirable mix of responsibilities as strengths in the NARS partners such as KARI and KEFRI increase; > there is need for clarification of linkages between the ECA programme and the AHI program; a clear statement of what ECA contributes to AHI is needed; agreement on comparative advantages and explicit recognition of linkages is needed; > ECA pilot projects need more involvement from ILRI in support of research fodder utilization; > the programme needs to strengthen research on the factors determining the effectiveness of the farmer participatory technology dissemination pathways (with Programme 4);

Subhumid unimodal plateau of Southern Africa (SA)	➤ Address nitrogen depletion through improved fallows with <i>Sesbania sesban</i> and other species and soil erosion with contour hedgerows; ➤ domesticate the priority trees for fruits, animal fodder and industrial products. Current priority species include indigenous fruit trees like <i>Uapaca kirkiana</i> and <i>Sclerocarya birrea</i> and fodder species; ➤ establish rotational woodlots to provide fuelwood in deforested areas; ➤ identify policy constraints to the adoption of agroforestry; ➤ build capacity at the postgraduate level with research institutes and universities; ➤ promote the scaling up adoption of agroforestry technologies already developed with farmers groups and the extension services.	> Increasing acceptance of improved fallow rotational woodlots, and fodderbank technologies indicate strong potentials for impact (already over 7,000 farmers involved); > has a good approach to technology transfer via NARS and extension services; but needs stronger involvement of NARS; > An updated strategic plan for the region is needed; among other things, it should lay out explicitly the nature of cooperation and complementarity with CIFOR and other IARCs in the region; > This is a good region in which to address the broader policy context (e.g., fertilizer subsidy policy, in relation to the attractiveness of alternative technologies (e.g., improved fallows) being addressed by the program; > Links with NARS, including agreement on relative responsibilities for various activities need to be strengthened, including for extension; links to NGOs for technology dissemination need to be strengthened; Links with ARIs, IARCS, and bilateral programs could be strengthened; > Programs 2,3,and 4 need to have more frequent and in depth contact with the region;
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Humid tropics of Latin America	➤ Reduce the rate of tropical deforestation driven by slash-and-burn by the development and testing of 'best-bet' permanent agroforestry, both at the forest margins and in degraded pastures; ➤ domesticate prioritized indigenous trees for timber (for example, mahogany) and indigenous fruits like <i>Bactris gasipaes</i> (peach palm); ➤ identify policy constraints to the adoption of best-bet alternatives; ➤ restore to a reasonable degree both above- and below-ground biodiversity and sequestered carbon in best-bet alternatives to slash-and-burn; ➤ disseminate improved systems within the policy context of Peru, Mexico, Brazil and other countries; ➤ strengthen capacity in agroforestry, particularly of NGOs, universities and local government bodies;	> The question of dispersion of activity and personnel is a key strategic issue for this regional programme to come to grips with in the short term; a strategic plan for the region is urgently needed, both to give focus to the work of ICRAF and to provide clearer guidance to ICRAF's partnering in the region, both with other IARCs and with NARS and ARIs involved in the region. > A particular institution that needs to be explicitly considered is CATIE since that international institution has extensive activity in the area of agroforestry and works in a number of countries in the region; > ICRAF should use caution in placing isolated policy researchers/advisers in a country without full cost recovery and explicit links to other ICRAF research to produce IPGs.
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Humid tropics of Southeast Asia	➤ protect natural forests by intensifying agroforestry systems at the forest margins; ➤ alleviate rural poverty among smallholder farmers at the forest margins; ➤ rehabilitate imperata grasslands through tree-based farming systems, such as jungle rubber and complex agroforests, and soil fertility replenishment strategies, particularly in the buffer-zone areas of protected forests; ➤ develop conservation farming systems using natural vegetative filter strips to sustain productivity of hillside farming; ➤ promote a favourable policy environment for best-bet alternatives systems, scaling up from the farm to the landscape; ➤ characterize the components of multistrata agroforestry and their impact on biodiversity; ➤ restore to a reasonable degree both above- and below-ground biodiversity and sequestered carbon in best-bet alternatives to slash-and-burn; ➤ continue developing modelling approaches to land-use strategies based on how to segregate and integrate agriculture and natural forests at the landscape scale; ➤ improve the delivery of agroforestry at universities and extension services in the region, through the development of curricula and training materials	> this programme provides a good model for other regions to use as a base, although adaptations considering regional variations need to be explicitly considered; > the output from this programme in Indonesia and its work in Thailand provides a good example of what can be accomplished in terms of introducing the broader policy context into national level discussions concerning the role and potentials for agroforestry in development; > SEA regional programme needs to update its strategic plan or statement of purpose and approach, including its process for deciding on expansion to other countries in the region, and its linkages with other institutions; > The programme needs to assess ways to strengthen NARS capacity, especially those institutes with agroforestry programs other than traditional agricultural research institutes; the Programme should draw on its good connections and relations with policy level national institutions to gain access to such groups;
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Humid tropics of West Africa	➤ domesticating and integrating high-value indigenous agroforestry trees into traditional farming systems. This work is based on the results of a tree prioritization exercise that has identified indigenous trees such as <i>Irvingia gabonensis</i>; ➤ improving multistrata agroforestry systems based on the traditional cocoa and coffee gardens as one of the best-bet alternatives to slash-and-burn agriculture; ➤ restoring to a reasonable degree both above- and below-ground biodiversity and sequestered carbon in best-bet alternatives to slash-and-burn; ➤ analysing existing policy and institutional constraints to adoption of improved agroforestry systems and design alternative policy instruments that would stimulate adoption; ➤ promoting the adoption of improved fallow systems developed by the programme as a means to restore nitrogen fertility; ➤ determining the environmental benefits of multistrata and improved fallow systems as best-bet alternatives to slash-and-burn; ➤ strengthening NGOs, universities and government bodies in the practice of agroforestry;	> shortfall in funding has resulting in curtailing ICRAF activity in this area; the Panel endorses this decision and urges ICRAF to develop closer, productive links with IITA and its agroforestry related work in the region; > continuation of the tree domestication work in the region, in the context of the ASB programme is endorsed. > needs to safeguard the infrastructure that the HULWA programme has developed; > should monitor the NGOs that have taken over the technology transfer, and should use this experience in overall ICRAF planning activities;
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Semi-arid lowlands of West Africa (SALWA)	➤ develop living hedges to replace the traditional dead fences made of sticks and crop residues, and so to protect valuable crops from wandering livestock. A key species is <i>Ziziphus mauritania</i>, which besides its protective function provides high-value fruits. Living hedges also decrease runoff and erosion during intensive rainfall and reinforce tenure rights; ➤ develop improved (more efficient and effective) ways of establishing trees in dryland environments; ➤ domesticate prioritized indigenous and exotic fodder trees, especially for dry-season production; ➤ regenerate the parklands, by domesticating and planting indigenous trees such as <i>Adansonia digitata</i> and <i>vitellaria paradoxa</i>, to produce leafy vegetables and fruits for sale; ➤ increase phosphorus and nitrogen capital of the soils, through a combination of agroforestry trees and applications of phosphorous fertilizers in sandy soils; ➤ develop improved policies in support of the above activities; ➤ build the technical capacity of NARIs, universities, technical colleges, NGOs and extension organizations.	> this is a regional programme where additional policy research on development linkages and institutional mechanisms, (e.g. related to irrigation development, area development programmes) could be usefully introduced to complement on-going technology oriented work; this work would look at the implications for socio-economic changes and for ICRAF's research and the types of technologies being developed by it in programmes 2.4; > the programme needs to think more about how it will produce the necessary IPG outputs that can benefit semi arid regions beyond the countries in SALWA; > the programme needs to move rapidly to complete its strategic plan for the region, including a plan related to choice of training and capacity strengthening activities and linkages between technology and policy research; > ICRA headquarters together with programme staff need to think through carefully the critical minimum mass issue in this region. Agroforestry systems in semi arid regions of the world are extremely important; and ICRAF has to position itself carefully to make sure that its investment in the area makes maximum possible contributions; > closer links and collaboration with ARIs and bilateral programmes working in the region (e.g., the French) could benefit the programme; need to synthesize extensive prior work done by bilateral and regional groups; > need to develop close links with CORAF.
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CHAPTER 3 - PLANNING AND PRIORITY-SETTING IN ICRAF: LINKS TO REGIONALIZATION AND PROGRAMME QUALITY ISSUES

This Chapter provides the Panel's assessment of a number of cross-cutting themes related to ICRAF's planning and prioritization activities, their implications for the move towards regionalization and ICRAF's efforts to ensure high quality Programmes. These cross cutting issues were identified by the Panel during the first phase of the EPMR, the field visits and the early days of the main phase. The themes address issues and questions raised in Chapter 2. Specifically, they are as follows:

- How does ICRAF set priorities and plan for its research and development agenda? Is the process adequate in terms of linking goals to actions? What are some of the ways in which the process might be improved? (See Section 3.1)
- ICRAF has moved recently to a regional model where much of the activity is driven by regional needs and opportunities, but within the overall context of the ICRAF strategy, goals, and objectives; how does this regional model work? Is it an appropriate way for ICRAF to organize its activities? Does this approach provide for adequate linkage among regions and between regions and the global Programmes at headquarters? What improvements can be suggested? (See Section 3.2)
- A key question to be addressed in any review of CGIAR Centres is the quality of their programmes - which the Panel interprets broadly to include quality of inputs, problem formulation, methods and implementation, and outputs. Quality is a key element to consider in planning. (See Section 3.3).

3.1 ICRAF's Priority Setting and Planning in an International Research Context

The 1993 EPMR recommended that ICRAF "develop a more transparent and systematic research programme planning process, including priority setting, monitoring and evaluation..." ICRAF responded by initiating an iterative and participatory process in January 1996, so as to streamline the preparations for the next (now current) Medium-Term Plan accordingly.

As stated in this MTP for the period 1998-2000, ICRAF attempts to set its research and development agenda in response to the global challenges of the next 25 years, and in accordance with the overall CGIAR research agenda. Thus ICRAF's activities are focussed on contributing to improvements in human welfare and environmental resilience through research and development in agroforestry land-use practices (mission statement). Implementation of the planned activities involves an integrated natural resources management approach applied through regional programmes, with backstopping from the global Programmes at headquarters, as outlined in Section 2.5

The annual planning process is designed to start in the regions with meetings attended by numerous partners and other stakeholders who bring forward their local priorities and propose implementation responsibilities. Programme Leaders from headquarters who are overseeing or proposing research in the region also attend, and their presence and typically strong negotiating stance are thought to contravene a focus on overly localized research. Programme staff at headquarters hold their own planning meetings, but plans are not finalized until both regional and programme staff meet for the Annual Programme Review (APR), a two-week review and planning marathon held each September. Results of the APR may necessitate adjustments to both regional and Programme plans made earlier. The outcome of this iterative planning process is incorporated into ICRAF's Programme of Work and Budget (PWB) and presented for approval of the Board of Trustees at their December meeting. Any needed final adjustments are made at a Management Retreat in January, attended by all senior and middle managers. The Panel commends the design of this process but has observed that funding shortages in the Regional Offices sometimes precludes the scheduling of formal annual meetings with partners.

According to ICRAF's Strategic Plan, the Centre is expected to continue its activities on the humid, sub-humid and semi-arid tropics, "areas where essential increases in food and fibre production must be obtained in ways that mitigate the major ecological threats of deforestation and massive land depletion." The Plan included criteria for the selection of regional sites, among them: a) the potential contribution that agroforestry technologies could make to specific ecoregions and to priority land-use systems; b) the constraints and potentials facing rural households; c) the interest demonstrated by national institutions and donors; and d) the comparative advantage of ICRAF to undertake specific research and dissemination activities in the region. The ASB process for the selection of programme benchmark sites supplemented these criteria. The Strategic Plan provided a starting point for more detailed planning that culminated in subsequent Medium-Term Plans.

In the Panel's view, the current MTP for the period 1998-2000 is a useful document for relatively short-term planning-but primarily at the Programme level. The Medium-Term Plan does not substitute for a Centre-wide research plan (except as an aggregation of discrete projects), and it does not contain explicit research plans for individual regions, although it lists the general objectives of the research for each. As a result, Regional Offices work primarily from an annual plan presented in the Programme of Work and Budget. They do not have strategic plans within the Centre-wide document, nor has a Centre-wide strategic document been developed subsequent to 1993.

Some staff have observed to the Panel that ICRAF is more proficient at short-term, annual planning than at planning over a longer term. Ideally, of course, an annual plan should derive from a research plan of three to five years duration that, in turn, should be based on a Strategic Plan covering a full decade or more. To be sure, even the Strategic Plan should be revisited from time to time as conditions change, opportunities arise and knowledge of needs and solutions increases. The Panel is not certain that ICRAF's planning processes adequately comprise consideration of these several time frames nor that they adequately provide for iteratively considering global issues in the light of regional requirements.

The Panel was pleased to note that the Director of Research has formed a small team to design a priority setting process that will employ sophisticated systems methodologies to be able to justify what work is done where on the basis of an explicit and quantitative assessment.

The methodology is designed to yield priorities, objectives, consensus and understanding, new opportunities and a cohesive framework for planning, impact projection and impact analysis.

It will be interesting to learn what the group comes up with and whether the results suggest a change in direction at any level, regional or global. Figure 3.1 shows a useful event chronology for NRM research being further developed by the team.

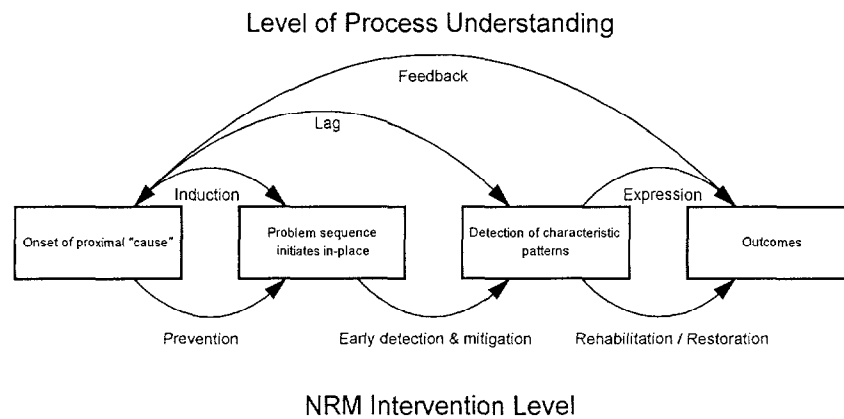


Fig. 3.1: An event chronology for NRM research

(Source: M. Walsh, ICRAF, 1998)

The development of this process and its application will, at best, take some time. The Panel considers it important, however, that ICRAF review its annual planning process and its relationship to longer-term plans. A schematic strategic planning framework for guiding this process at the regional level is given below in Figure 3.2.

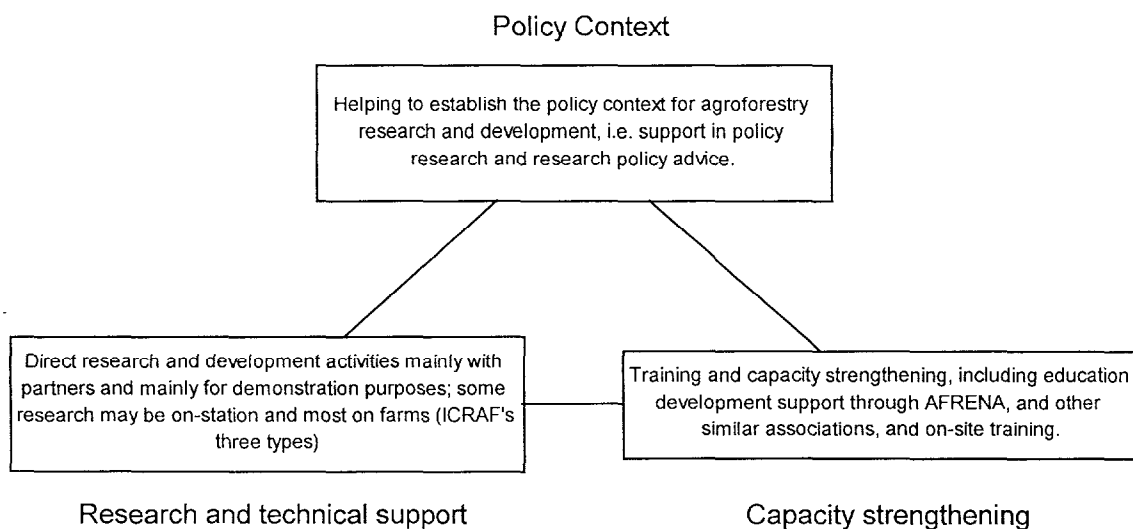


Fig. 3.2 Strategic Planning Framework for Regional Activity.

While all regions will be different in terms of how they provide an appropriate mix of support to regional partners, the three basic elements are needed - work on policy context (primarily Programme 1 input), direct agroforestry research and development (all Programmes) and training and capacity strengthening (all Programmes, with a focus on Programme 5). This planning framework fully complements ICRAF's five research pillars and highlights the strategic dimensions of the Centre's work.

To help operationalize this framework, **the Panel recommends that:**

ICRAF review and update its 1993 Strategic Plan, develop both strategic and medium-term plans for each of the Programmes and Regional Offices and use these as the basis for annual planning.

3.2 Regionalization of ICRAF's Programmes

The six regions of ICRAF's organisational matrix are geographically diverse, with four in Africa, one in Latin America and one in Southeast Asia. The level of activity, funding basis and mix of programme activity vary considerably between regions. In fact, as mentioned earlier, the ICRAF HULWA region will close down due to lack of funding support and the recognition that ICRAF's comparative advantage in HULWA was in the area of tree domestication and how to integrate trees into the farming system. IITA as the regional coordinator for ASB and the eco-regional programme, EPHTA, is responsible for other aspects such as characterization, farming systems, crop improvement, policy, etc. The matrix management system is still evolving with the recent transfer of considerable decision making authority and fund raising, financial management and reporting/evaluation responsibilities to the regional coordinators.

The Panel looked at several questions related to the rapidly evolving regionalization of ICRAF's programmes. One relates to the overall strategy that ICRAF management has adopted for the regional programmes. A second question relates to the relations between headquarters and the regional teams - both actual and those intended for the future when the system is fully developed. Third, there is the question of whether or not the regional approach is advantageous for ICRAF in its activities in the Systemwide programmes established under the CGIAR umbrella.

3.2.1 ICRAF Strategy for the Regions

ICRAF's current strategy incorporates the idea that each region should have some activity from each global Programme. While this might seem desirable in order to fulfil ICRAF's mission, the Panel believes that funding limitations, as well as the great differences among regions, including different priorities, will make this difficult to achieve, and perhaps not desirable. The differences among the regions are such that one or more programme elements may not have top priority. Instead heavier concentration in a few programmes may be the most appropriate approach for a given region, as is currently the case.

ICRAF has developed several approaches to the challenge of staffing the regions appropriately. For example, in the SEA regional model, three regional IRS staff located in one sub-centre relate to three different global Programmes; and the activities undertaken in the

region relate mainly to those three. The IRS staff provide a critical mass, a defined problem and a methodology for developing an approach to solving it. Along with functioning logistical support, this has attracted scientists from ARIs and from NARS to work with the ICRAF staff, operating from their offices on the CIFOR campus. This leveraging of ICRAF's investment enables establishment of viable problem-oriented teams, often with an expanded discipline base paid for by others.

The SEA region provides a good model for the others, although the Panel notes that most of ICRAF's regions do not yet have the disciplinary mix to operate in the same manner. However, they can aim towards the same general type of synergism and collaborative arrangements demonstrated by the SEA programme.

Appropriate location of the regional programmes is important. Where the regional headquarters is located in one of the NARS research stations, this provides ICRAF with the opportunity to support the development of that station for the NARS, through support in upgrading both building and field facilities. There is a tendency in such circumstances to then regard the building (and the station in some cases) as ICRAF's, and this is unfortunate. It is at this level that the most realistic model for cooperation (and capacity strengthening) with the NARS in general should be set. The culture of interaction with colleagues who are not ICRAF staff is vital to the success of ICRAF's mission. This issue is also dealt with in Chapter 4.

Another pattern of operation in the regions is the posting of individual IRS in-country, sometimes in isolation. This necessitates a different *modus operandi* for ICRAF. In such circumstances, the programme allegiance of the staff member becomes less important than the allegiance to ICRAF, because she or he is in a sense representing ICRAF as a whole. The position requires someone who is an integrator and a facilitator, since what they can achieve in the way of research on their own often is limited. Nevertheless, ICRAF has shown how well this can operate, e.g., in Thailand where the ICRAF's senior scientist (a policy analyst) has developed a network of collaborators covering both socio-economic and biophysical aspects of the problem of managing a mountainous forest margin and extensive associated watershed. It is also in this situation that the regional staff person requires good support from headquarters Programmes in the technical aspects of the work, so that scientific standards are maintained. As indicated elsewhere, the Panel cautions ICRAF about outposting scientists alone in a country or region.

A further extension/development dimension has been added in all regions with ICRAF's move towards farmer participatory research as the pathway to test the robustness of the research findings and to facilitate dissemination. Regional programmes have different levels of co-operation with the NARS and NGOs in this process; but it is at this level that the dissemination and rural development starts to take a sustainable, concrete dimension. ICRAF regions need to keep uppermost in the scheduling of their activities the recognition that, at the development end of the spectrum, ICRAF's main role is to test the effectiveness of different methods of extension of NRM research rather than to be the main extension agent *per se*. Having once developed techniques that are effective, then ICRAF's role reverts to one of training the trainers in those techniques, as part of an agreed strategy with their NARS and NGO partners.

Maintaining the balance between these research and development components at the regional and headquarters levels will be a dynamic process. The effectiveness of the regional programmes will thus depend a great deal on the capacity and management skills of the

Regional Coordinators and the way global Programmes make their input to regional activity, both in terms of collaboration in planning research and in providing technical advice and analytical support from the headquarters laboratories. These interactions are very much in an evolutionary phase at ICRAF. The strategy and research plan, combined with funding, have an overarching role in determining the emphasis that regional programmes place have on research, institutional support and extension to farmers. The present funding emphasis is towards development activity, so that regional programmes are generally operating at the applied end of the research spectrum with an increasing emphasis on farmer participatory research and exploration of ways to extend new technologies to farmers.

ICRAF regional programmes already have a wealth of experience with different aspects of ICRAF's overall programme, including both the research side and the development side. In the near future, that experience needs to be drawn upon in a systematic way to ensure that the process of regionalization is cost-effectively implemented.

Thus, the Panel: recommends that

ICRAF do a systematic analysis within the year of the factors associated with successful and unsuccessful operation in the regions that draws out the lessons for an updated set of guidelines for management of the regional programmes.

The Panel believes that such an exercise, which should include some outside expertise to provide an objective perspective on the headquarters/regional linkages, would be of great benefit to ICRAF. While it might be argued that it is too early for such an assessment, the counter argument is that an early one provides feedback while the regional programmes still are adjusting to the new authority and responsibilities given them, and thus are less set in their ways.

3.2.2 Region and Headquarters Interactions and Coordination

The ways in which the Research and Development Divisions at headquarters support the regional activity will be important in ensuring that ICRAF maintains a cohesive vision and "programme of action" rather than operating through a series of autonomous, regional mini-ICRAFs. This is in no way a criticism of the principle of decentralization to the regions of management functions. Rather, it points to a challenge to ICRAF's various levels of management and operations to improve their functioning in the new structure.

The fund raising process, which has now been moved out much more to the regions, requires good communication with ICRAF headquarters to ensure coordination of the project genesis/development cycles so that regions are not competing for donor funds in a manner that distorts ICRAF's overall agenda. ICRAF has moved the Projects Office from the DG's office to the FINAD Division. It assists in processing project proposals, but mechanisms will be needed to efficiently keep management informed of the status of proposals so that they can coordinate their representations to donors about funding and reduce any tendency to develop major imbalances in funding between regions. Obviously, some donors will prefer to work with particular regions and have their own priorities on the type of project they wish to fund. However, the more they feel part of the ICRAF planning process and use the proposed research plan as a guiding document to help decide what is included or excluded, the more likely a mutually acceptable outcome will emerge. The "Agroforestry for sustainable rural development

in the Zambesi basin, project management plan,” provides a good model of the way this donor-ICRAF Regional Coordinator- senior management interaction may take place.

The evolution of the regional programme model has been rapid and it is much to ICRAF's credit that there have been relatively few areas for concern thus far. What has been learnt so far is that it is necessary to have a critical mass of staff and support funding if the region is to function as a true (research and development) programme. The lesson from the headquarters side is that the time commitment for headquarters based staff is considerable and there is a challenge in servicing such widespread locations and coping with the travel involved.

3.2.3 ICRAF's Regional Role in CGIAR Systemwide Programmes

Another aspect of ICRAF's regional activity is its role in the CGIAR Systemwide ASB and AHI programmes. The ASB consortium (AARD-Indonesia, EMBRAPPA – Brazil, IRAD – Cameroon, CIAT, CIFOR, IFPRI, IITA, IFDC, TSBF, ICRAF, ten advanced research institutes and five other major national programme partners as well as 29 other national research institutes, 18 universities in collaborating countries, 43 NGO's) developed as a multi-institutional multi-national project funded by the Global Environment Facility of the UN and UNDP from 1994 with a one-year cycle and a mandate “to work towards mitigating tropical deforestation, land depletion and rural poverty through improved agroforestry systems” through research on both technical interventions and policy options. ICRAF coordinates this global activity through a half-time senior staff member who also works with the Cornell International Institute for Food, Agriculture and Development on related activity, and a full-time assistant coordinator. ICRAF's regional work in Latin America, Southeast Asia and Humid West Africa, as well as global research at headquarters, represent ICRAF's direct contribution to the ASB agenda.

Part of ICRAF's work in the Eastern and Central Africa (ECA) region is a direct contribution to the ecoregional AHI programme, where the main concern is “improving Natural Resource Management within the context of improving agricultural productivity in the highlands.” The AHI seems poised to make a substantial and beneficial impact on the way research is conducted in the region. The synergies accruing from the collaborations with the NARS and ICRAF and other international Centres, and from concentration of efforts on well chosen representative sites, will do much to improve the capacity of the NARS to deliver outcomes that will have impact at the farmer level. Although much of phase 1 was spent in planning, this was necessary for the sustainability of the AHI itself. The AHI programme was comprehensively and favourably reviewed for ASARECA and the donors supporting AHI in 1996.

In sum, both AHI and ASB provide good examples of the facilitating role ICRAF can play in institutional strengthening of NARS, while at the same time conducting research producing IPGs. The gradual transfer of responsibility for management of the AHI and ASB to the NARS is occurring in a carefully planned manner that says much for the skills of the coordinators. It is to be hoped that donors can see that the stage is now set for very productive outcomes from the NARS, supported by the technology and know-how available from the IARCs involved.

3.3 Programme Quality - Inputs, Methods and Outputs

ICRAF has transformed itself in the last five years, establishing its mark as a scientific research institution able to play a significant global role. A key feature of ICRAF is that it deals with the issues surrounding agroforestry in a holistic manner. The recognition of the pivotal role to be played by the social sciences in setting priorities, in developing strategies and in the dissemination process has been central to this. At the same time ICRAF has developed capacity in understanding processes at both the biophysical and socio-economic level and has embarked on placing the knowledge gained in a systems context and taking the technologies developed as soon as possible to on-farm tests. ICRAF is to be applauded for putting much effort into the testing of the farmer participatory research model as a method to combine research and extension. Much energy, commitment and goodwill on the part of the NARS collaborators have gone into this effort. With such a rapid development there are bound to be areas where some change in approach or style of interaction are needed, but we believe ICRAF has the capacity and the will to undertake these.

Time Pressures and Quality of Output: One of the casualties of this rapid development has been the time available to develop genuinely collaborative research projects within the Centre. Not surprisingly this has been less of an issue for some of the regions where the small number of IRS has promoted team building and a problem-oriented approach. The annual review and planning meetings, while charged with energy and good intentions are no substitute for the need to reflect and discuss together at a neutral forum in a less pressured atmosphere, to define the problem and the approach to be used in its solution. This process should be undertaken in the context of the overall strategy for ICRAF to discharge its mandate as discussed in Chapter 3.1. ICRAF needs to recognize that this reflective and interactive part of the planning process is not time wasted but is a means to focus the considerable intellectual capital available in the Centre on a collective outcome.

The recent CCER for Programme 3 commented on the separateness of the ICRAF Programmes in general. This is at an intellectual level and is a separate issue to the atmosphere of good will and camaraderie that emanates from the Centre. The domestication of trees for example will need a great deal of input from Programme 1 in assessing the routes to market development, Programme 3 for inputs in ways to establish the plants and maximize their growth, Programme 4 for putting the use of these trees in a farming systems context and evaluating farmers abilities to cope with these new inputs, and Programme 5 for helping to disseminate the new knowledge.

One of the main competing activities for this shared time in problem solving is the need to be continually seeking new restricted funds. ICRAF must re-examine its approach for managing this process so that those with acumen in this area are assigned the task rather than it being everyone's task. The individual scientist needs to be involved in the discussions in setting up the issue, making some initial contacts and in helping prepare the project document but then needs to be gradually relieved of the main responsibility for taking the project proposal further. Part of this process of reordering time allocation should involve a much more rational and ordered approach than at the present for deciding on what collaborations to pursue in projects and this is discussed in Sections 3.1 and 4.2.2.

Researchers and Facilities – Quality Issues: The staff at ICRAF are both committed to their duties and generally of high calibre. The skills required and the type of personality that

best carries out certain activities vary, but ICRAF has in general got this mix right. All staff need to be cognizant of ICRAF's role in capacity strengthening and the ways that this can be carried out. There is a continuing need to be aware of the benefits of genuine collaboration, particularly with the NARS.

The Panel recommends that:

all IRS and senior nationally-recruited staff take part in regular training courses on creating working partnerships, on working in teams and on recognizing the influence of personality and of cultural differences in relationships.

The new facilities at ICRAF headquarters are very good by any standard and in part lead to the congenial atmosphere for research. However the very excellence of this input to the programmes needs to be used carefully in building up collaborations with the NARS. The atmosphere in these relationships needs to be one of genuine sharing in the good fortune to be able to use such good facilities on an equal basis. For this reason ICRAF needs to carefully consider its policy for charging for use of the facilities at headquarters by NARS as some consideration should be given to the issue of the volume of throughput achieved and achievable, and the value put on goodwill developed by sharing the facilities at an affordable cost. There is also a good opportunity for ICRAF to use its very good soil chemistry research capability in support of NARS through the TSBF network.

One of the major inputs to programme quality is the funding available for capital equipment and operating costs. When much of this input as well as staff costs need to be met from unrestricted funds, then the competition for these funds may mean that the Programme may not obtain enough resources to carry out its Centre-agreed research agenda. The Centre needs to find ways of obtaining restricted funds to support Programme 3, which is the most affected by the lack of such funds at present. One way to do this is to draw funds from the restricted projects of other Programmes that it supports with necessary knowledge, often gained from Programme 3 research. They should also seek funds from projects with a development emphasis where some supporting research is still needed. Any development project dealing with nutrient replenishment or with watershed management would obviously fall in this category. This process knowledge is essential if ICRAF is to use research to guide its activities rather than to rely on empirical testing of ideas.

Quality of the Methods Used: The methodologies that ICRAF are using in its research have generally been at the cutting edge. The research on plant/water relations and the interaction of organic/inorganic fertilizer interaction, on systems evaluation of the effects of agroforestry interventions, for example, has laid the groundwork for a scientifically rigorous analysis of the way to develop agroforestry systems for different regional environments. There is a need to see that the level of quality control exercised at headquarters flows through to the sometimes less experienced staff in the regions to ensure that the research is necessary, is using appropriate methodologies, is analyzed appropriately and that the implications of the results are understood and are then transmitted to the rest of the ICRAF community. The Panel found a very few instances where more rigour may have been warranted. ICRAF has early on in this five-year period undertaken careful reviews of some of its earlier research in the regions and has shown a commendable ruthlessness in stopping experiments that may have been poorly designed.

ICRAF has shown a capacity to move into new research areas once a line of enquiry has achieved the required results. For example, in the area of plant/water relations between trees and crops, ICRAF developed techniques for examining water use by trees and from this was able to show where, and how, competition for water reduces crop yields and where this overrides any benefits from mixtures of trees and crops that otherwise may have accrued. In the process, inexpensive and robust instruments were developed for measuring water flow through roots.

Following this line of research on the use of water at a field level, the issue of water use at the watershed level was then addressed, and ICRAF scientists from Programmes 1,3 and 4 have developed techniques for addressing the effects of variation in the land use at the landscape level. ICRAF is thus well placed to take the lead role in the coordination of research to be undertaken under the Systemwide SWIM initiative project on Improved Water Utilization in a Watershed Perspective.

ICRAF has developed a systems approach to the replenishment of soil fertility. It incorporates research results on changes in soil fertility through various means, including improved fallows, biomass additions and inorganic P fertiliser additions; erosion control measures; planting regimes; and on-farm experimentation as a vehicle for testing methodologies and disseminating ideas. Socio-economic factors in farmer uptake of the practices are being analysed at several locations in Kenya, Malawi and Zambia in collaboration with NARS and NGOs. ICRAF's catalytic role in this rapidly expanding endeavour has been very commendable and indicates the role ICRAF could play in support of larger National development projects on soil nutrient replenishment or "capitalisation".

An area where ICRAF's methodological approach can be improved is in the development of animal fodder for small scale dairies. There is a need to integrate this research and dissemination activity much more closely with other aspects of animal management such as feed nutritional quality and the role of animals in the production system. Closer collaboration with ILRI in designing and operating such projects would help do this. It is not much use providing fodder for dairy cows if the feed is of poor nutritive value, if the animals are in poor health because vaccines are not available, if they cannot be gotten in calf, etc.

ICRAF has developed methodologies for the collection of germplasm of trees that have a potential role in agroforestry. Farmers' evaluation of the "value" of trees that they use has helped set priorities for the collections undertaken. ICRAF's multinational Advisory Committee on Genetic Resource Activities plays an important role in reviewing and helping plan the activities of Programme 2 in this area. There is need for Programme 2 to reconsider its logical framework to encompass the broader issues of marketing in its concept of domestication. ICRAF has close links with IPGRI and ILRI in this genetic resources area and with ILRI has undertaken joint collections of *Sesbania* spp. that can now be housed at ICRAF. They have also undertaken collaborative research on molecular genetic analysis of fodder legumes and training in germplasm collection techniques.

There is an increasing world-wide interest in carbon sequestration as a major IPG issue, and ICRAF's development of methods to model the effects of land use and agroforestry interventions in the humid tropics on the store of carbon in the soil has made a major contribution to the way in which soil as a sink for carbon can be factored into global models of carbon pool sizes. Recent ASB consortium findings demonstrate that the carbon sequestration

potential of the most promising alternatives to slash and burn agriculture in the humid tropics are those involving agroforestry trees; most of the carbon sequestered is in the above-ground biomass. By comparison, in cropping systems at the forest margins, most of the carbon sequestered is in the soil. ICRAF can capitalize on its ability to use the methods developed under ASB to make a contribution to IPG activities but needs to carefully assess where it has a comparative advantage and the resources to follow through such lines of research.

The policy research undertaken by ICRAF in Indonesia on the management of the forest margins has been ground-breaking in that it showed how analysis incorporating biophysical and socio-economic information could lead to fundamental changes in the ways governments view forest lands and the role of local people in preserving biodiversity and existing agroforests.

Quality Assurance: ICRAF has developed a procedure for ensuring the quality of its outputs. The global Programme Leaders provide technical backstopping and advice for the regional programmes. Reviews at the APR, by the Director of Research, by Programme Leaders and peer reviews for publications are all part of the process. Furthermore staff assessments also deal with issues of the quality of the scientific output.

In addition, ICRAF has commissioned ten Centre-Commissioned External Reviews (CCERs) in the last five years. These were targeted at a range of issues, and only five deal with overall Programme, Division or region performance. The reviews are of variable quality and hence usefulness. Special attention should be paid to the TORs for the CCERs. It would also be helpful to use reviewers that have some familiarity with the CGIAR system and ICRAF's role in it. It is not helpful when CCER's go beyond their TORs because this reduces the time spent on programme issues *per se* and hence the quality of the output. The recent CCER for Programme 3 is a case in point.

Disciplinary Coverage: There are still some gaps in the Programmes in terms of their discipline coverage. For example in Programme 2 there is a need for more input into nursery propagation and establishment techniques for the trees under domestication. In Programme 3, there is a need to measure the amounts of nitrogen being fixed by the legumes used in the agroforestry systems ICRAF is developing and to undertake research on ways to maximize this, particularly if the germplasm has been transferred from another location. This could be undertaken in-house and/or through projects developed in collaboration with NARS (such as KEFRI), universities and ARIs with capability in this area. ICRAF has no in-house expertise in pest management, and *Mesoplatys* beetle and nematode attacks on *Sesbania* used in improved fallows have been identified as a problem already. With expanded areas of plantings of agroforest trees/shrubs, pest problems are likely to appear. Organizations such as ICIPE and CABI based in Nairobi have the expertise required to work with ICRAF on these issues. In the Development Division there is a need for additional expertise in the area of extension methodology to be able to set up different approaches and test their effectiveness (see also Chapter 4). ICRAF, with its laudable commitment to taking the process of research into the development end of the RtoD continuum, is ideally placed to undertake some groundbreaking and much needed research in this area.

The Panel recommends that ICRAF further develop the research and training needed in the area of vegetative propagation, nursery management and establishment.

The Panel suggests that ICRAF develop research capability in the measurement and enhancement of nitrogen fixation of trees in agroforestry systems.

The Panel suggests that ICRAF work with ICIPE and CABI in the area of pest control in agroforestry systems rather than develop in-house capability.

ICRAF's programme on domesticating trees that produce high value products needs to be supported by careful analysis of the marketing aspects of such products in order to define the ways in which poor farmers will benefit now and continue to do so. Expertise to undertake such appraisals is not presently available in ICRAF, and the strategic planning process in this area is thus incomplete.

The post-harvest aspects of the products from domesticated trees is another area where disciplinary strength is lacking. Since these are usually product specific, such expertise should probably be obtained through consultancies or from NARS who may be able to address this issue.

In Sections 3.1 and 3.2, the need for policy research as an important part of the strategic planning process has been addressed. This disciplinary support is not currently available in all regions. In the Latin America Regional Programme (LARP) a closer link with the CIAT staff member posted under the ASB programme at Pucallpa, who has expertise in policy research, may be a way to provide the necessary support.

ICRAF otherwise has a good mix of disciplines and skills amongst its IRS and should explore ways of complementing its needs by closer collaboration with the NARS or by secondments from ARIs. It should be possible to increase the level of short-term secondments from the NARS with salaries paid for by the NARS and/or to expand the visiting scientist or fellowship programme. The experience with this under AHI indicates the potential. The other way to foster genuine collaboration with the NARS is to commission some work using specific expertise and facilities that the NARS have as part of a collaborative programme as in the model developed by ASB and AHI. The AHI programme, for instance has set up the culture for genuine cooperation between institutes. ICRAF with ASARECA needs to vigorously pursue funding for AHI to bring this up to the rather modest budgeted level.

A significant gap in the expertise base is in the area of extension methodology. ICRAF needs to undertake research on the ways to disseminate its technologies to farmers and to evaluate those being used, particularly those in the pilot projects. A recommendation on this is made in Chapter 4.1.2. This process will help ICRAF to determine how best to undertake its development activity. For example, in the SARP, should more emphasis be placed on the train-the-trainer programme (in order to build up the capacity of the Malawian extension services and NGO's) to undertake on-farm dissemination of improved fallow technologies or further develop the process of on-farm experimentation as the entrée to farmers?

Potential for External Interactions to Further Quality: There are four international institutes (ICRAF, ILRI, TSBF and ICIPE) as well as regional projects such as RELMA and the collaborative GTZ-ITFS Project with headquarters located in Nairobi, all with an interest in socioeconomic and spatial data bases. ICRAF is in a good position to take the lead on making whatever information is available collectively from surveys etc. and to develop a network that keeps in touch about further raw data collection and GIS outputs that have used these, so that duplication is minimized. One of the quality outputs from having such a large scientific community in Nairobi, in the NARS, at the universities and in the international organizations is the opportunity to undertake a dialogue through seminars and workshops on cross-cutting issues. This is a challenge for all the organizations to better use this intellectual capital.

With the increasing interest in such major public goods activities as carbon sequestration and watershed management, ICRAF needs to very carefully assess whether it has a comparative advantage and the resources to follow through such lines of research. ICRAF could play a coordinating role in such endeavours if it is well placed from its physical location to do so.

One of the aspects of output that needs further consideration in ICRAF is the sharing of responsibility for further development of maturing technologies by the NARS. The pilot project at EMBU is a particular case to be re-examined in this regard, and the relationship with KEFRI at Maseno in terms of station management on a day to day basis also needs attention so that the allocation of shared responsibility is consistent with ICRAF's comparative advantage. In Southern Africa Regional Programme (SARP) in Malawi and Zambia it needs to be recognized that the project is operating on a government station and that it is not just an ICRAF project as the signs would tell us (and the attitude of some of the staff) but rather a collaboration with often several ministries. ICRAF also needs to ensure that its seconded staff and NARS colleagues are not differentially affected in situations where operating funds are limited.

Quality of Publications: ICRAF has made a commendable effort to publish its results in refereed scientific journals, conference proceedings, book chapters, reports and more popular press articles. There has been a dramatic increase in peer reviewed articles from 22 in 1993 to 109 in 1997 and a change in articles per senior scientist from 0.2 to 1.1 per year. As detailed in Chapter 2, ICRAF's output is substantial. There has also been a rapid increase since 1994 in the number of ICRAF's papers cited, based on the Science Citation Index. It increased from five in 1994 to over a hundred in 1997. ICRAF has published 251 papers in refereed journals from 1993 to 1997, with 33 percent of these co-authored with NARS partners and 18 percent with partners in the North. In 45 percent of the joint papers, a NARS collaborator was first author, whereas in the prior five-year period the figure was only 4 percent of the 11 percent of co-authored papers. This is a dramatic indication of ICRAF's commitment to undertaking research with NARS scientists. ICRAF's articles have been published in 50 scientific journals, and this has helped them reach a wide audience.

During the five-year period to 1997, ICRAF published 695 articles and reports including 84 book chapters. Again, authors from the NARS contributed to 26 percent of all the articles published by ICRAF, while authors from the north contributed to 15 percent. If one uses the index of the ratio of total publications to refereed journal articles, ICRAF is as low as 2.8. These publications have made a very significant contribution to the science and practice of

agroforestry, laying the theoretical groundwork for the benefits or otherwise of the use of trees on farms. The recent work on systems modeling of on-farm effects of agroforestry that goes across programmes is a significant advance in the use of this knowledge to predict the role of agroforestry across environments and farmer practice.

Programmes 3 and 4, with more staff in place over the period, have each published more than 70 papers in refereed journals during this period. Programmes 1, 2 and 5 have published 45, 53 and 7 respectively. Articles published in conference proceedings range from 50 in Programme 4 to 32 in Programme 3. Programme 5 has produced a series of training modules being used in 60 universities in Africa, as well as a four-module course on Agroforestry Research for Development/Integrated Land Use and another on Experimental Design. A CD Rom data-base on agroforestry has been produced, and wherever possible AFRENA NARS have been set up with E-mail connections. Sixteen slide modules, a video and other promotional material have also been produced. These are high quality outputs.

In conclusion, the move into examining the effects of spatial diversity as well as structural diversity in ecosystems and landscapes, coupled with satellite imaging to map and monitor changes in the landscape, will bring together Programmes 1, 3 and 4 into developing decision support systems and integrated national resource management and keep ICRAF at the cutting edge of this rapidly developing integrative scientific endeavour. The on-farm trials are testing a new approach to undertaking adaptive research and at the same time are assessing dissemination methodology.

ICRAF has the challenge to ensure that its excellent strategic research programme develops vigorously and keeps in step with the more applied on-farm research. If ICRAF is to remain viable as a leading research institution, it needs both.

CHAPTER 4. - THE RESEARCH-DEVELOPMENT CONTINUUM: ICRAF LINKAGES AND CAPACITY STRENGTHENING

ICRAF is evolving into an institution that gives explicit and equal emphasis to research and to the development activities needed to make sure that the research results are as effectively, efficiently, and rapidly as possible put into use on farmers' fields and in ministers' offices. ICRAF focuses on generating effective "development pathways," or road maps for how it and its partners can get from research to development along a research-to-development (RtoD) continuum that yet remains to be defined in concrete terms.

ICRAF has been moving for some time towards a more explicit recognition of this RtoD continuum approach to its activity, i.e., one in which the research continues to be problem driven, but where the organizational culture emphasizes more the rapid dissemination and effective spread of technologies and institutional innovations developed by the centre and its partners. How does this RtoD continuum work in practice? How do ICRAF's linkages contribute to its realization, particularly given ICRAF's move to regionalization? What types of partnerships does ICRAF have, and how do they need to be modified in the future to make ICRAF more effective and efficient in meeting the overall objective of more rapid adoption of ICRAF and partner technologies? These are the cross-cutting themes addressed in the present chapter. They complement the discussion in the previous chapter which dealt with planning and prioritization and basic regionalization and quality issues.

In moving down this road to operationalizing the RtoD continuum, ICRAF has considered and put in place a number of elements. First, was the establishment of the Development Division and the decision to make it an equal and complementary programmatic force and not a "service" unit for the research division, as is done in a number research organizations. Second, as a result of ICRAF's medium term planning, the Centre changed to the new matrix management model and the regionalization of ICRAF's programme to more effectively bring to life the RtoD continuum by focusing activity at the concrete level of activities in the regions. These elements have already been covered in Chapters 2 and 3. Third, there was a renewed focus on rationalizing linkages with other groups - CGIAR centres, NARS, and other research and development organizations - to fit more into the needs as envisioned along the RtoD continuum. Fourth, the role of ICRAF in capacity strengthening and training is being rethought in the broader context of the RtoD continuum. The Panel emphasizes, to avoid the impression that these are revolutionary changes, that the thinking behind these changes has been evolving over a longer period of time and that evolutionary changes are the result of longer term planning over a number of years.

In what follows, the Panel describes briefly what is involved in each of the elements, assesses ICRAF's role, activity, and performance in each area, and provides, where warranted, some suggestions and recommendations.

4.1 The Panel's View of ICRAF's Research to Development Continuum.

The RtoD continuum, thought of in a dynamic context, has research problem identification as the starting point and feedback from implementation as the ending point, in a given cycle of the process. In between along the continuum are problem definition, research design, research implementation, translation of research results into ideas and technologies for development, dissemination, adoption and adaptation, and application and implementation.

A key strategic concern along this RtoD continuum is the area in the middle, where research gets translated into useful approaches to agroforestry that overcome the knowledge, resource, and motivation constraints that face farmers. Although it is an explicit concern of both the Research and the Development divisions, primary responsibility for operationalizing the concept lies with the Development Division. This is a new division, with its head having arrived to take up his duties during the main phase of the EPMR. The Division currently sees its mission as follows:

to facilitate, catalyze, and support greater adoption and impact of agroforestry innovations.

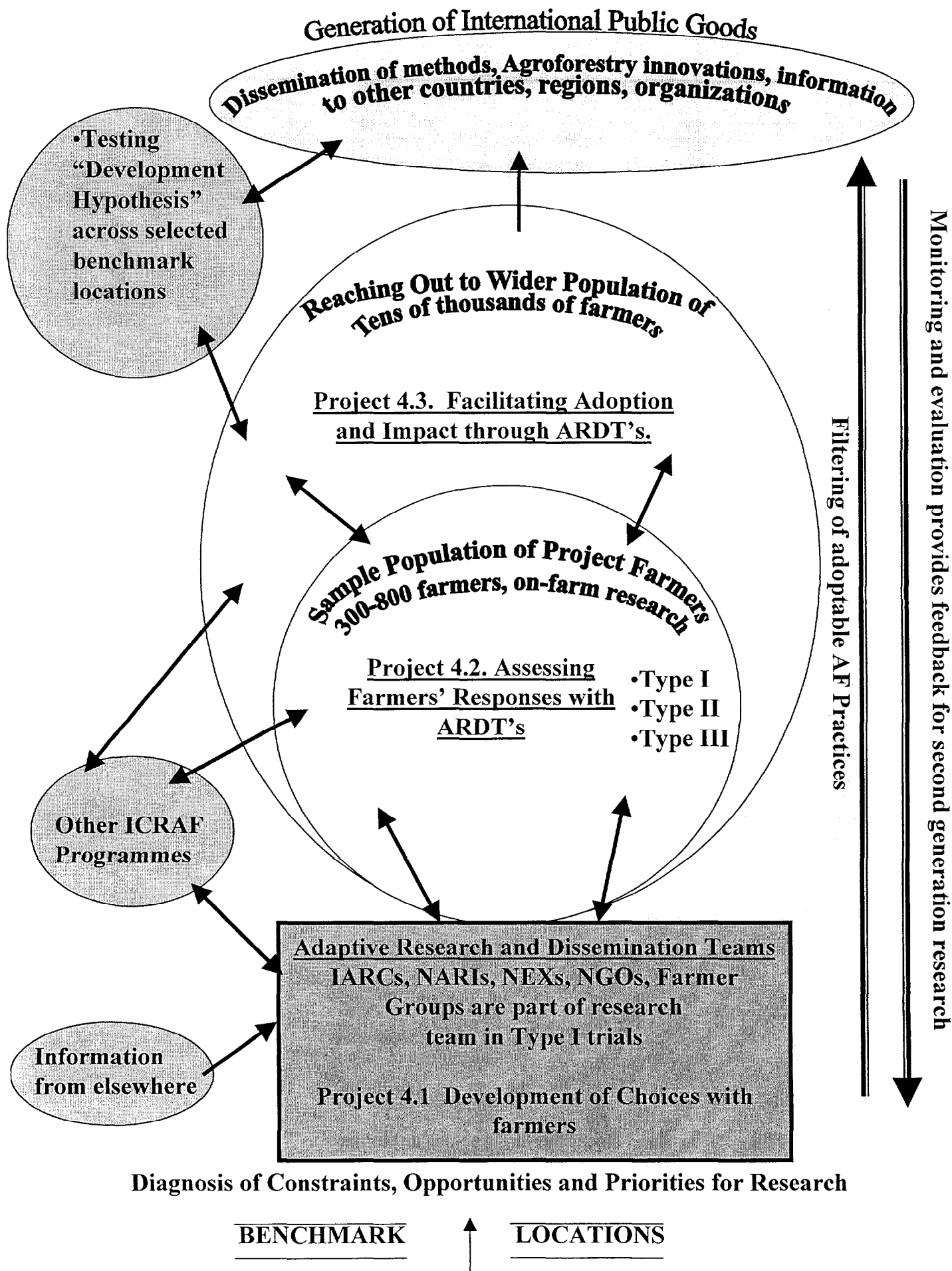
What still remains to be clearly defined by ICRAF as a whole is how the link between this laudable mission and that of the Research Division best can be operationalized and developed into an institute wide process, i.e., how will ICRAF deal with the transition zone between research and development, and how will it decide *what* agroforestry innovations to “facilitate, catalyze, and support the adoption of;” and then, how does it know which development pathways will be most effective for different types of innovations under different circumstances. An effective operational approach to effective implementation of the research to development continuum requires answers to such questions. And the Director of Development has identified this challenge as his highest priority for attention over the coming 6-12 months.

The Panel believes that operationalizing ICRAF's “development pathways” concept is a challenge for all of ICRAF, not just the Development Division. At the same time, there has to be some identifiable focal point in the organization for approaching the challenge. At present, this activity is being spearheaded in operational terms by the work being done in Programme 4, and in broader, more conceptual terms related to policy interventions, by parallel, complementary work being done in Programme 1. Programme 1's input is discussed further in Section 3.1. Here, it is instructive to provide a brief overview of the operational strategy and process developed by Programme 4 scientists, with input from the other programs.

Figure 4.1 illustrates one concrete example of ICRAF's attempt to develop a strategy and process for operationalizing the research-development continuum in ICRAF within Programme 4. As indicated in the figure, Project 4.1 (development of choices with farmers) works through the ICRAF/NARS initiated Adaptive Research and Dissemination Teams (ARDTs) to identify farmers' problems and promising agroforestry technologies. This involves input from other ICRAF programs and from the outside (including the IPG research results developed by Programme 4).

Figure 4.1. ICRAF: Systems Evaluation and Dissemination

The generation of IPG through adaptive research and development



Promising technologies, when adequately researched through Programmes 1-3, then enter the second phase, which is the focus of project 4.2. This stage involves assessment of a limited group of farmers' responses to the technologies introduced.¹ The ARDTs also are involved in the process. Information from this stage feeds back to Programme 4 as well as to the other relevant ICRAF programs. As indicated in the figure, the next stage involves wider dissemination to a broader population of farmers - the true dissemination and development phase of the work for any given technology or system of technologies.

Finally, through Programme 5, NARS partners, and NGOs, there is widespread dissemination of results to other countries and organizations. This is where the IPG nature of this seemingly very local, hands-on research comes to the forefront. ICRAF develops and tests "development hypotheses" that can have widespread application, e.g., hypotheses related to conditions for farmer adoption, hypotheses related to dissemination techniques, and so forth, based on comparisons across a number of sites and countries, both with different and with similar conditions. Particular attention is given to the unique issues that affect the dissemination, adoption and adaptation of NRM innovations, which the Panel believes will have important implications beyond agroforestry. Work from a given benchmark site is brought together with that from other sites to develop general principles and ideas for further testing and dissemination; and such work becomes ICRAF's IPG contribution of the activity in this particular area.

Looking at the research to development continuum more broadly, a number of interesting questions surfaced for the Panel. They include the following:

ICRAF, as a CGIAR centre, has to focus on producing international public goods (IPGs). At the same time, many of the development activities pursued by ICRAF appear to be quite narrowly focused on adaptive issues for a particular region. What is the situation with regard to IPG in ICRAF?

Should ICRAF be focusing on *research* on dissemination, or on dissemination itself, or some combination of both? Should ICRAF develop in-house professional capacity in dissemination? In dissemination research? in extension methods research?

What about expertise in marketing research or marketing itself - an obvious requirement along a number of common development pathways involving agroforestry products? What about expertise in the area of post-harvest technology assessment and development?

4.1.1 The International Public Goods Nature of ICRAF Research

ICRAF is dealing for the main part with quite applied issues - agroforestry systems tend in general to be quite site specific, if the complexity of individual sites are adequately considered. However, as indicated above, it appears that ICRAF - and specifically Programme 4 - has developed the balance needed to take advantage of both the international and the longer term nature of ICRAF and its programme in developing IPGs from synthesis of results from

¹ Assessment is based on the results of Type I research: researcher designed - researcher implemented trials; Type II research: researcher designed - farmer implemented research; and Type III research: farmer initiated-farmer implemented trials).

specific sites where similarly designed and comparable research approaches were used. Thus, work in the field is brought together with more conceptual modelling to produce results that are of widespread interest across the regions of the world, particularly to scientists and institutions concerned with NRM. The same approach is used by researchers in Programme 1, and by the biophysical researchers associated with Programs 2 and 3, who also do cross-country comparisons. In addition, ASB has been producing cross site and interdisciplinary syntheses and models.

The question addressed by the Panel was the extent to which ICRAF researchers are focusing on the full range of potential IPG contributions of its research. The Panel concluded that, in general, ICRAF scientists are aware that they need to focus on IPG research in order to get the substantial spillovers across countries and regions needed to justify the high cost per senior scientist. And most of them seem to be making a conscious effort to link their site specific work with broader IPG types of synthesis and modeling work.

4.1.2 Dissemination of Research Results and Research on Dissemination

Obviously, it is not a matter of one or the other, but rather the balance between the two that should be important to ICRAF. While ICRAF has a role to play in producing publications and working with NARS partners on dissemination of its and joint research results, as well as research methods and other knowledge, it clearly does not have, in the Panel's opinion, a comparative advantage in leading the actual dissemination activities at the field level. At the same time, in pursuing an effective approach to implementing the RtoD continuum within the ICRAF context, the centre does have a role to play in researching the effectiveness and efficiency associated with alternative dissemination pathways and approaches. The role requires that ICRAF participates **as a partner** in designing and assessing alternative dissemination approaches. This is in fact one of the charges given to Programme 4, although it still largely remains to be operationalized by the Program, except in Southern Africa where an international dissemination specialist is engaged in such analyses.

The main constraint in the other regions at present is the lack of a researcher with expertise in this area. The Panel believes that this is an important area in which ICRAF should be involved. If it is going to focus on efficient RtoD pathways, it needs to understand much better the particular dissemination issues related to agroforestry technologies and systems. The issues are not necessarily the same as in either agriculture or forestry, since in agroforestry there is a mix of agencies and institutions involved that is different from the mix in either agriculture or forestry.

In sum, the Panel recommends that:

ICRAF develop an area of identifiable activity and increase the capacity at headquarters related to research on dissemination methods and techniques within Programme 4.

As indicated above, the Panel recognizes that there is some analytical and empirical field work in this area going on, e.g., in the Zambia project. However, the Panel believes that there is need for a strong presence at headquarters in this area to draw out the experience from around the world, help to develop broader lines of thinking in this area, and to do selected research in the area. At the same time ICRAF should explore possibilities for linking this area

of research with the carrying out of constraint and needs analyses with partners. (In fact such analyses are needed input for work on alternative dissemination pathways and approaches).

4.1.3 Marketing and Post-harvest Technology in the Research to Development Continuum: The role of ICRAF

Value added and market development, as well as marketing channels and activities, are key components in the development pathway for many agroforestry systems. Input related to these areas often is the missing link in the RtoD continuum, e.g., in the case of much of the agroforestry development in the Amazon, where key questions revolve around appropriate post harvest technologies for use in local value added activities and market channels and approaches for higher valued agroforestry outputs. Availability of effective marketing mechanisms and efficient value added processing opportunities are part of the delivery system needed, and can provide a major incentive for adoption and development of alternatives to slash and burn.

Market forces and policy dimensions of agroforestry product processing and marketing need to be understood. Some work has been undertaken in SE Asia by programme 1 scientists. Are there alternative sources of supply for this type of research? Probably some, but certainly not many that have as yet focused on agroforestry marketing and market development issues. There is not widespread understanding of the markets for agroforestry products, and not much work is being done in this area. There is some work on subsistence products from extractive reserves, done by some NGOs. However, the economic situation involved in those cases is quite different from that envisioned by ICRAF in its work related to high value tree crops from local agroforestry systems. ICRAF needs the expertise to help NARS, NGOs and other groups working with agroforestry development projects understand how market forces can be tapped, how markets can be developed, and how marketing expertise can be utilized to introduce marketing into projects. In this respect, ICRAF organized an international workshop on marketing policies for agroforestry products, including non-timber tree products in Nairobi in 1997.

Hand in hand with need for marketing expertise is the need for expertise in post harvest technology (PHT) development - expertise in the process by which communities and individual farmers most effectively can develop value added activities for their agroforestry outputs, hopefully combined with some knowledge and understanding of the small scale technology options available to communities and farmers groups. Such activities can help generate scarce incomes for purchase of foods and other staples. The CGIAR has accepted the general principle that PHT may be a productive use of CG funds in certain cases where it presents a constraint on effective development and utilization of CG generated technologies in helping to alleviate poverty among poor rural people. For example, in the case of agroforestry, certain basic processing activities for tree products can be done effectively and efficiently on farm or in local communities, thus adding value to the outputs and incomes at the farm and community levels rather than at the middleman or commercial processing levels outside the communities. Marketing constraints often are exacerbated by lack of knowledge and access to post harvest technologies and processing facilities. Thus, the two go hand in hand.

Part of the dissemination research and development activity discussed earlier has to address the institutional questions related to PHT and marketing within farm communities. E.g., producer cooperatives, marketing boards, etc. need to be included in the work along the RtoD continuum. Institutional questions related to finance also need to be considered all along

the value added pathways that communities choose. Often, credit is a key constraint in setting up value added activities.

In sum, the Panel supports the initiatives within ICRAF to develop the expertise in marketing and PHT research and development that will permit ICRAF to be more effective in supporting NARS and NGO activity in promoting development of local RtoD pathways for agroforestry and agroforestry products. At the same time, the Panel emphasizes that ICRAF's expertise should be focused on strategic planning and research in these areas. ICRAF can hardly afford to expand expertise in the actual areas of marketing and post harvest technology or value added development. The conditions around the world are too different in different agroforestry systems to be able to hire someone who can be effective at the international public goods level in the actual development of value added activities and marketing.

The Panel recommends that:

ICRAF pursue the establishment of activity and expertise at headquarters in the areas of market development research and strategic planning for value added activities (including the process of identifying, choosing and developing appropriate post-harvest technologies).

This activity could be situated in either the Research or the Development divisions. Although the Panel has no strong preference for either, it would seem that the activities might be situated together in the Development division, either in a separate programme or in Programme 4. Wherever the activities are located, they should be housed together to draw on the synergies between the two areas of expertise. Both relate to effective implementation of the RtoD continuum beyond the production of tree outputs on farm. Both are necessary ingredients for creating effective development pathways for agroforestry and for moving effectively along the RtoD continuum.

4.2 External Linkages and Relations

ICRAF's history of formal collaboration dates back to 1984, when the first external review recommended that the mandate should include collaboration with national and regional institutions on agroforestry technologies research and development. In response to this, ICRAF developed partnership programmes through activities at headquarters and through a network approach. For Africa, the 4 Agroforestry Research Networks (AFRENAs) (based on agroecological zones) became established between 1986 and 1990 as partnerships between ICRAF and NARS of the Africa region. Since ICRAF became a member of the CGIAR in 1991 with a global mandate, regional programmes and partnerships also became established in Latin America and South-East Asia. The number of partners has been growing steadily over the years since ICRAF joined the CGIAR.

ICRAF views itself as a partnership-based, development-oriented research organization. It has more than 420 partnerships of varying importance; and a significant portion of senior scientist time is spent on partnership-based activity. In fact, most ICRAF activity, and all field activities, are partnered; and more than 40 percent of ICRAF's published outputs over the 1993-97 period involved partner authors - an indication of true sharing of credit for intellectual

outputs associated with the centre. Yet, some persons voiced concern to the Panel about a low level of partnering and collaboration with both CGIAR centres and non-CGIAR entities.² Thus, the Panel has identified partnering as a theme meriting attention.

In terms of sheer numbers this concern is unfounded. As mentioned, ICRAF has about 420 partnerships on the books with other CG centres, NARS, NGOs, ARIs, universities, and other groups. ICRAF leads one CGIAR Systemwide Initiative/Programme (SWI/P) and one Ecoregional Initiative/Programme (ERI/P); both include many different partners. One of those, the Alternatives to Slash and Burn (ASB) Program, is arguably the most successful of the SWIs. ICRAF participates in an additional 11 SWI/Ps and ERI/Ps with other CGIAR centres. In terms of numbers, it participates in more than most other centres.

Thus, in terms of numbers, ICRAF is a centre with many linkages - some would argue too many, rather than too few. By their own estimate, most ICRAF staff are putting up to one person month of time per year into partnerships, and this does not include time in the research and development activities associated with the partnership. (1998 Internal survey done for the EPMR). Thus, at first glance, the transactions costs of partnerships are substantial (although, as indicated below, this can be a misleading conclusion).

The concern of those who question ICRAF's level of partnering is not a matter of numbers. Rather, the key questions relate to other dimensions of partnerships - ie., the balance, nature, and quality of partnerships with NARS, other CGIAR centres, and other institutions, such as advanced research institutions (ARIs).

In what follows, the Panel assesses ICRAF partnering with each of these groups, after a general review of partnering in ICRAF, including mention of the results of an internal survey of partnership activity. Unfortunately, the survey done for the EPMR did not break down the numbers by type of partnership - a task that ICRAF needs to undertake in the future, as it further systematizes and organizes its partnership activity to greatest mutual advantage. Also, it did not survey the partners themselves; also something that needs to be done in the future, as part of the activity of the Development Division in looking at the Research to Development Pathways. A final section in the Panel's report sums up the Panel's assessment of the theme and provides a recommendation.

In accordance with its mission, ICRAF is focusing its partnership programme on collaboration in research with increasing emphasis on systems development and promotion of information dissemination. It uses a wide variety of partnership formats, ranging from bilateral ones, through regional associations and consortia, to global partnerships, such as in the CGIAR SWIs. The most common format is the network. Some of the larger integrated partnerships that have evolved through ICRAF initiative include:

- > the Agroforestry Research Networks for Africa (AFRENA)
- > the African Network for Agroforestry Education (ANAFE)
- > the regional African Highlands Initiative (AHI)

² To put this concern in perspective, ICRAF should not be singled out. It is a common concern voiced across the CGIAR System by donors and others. The question is whether CGIAR centres work enough with each other to take advantage of the full range of synergies or complementarities available; and whether centres partner well with enough NARS and ARIs.

> the systemwide Alternatives to Slash and Burn (ASB).

Both structure and content of the partnerships vary in relation to the wide range of framework conditions, priority problems and partners' needs in each of the regions. This presents a challenge for ICRAF that requires a more systematic and analytical approach to understanding its partnerships, their successes and failures, and the factors associated with such.

In addition to these formalized agreements there is informal, frequent, and often intensive, open collaboration among ICRAF scientists and colleagues at all levels and with numerous relevant research organizations. These interactions are important, although not noticable except to the scientists themselves. As the Panel talked to the various ICRAF scientists, it became encouraged by the widespread nature of these professional relationships with scientists in other organizations, including particularly in the other CGIAR centres. The Panel suggests that Management develop a mechanism for monitoring and evaluating such partnerships, encouraging them where appropriate, and making better known the widespread nature and benefits of such informal professional linkages.

At the same time, the Panel recognizes that thematic, regional and organizational diversity of ICRAF's work, and thus that its alliances with partners, complicate accountability, coherency, continuity, and monitoring and planning processes. The question of efficiency of partnerships needs some further attention and clarification by ICRAF.

4.2.1 Links with Other CGIAR Centres

ICRAF has a significant number of linkages with the other centres in the CGIAR System, many of them through the systemwide initiatives, most of which started since the last EPMR. They involve two main types of links: (1) ICRAF's involvement in SWI/Ps and ERI/Ps; and (2) specific agreements with one or more centre(s) to do specific project activities, or to share responsibilities in a given activity or program.

4.2.1.1 Involvement in Systemwide Programmes

As mentioned above, ICRAF is lead institution for two SWP - the Alternatives to Slash and Burn, and the African Highlands Initiative, which is part of a broader SWP on mountain environments (The Global Mountains Development Programme, listed below). Both of these programs are described in Annex IV, and, since they relate rather directly to ICRAF's work in the regions and its regionalization and decentralization of activity, further comments on them are provided in Section 3.2 dealing with regionalization, rather than here, where it is the linkage and partnership aspects that are of interest.

It is instructive to look at ICRAF's estimates of its costs for the coordinating role of the two systemwide programs it coordinates. Thus, in 1997-98, the coordinating costs of the ASB programme were some \$289,000 per year, which represents about 5 percent of the estimated total resources going into the programme in that year. The annual coordinating costs of the AHI programme was \$375,000, or about 13 percent of the total resources going into it. If one looks at typical coordinating costs for programs with which the Panel is familiar, then these costs incurred by ICRAF are below the norm as a percentage of total resources in the program, which implies that ICRAF is fairly efficient in its coordination function.

ICRAF also participates in 8 other systemwide programs, as indicated in Table 4.1. As indicated in the Table, most of these Systemwide activities are not very active yet - most are new within the past two to four years and have not developed any effective strategies, operating mechanisms and style. However, when effective, such as in the case of the ASB or the AHI, participation can be productive, both for ICRAF in terms of its mission and goals, and for its partners, since ICRAF brings some unique talents and ideas to the table. The relatively high transactions costs (travel, meeting and negotiating time, etc.) can be justified when the programs are successful. The leveraging effect of such transactions costs converts many of them into investment costs for the future programme and success of ICRAF.

When not effective, such systemwide initiatives could end up making a significant drain on ICRAF's scarce resources. Thus, in the overall context of rationalizing its partnering activity, the Panel cautions ICRAF to move very carefully in further commitments to programs, unless the intended activities fit directly within the framework of ICRAF's strategy and MTP.

4.2.1.2 ICRAF Relations with CIFOR and Other IARCs.

The first EMPR dealt comprehensively on the special relationship between ICRAF and CIFOR and the activities undertaken by the two centres. At that time various cautions were put forth regarding potential overlaps and duplication of efforts. Recognizing the need for clarification of this somewhat sensitive issue, and based on the recommendation of the previous 1993 ICRAF EPMR, The directors general of the two centres undertook a comprehensive study of their complementarities, as outlined in the CIFOR and ICRAF in the CGIAR, Partners in a System-wide Research Agenda (1994). The major areas of complementarity identified are in policy research and forest genetic resources, within the context of ASB, although other opportunities for collaboration will become available when addressing wider issues, e.g., those involved in tree domestication.

In terms of the situation today, in the Panel's view, and as noted also by the CIFOR EPMR: a) those formal relations that have been established between the two centres appear from both sides to have been cordial and productive; b) the amount of cooperation and joint involvement has been somewhat less than desirable, considering the potential complementarity of the talents and interests involved (one interested from the forest out to and including the forest margin, the other from the agricultural fields out to and including the forest margin - the point where the interests become mutual and, hopefully, the work complementary; and c) there is indication that the relations may become more productive in the future, given the facts that ICRAF has recently moved its Southeast Asia headquarters onto the CIFOR campus, where the Panel observed excellent informal interaction; and the Peruvian Amazon programs of both centres (together with that of CIAT) are maturing to the point where some productive cooperation, collaboration, and sharing of facilities and expertise has become a reality. ICRAF depends on CIFOR's expertise on plant biodiversity and thus sees no need at this stage to develop in-house expertise in this area. With regard to the Latin American/Amazonian programme within the ASB, it is worth noting that ICRAF and CIAT were initially working together in Brazil, but funding limitations have stopped this collaboration on site. CIAT is still part of the ASB network in Latin America; and there is need to explore how its expertise in the area of policy research and spatially-based, decision support systems, could be more closely integrated with ICRAF's Regional Programme in Latin America.

The Panel notes that, although the mission statements of the CIFOR and ICRAF differ

widely, it is difficult to delineate territorial boundaries at the forest margin segment of the continuum going from natural forest to the dominant agricultural fields of densely populated agricultural regions. ICRAF and CIFOR need to develop the relationships and mechanisms that allow them to complement and supplement each other where possible and share responsibilities jointly where their interests overlap. For example, both centres could jointly adopt a regional focus in such areas as grassland rehabilitation with trees, and community forestry that also involves agroforestry practices as part of the landscape development. At present, CIAT, CIFOR and ICRAF are housed at a new facility located within the Peruvian NARS at Pucallpa. This took place after a joint visit of the three DGs in November 1997. The result of this visit was a commitment to form a joint programme to cover the full range of Amazonian terrestrial ecosystems, from primary forest to degraded agricultural lands.

The only formal collaborative programme with CIFOR is related to CIFOR's role in the ASB program, where CIFOR is responsible for above ground biodiversity work, and ICRAF is responsible for the C stocks work, while TSBF handles below ground biodiversity. In addition, there are many useful informal linkages between ICRAF and CIFOR, e.g., related to land tenure and other policy research, people-forest interactions, led by CIFOR's non-timber forest products program, and work on rehabilitation of Imperata grassland on smallholder production systems. In addition a CIFOR economist is collaborating with ICRAF on tree domestication work in Cameroon.

In terms of linkages with other IARCs (other than through the SWIs or ERIs), the Panel only has a few comments. Interaction with IRRI occurs in the Philippines in the management of the acid uplands in Mindanao which grow rice. There ICRAF's role is one of comparing the ways erosion can be controlled and how trees and shrubs can be used to add value to the system either from NTFP's, or to provide mulch and thereby nutrients for crops. Discussions are in progress on a project to encourage the planting of trees on farms for NTFP's, fuelwood and timber and for communities to consider planting trees as part of an overall strategy for managing watersheds and this may involve IBSRAM, ACIAR and the Provincial government of Mindanao.

The CIMMYT coordinated East and Central Africa Maize and Wheat network has links with the AHI. However, to date this has provided little opportunity to integrate into the network activities the agroforestry technology ICRAF is helping to develop. In southern Africa both Centres have networks and both have research activity in Zimbabwe and Malawi. Although ICRAF has been working with CIMMYT's soil fertility network in Southern Africa, the full potential for closer Centre cooperation in their interaction with the NARS has not been realised.

In the case of IITA in the Humid West Africa regional program, relations for a time were strained because the roles of the two institutes in the ASB initiative were not well defined; and the research programs were poorly integrated and connected to the EPHTA, which IITA coordinates. ICRAF and IITA also need to come to a common understanding of the way the agroforestry technologies developed by the two organisations are presented to the world at large, particularly in the area of mixed tree and crop systems. This is important for the credibility of both organisations with the NARS. Other linkages are mentioned in the discussion of ICRAF in the systemwide programs.

4.2.2 Links With NARS Partners and Other Collaborators

The general CGIAR policy on collaboration with NARS focuses on capacity building and institutional strengthening through partnerships. In this context partnership means enabling NARS so they eventually can take over the activities and responsibilities initiated jointly with the IARCs in the areas of research, development, and training. The 1993 ICRAF EPMP recommended that ICRAF should develop a joint strategy with the NARS for devolution of ICRAF's country level agroforestry research to the appropriate NARS, while maintaining a strong support role through regionally-based teams and headquarters staff.

ICRAF Board and Management responded by emphasizing that the strategy, at least in Africa, will be directed to strengthening of AFRENAs for greater national responsibilities and maintaining of core elements of partnerships between NARS and ICRAF. This concept has been expressed in an ICRAF policy guideline paper (No. 8: *Building Partnerships with NARS*, March, 1997), promoting a comprehensive approach to partnerships, mainly through networks. The paper provides guidance on the criteria to consider in setting up partnerships, and it provides a description of the four types of partnership networks that ICRAF engages in and promotes. Finally, it provides a section entitled: "where do we stand to date." As such, it is a document that all staff should have read.

The Panel views this policy guideline paper more as a statement of principles and general justification for partnerships, than as paper that lays out operational guidelines for designing partnerships that have a maximum chance of success.

The comparative advantages of ICRAF for collaboration with NARS partners are mainly in the areas of:

- research quality control and process monitoring, particularly in the field of NRM;
- backstopping of planning, implementation and assessments as a service function
- networking initiating, strengthening of operations;
- integrated in-service training at academic levels .
- facilitating the dissemination of agroforestry innovations

A core question in terms of NARS partnership development is on the dissemination side. When and how are research results transferable and where are the constraints in acceptance and successful application and widespread adoption? The links from research to farmers's practices have long been seen as under the responsibility of different agents that researchers and research institutions. Researchers have seldom followed through from research to extension. Dissemination is more than elaboration of methods and technologies. Knowledge is to be connected with practical experience; and that requires strong collaboration between local extension and researchers, on the one hand, and the personnel of ICRAF, on the other hand. Thus, in a sense, a new partnership policy guideline document from ICRAF also would have to involve a statement on insights related to implementation of the RtoD continuum.

ICRAF, through the establishment and recognition of its Development Division as an equal partner with research, has indicated that it intends in the future to give more attention the contents and strategies in capacity building of not only research (NARS) but also national extension services. One useful approach to this broadened perspective of partners is represented by the link between ICRAF, GTZ, and ITFSP. This concept has been expanded to

the SADC-Zambesi Basin Project where ICRAF staff in collaboration with national partners are developing a new quality of linking agroforestry research to rural development by technical training programmes for extensionists and implementation at farm level through Adaptive Research and Dissemination Teams (ARDT). An example of the intended and in some cases operational links among the ICRAF-Zambia team is indicated in Figure 4.2, taken from the 1996 Project Management Plan for the Zambesi Basin Agroforestry Project funded by Canada. The key to successful implementation of this excellent model of collaboration and interaction is the actual linkages that get established in the field, and that depends on personalities, on the rules accepted by the team, on the nature of the process of interaction adopted, and on many other factors that need to be studied.

4.2.3 Linkages: Panel Summary Assessment and Recommendations

The Panel believes that too many partnerships could become a concern for ICRAF in the future, unless it develops a much clearer policy and set of operational guidelines for partnering. Given this concern, the Panel believes that it is time for ICRAF to take a more analytical look at its experience with partnerships and to develop a firmer, more analytically based set of operational policy guidelines that take into account ICRAF's full range of experiences, *as well as the reactions and opinions of the partners*, obtained in a systematic fashion through questionnaires and interviews. Although the Panel is reluctant to suggest another working group and set of activities that will take time away from ICRAF's research, the Panel also feels that the subject and the size of the potential gains from rationalization of partnering are significant and great enough to warrant action; and thus.

The Panel recommends that:

ICRAF craft a strategy, operational policies and associated guidelines on partnerships that go beyond its current policy guidelines, and that these new statements be based on the results of a thorough analysis of ICRAF's partnership experience. Special attention should be given to the pathway for NARS strengthening and to ways to handle differences in organizational culture.

The Panel believes that the working group, which should include outside experts and have partner input, could provide ICRAF with very useful insights on the nature and causes of success and failure in partnerships. The working group should provide, based on its analyses, a) further understanding of the nature of the different kinds of partnerships in which ICRAF is involved; b) judgement on the relative success (at least in a qualitative sense) of the different types of partnerships; c) the proximate causes of failures and successes in partnerships; d) the rationales for ICRAF partnerships of different kinds; and e) a draft set of guidelines and a draft policy statement for ICRAF partnering. This issue of partnerships is bound to become more important in the future, as ICRAF struggles with its concerns for priority setting and impacts of its work. While the Centre has done a great deal of thinking on the subject, a more structured, systematic effort at this time - based to some extent on past experience - should benefit ICRAF and its partners.

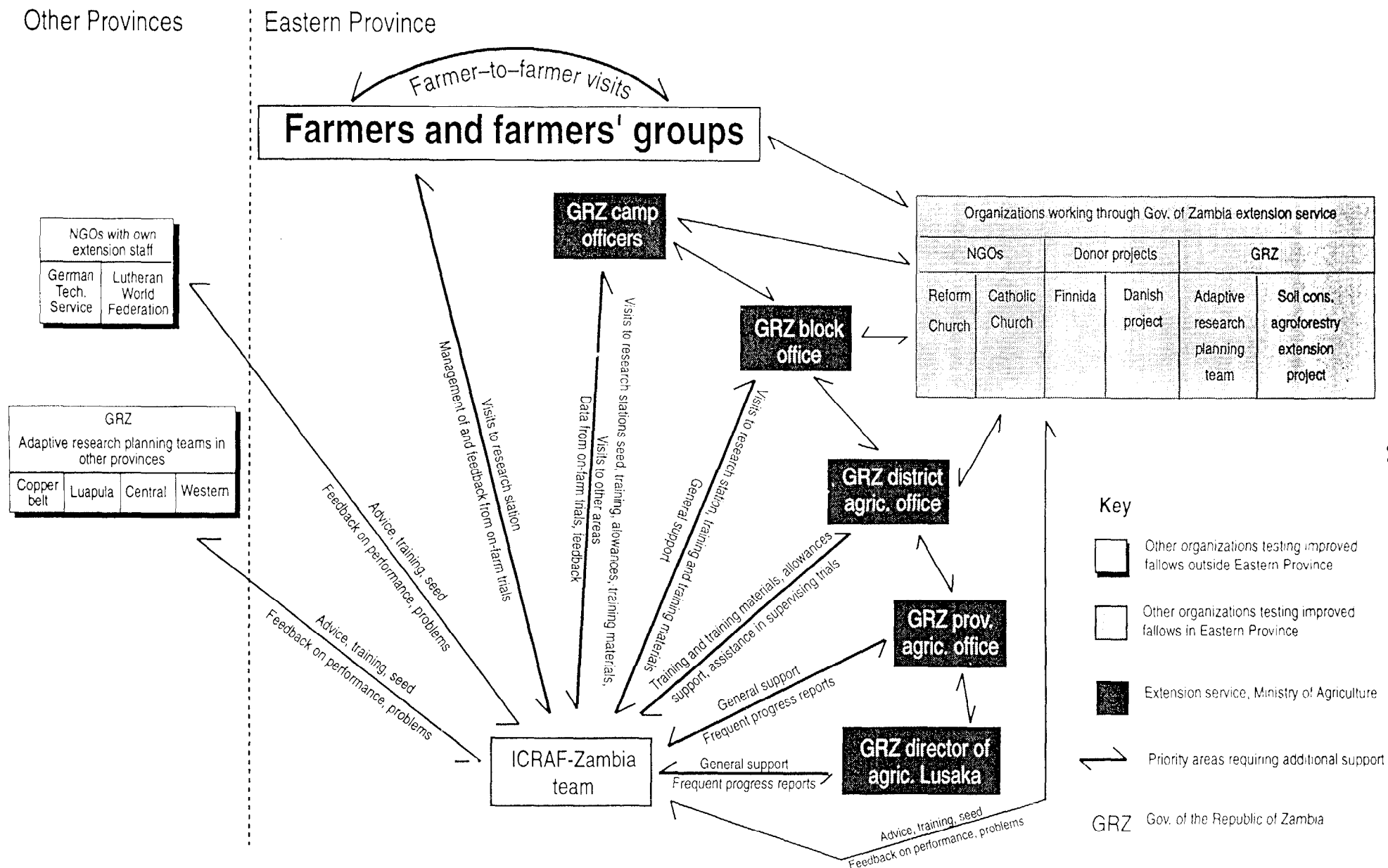


Figure 4.2 Institutional links among ICRAF-Zambia team, farmers and other organizations testing improved fallows

4.3 Capacity and Institutional Strengthening

ICRAF's capacity strengthening programme is comprised of a number of diverse activities. They include the development of curriculum and training methodology, group training programs of varied lengths on a number of both introductory and specialized subjects that focus on the training of trainers, individualized training (mainly for students working on MSc or PhD theses) and the preparation of training materials using print and electronic media. In addition, staff work with universities in every one of ICRAF's regions to encourage the incorporation of agroforestry materials and full courses at the undergraduate and graduate levels. This has been an important impetus to the recognition of agroforestry as an applied science.

Participants in CIS activities include NARS staff, NGO personnel and students from universities in the regions and from donor countries. Between 1993 and 1998, 1067 participants from 72 countries were beneficiaries of one or another training program. Most of these programs were concentrated in Africa (42), with only three each in Latin America and Southeast Asia, and the Panel suggests that an effort be made to improve the distribution. On average, 50 students are attached to project staff at any point of time; they produce some 15 MSc/PhD theses per year.

Training materials were provided to all participants of ICRAF training courses. In addition ICRAF distributed materials to ANAFE's 98 member institutions and to more than 1750 individuals or institutions or individuals. ICRAF's training materials are also now available through the ICRAF web site and the centre is registering an average of 5 requests a week for these materials. The latter is expected to increase as more training and education institutions go on-line.

While the current work with students is commendable, there is a need to pursue more systematically ICRAF's objective of strengthening the capacity of NARS scientists. One way of doing this is to expand the programme of visiting scientists and seconded staff by providing additional opportunities to promising developing country scientists engaged in agroforestry research.

Accordingly, **the Panel recommends that:**

ICRAF establish a visiting scientist scheme to attract postgraduate researchers and mid-career scientists to work with the Centre's cutting edge scientists.

Staff from all five Programmes, the Regional Offices and the Research and Information Support Units provide the substantive input into these capacity strengthening activities, including acting as lecturers and course leaders and supervisors of thesis research. The staff of Programme 5 provide both substantive and logistical support, working closely with the Information Support Unit.

Programme 5, now termed Capacity and Institutional Strengthening, has evolved since 1993 from the former Training and Information Division that was established in 1989. The Division deepened the involvement in capacity strengthening that had been an aspect of the information and advocacy role of ICRAF in its days as a Council. As it looks to the future, the Programme will strengthen its emphasis on delivery of quality programs and materials. It will

be especially important, in this regard, that programs and materials be made available to French and Spanish speaking participants in their own language. The Panel suggests that ICRAF seek a collaborator that can provide some translation/interpretation services at modest cost.

It will also be important for Programme 5 staff to develop a system to monitor the progress of participants and to track the careers of earlier participants. Together with an analysis of evaluations carried out at the conclusion of courses, this will provide the basis for determining the effectiveness of past training and for improvements that should be introduced. There are plans to do this. In addition, the Programme's future plans include the transfer of introductory level training from ICRAF to the NARS and to universities in the regions, although ICRAF staff will continue to provide backstopping as needed and to develop and supply training materials. They will also periodically update the trainers. The Panel supports this decision as appropriate and timely, in part because it will make it possible to respond efficiently to the increasing demand for agroforestry training that ICRAF's efforts to date have stimulated. ICRAF staff will then concentrate on the more advanced courses.

Consideration is also being given to ways in which technological advances will enable the Centre to reach even larger numbers of partner scientists, including use of the Internet and establishment of a distance learning studio and programme at headquarters. The latter will be linked to the World Bank –funded African Virtual University initiative.

Table 4.1 Description of ICRAF Involvement in Systemwide Programmes

NAME OF SYSTEMWIDE PROGRAMME	DESCRIPTION OF ICRAF INVOLVEMENT
Desert Margins Initiative (DMP)	ICRAF is a member of the regional steering committee. The program, however, is not yet operational
Systemwide Livestock Initiative (SLP)	ICRAF is involved in the East African Highlands part of this program, working with over 2000 farmers in participatory evaluation of high quality fodder shrubs and trees. They are joined by KARI and ILRI in this work. ICRAF sahelian activity also is funded in part by this SWI. The work deals with two of the most promising fodder banks species, <i>Gliricidia sepium</i> and <i>Pterocarpus erinaceus</i>
Ecoregional Initiative for the Humid and Subhumid Tropics of Africa (EPHTA)	ICRAF's work in this program is linked to its HULWA activities associated with the ASB program, which it coordinates. IITA convenes EPHTA. ICRAF's participation is limited to involvement in the Humid Forest Consortium, one of three within the EPHTA. Within that Consortium, ICRAF's work is focused on domestication of high value indigenous tree species and integrating this work into improved tree based cropping systems through diversification. Funding has not been forthcoming in this program, and it should be noted that to date, ICRAF and other international centers have received no resources from the program. In fact, the responsibilities of member IARCs have yet to be officially defined.
Systemwide Genetic Resources Programme (SGRP)	Much of the work in this program is carried out through the Inter-Centre Working Group on Genetic Resources (ICWG-GR), which is the steering committee for the SGRP. It meets annually. ICRAF maintains excellent formal links with the SGRP (it hosted the annual meeting in 1998); and informal links with many of the members of the ICWG-GR, particularly CIFOR, ILRI, and IPGRI. The SGRP has endorsed many of ICRAF's genetic resources initiatives in the past. It helped to fund a major workshop at ICRAF in 1997.
Systemwide Information Network for Genetic Resources (SINGER)	This initiative is coordinated through the SGRP and involves all centers that store genetic resources <i>ex situ</i> . ICRAF has participated fully in this initiative and has on occasion received funding from it. ICRAF has placed data from more than 2000 accessions in SINGER
Systemwide Initiative for Water Management (SWIM)	ICRAF is one of ten centers represented on the steering committee of this initiative, which is led by IIMI and IFPRI. Of the current seven projects of SWIM, ICRAF is leading the project on Improved Water Utilization in a Watershed Perspective with IIMI, WARDA, IFPRI and ICRISAT. A concept note has been prepared to obtain funding for further work by ICRAF to test a prototype framework and various hydrological models using a long term data set of the University of Nairobi. A number of other partners are involved in this activity, including in Thailand
Systemwide Water and Nutrient Management (SWNM) Initiative	ICRAF was instrumental in helping CIAT and IBSRAM develop the overall SWNM strategy. Of the 4 SWNM themes, ICRAF is involved in two: overcoming nutrient depletion in Africa (led by TSBF) and controlling soil erosion on hillsides in SE Asia (led by IBSRAM). ICRAF through AHI contributes to the nutrient depletion theme through many joint trial in East and Southern Africa. In SE Asia, ICRAF contributes to SWNM through policy research in Thailand and biophysical research in Indonesia.
Integrated Pest Management Program (IPM)	ICIPE represented ICRAF at the first meeting as a collaborator to the pest management research at ICRAF. Various proposals by ICRAF have not been included in the agenda of the initiative, and ICRAF has neither contributed much nor gained from the initiative so far. Yet ICRAF recognizes that IPM is important in an agroforestry context and will continue to monitor progress in it and participate where it seems appropriate. The initiative has, however, brought ICIPE and ICRAF together in several activities, since ICIPE also has an interest in pest management issues related to agroforestry.
Common Property Rights Initiative (PRCA)	The program began in 1995 when IFPRI received some preliminary funding to coordinate efforts in this initiative. An ICRAF scientist is a member of the steering committee. The new head of program 1 (formerly with ILRI) also is a member of the steering committee as representing ILRI. ICRAF staff have been active in this program, although it has not gotten into much activity yet. The Southeast Asia regional team will likely become involved in the next planned activity of the initiative.
Global Mountains Programme (GMP)	This program includes the East African highlands (and ICRAF convened AHI program - discussed elsewhere), the Andes, and the Himalayas. CIP is taking the lead in developing the overall program (and leading the Andean component). To date, ICRAF's contribution has been through the AHI.

CHAPTER 5 - GOVERNANCE AND MANAGEMENT

5.1 Board of Trustees

ICRAF's Board is currently comprised of 14 members, including four women and five persons from developing countries. One seat is reserved for a representative of the Kenyan Government, while the Director General and the Chair of the CIFOR Board serve *ex officio*. Members, elected for three-year terms, once renewable, come from a spread of geographic regions and represent a variety of scientific fields relevant to ICRAF's mandate, including persons experienced in finance and administration. (See Table 5.1) The Panel observed that the nomination process was systematic and based on criteria identified in advance.

The Board is nominally structured in the usual way, with an Executive and Finance Committee of seven persons, a Nominations Committee of ten and an Audit Committee of four. The latter two normally meet at the same time and between them absorb the entire Board membership. The Board made a deliberate decision, however, to make the Programme Committee a committee of the whole, albeit with a chair separate from the Board Chair. In point of fact, the Programme Committee's work is totally integrated within the Board's agenda of the second meeting of the year (usually in December), at which time it completes its work for the year and does not reconvene during the April meeting. At present, there is also an *ad hoc* Resource Mobilization Committee that will assist the staff and engage Board members in seeking new sources of funding. A small *ad hoc* committee also met separately at the meeting attended by the Panel to review in depth and report to the Board on several proposed personnel policy changes. There was some discussion of establishing an additional *ad hoc* committee to consider Board procedures, although no action was taken. In view of the fact that the current Board manual is somewhat out of sync with the procedures that have evolved, **the Panel suggests that the Board review its procedures and revise the manual accordingly.**

Immediately preceding the April 1998 meeting, the Board spent two days in a retreat with senior management. The objectives were: a) to launch a process to develop a common vision for the future of ICRAF and its alliances, and b) to begin to develop an agenda for action to meet the Centre's objectives in 2003. The retreat resulted in an action plan for Board and management that will involve the preparation of reports on nine significant issues for review at the next and subsequent Board meetings. Board members and management indicated that they especially valued this extended period for brainstorming on strategic issues and expressed the need to repeat such opportunities. The Panel shares their view on the importance of such a structured activity.

Board members appear to have a good working relationship with each other and to exhibit a strong commitment to ICRAF. Participation at the meeting observed was active and all-inclusive, with differing opinions stated candidly. Relations with management are also cordial, although in the past the Board has not hesitated to exercise strong control when circumstances warranted.

**Table 5.1 - International Centre for Research in Agroforestry (ICRAF)
Board Composition (1993-1998)**

Name	Nationality	Specialization	Gender	Nominated by	93	94	95	96	97	98	Last Position held
M. Singh	India	Agronomy	M	Board	X						M-BOT, M-PC
M. Toure	Senegal	Soil Science	M	Board	X						M-BOT, M-PC
B. Santos	Dominican Republic	Agricultural Economics	M	Board	X						M-BOT, M-PC
R. Mupawose	Zimbabwe	Agronomy	M	Board	X	X					VC-BOT, M-AC
J. McWilliam	Australia	Agronomy	M	Board	X	X					M-NC, C-PC
G. Holmes	United Kingdom	Forestry	M	Board	X	X					C-BOT, C-EFC, M-PC
Stachys Muturi	Kenya	Agriculture & Development	M	Host Govt.	X	X					M-EFC, M-AC
B. Bengtsson	Sweden	Agricultural Development	M	CIFOR	X	X	X	X			M-EFC, M-AC
E. Tyrczniewicz	Canada	Agricultural Economics	M	Board	X	X	X	X	X		C-PC, M-EFC
D. Thorud	U.S.A.	Hydrology	M	Board	X	X	X	X	X		C-BOT, C-EFC,
Yemi Katerere	Zimbabwe	Forestry	M	Board		X	X	X	X	X	C-BOT, M-PC, M-NC, C-EFC
Pedro Sanchez	United States	Soil Science	M	DG	X	X	X	X	X	X	(DG) M-EFC, M-NC, M-PC
Uraivan Tan-Kim-Yong	Thailand	Sociology	F	Board	X	X	X	X	X	X	VC-BOT, M-EFC, M-PC
Neil C. Turner	Australia	Agronomy	M	Board		X	X	X	X	X	C-PC, M-AC, M-EFC
Otto von Grotthuss	Germany	Forestry	M	Board	X	X	X	X	X	X	M-NC, M-PC
Maria de Lourdes Davies de Freitas	Brazil	Environment	F	Board	X	X	X	X	X	X	C-AC, M-EFC, M-PC
Matt Heering	Netherlands	Forestry	M	Board		X	X	X	X	X	C-NC, M-EFC, M-PC
Minoru Kumazaki	Japan	Forestry	M	CGIAR	X	X	X	X	X	X	M-AC, M-PC
Moise Mensah	Benin	Economics	M	Board	X	X	X	X	X	X	M-NC, M-PC
Wellington Ngulo	Kenya	Veterinary Science	M	Host Govt.		X	X	X	X	X	M-AC, M-EFC
Anette Reenberg	Denmark	Geography	F	Board				X	X	X	M-PC, M-NC
Gill Shepherd	United Kingdom	Anthropology	F	CIFOR					X	X	M-NC, M-PC
Lucie Edwards	Canada	Administration	F	Board					X	X	M-NC, M-PC
Richard Beahrs	United States	Business Executive	M	Board					X	X	M-AC, M-PC

The Board itself feels members should interact more with the staff, despite the fact that its agenda regularly includes meetings with both staff associations. In addition, all staff are free to attend open Board meetings and to approach members informally during morning coffee breaks. For this reason, the Panel is puzzled there is so little understanding of the Board's role and responsibility to ICRAF on the part of many staff members. **The Panel suggests that management communicate more clearly to staff the legal, fiduciary and other significant responsibilities held by the Board.**

The Board takes seriously its evaluation responsibilities. At the April 1998 meeting, considerable time was spent reviewing the performance of the Director General, who then met with members in closed session to discuss achievements of the past and plans for the forthcoming year. This procedure has been undertaken annually since the time of the last EPMR. During two prior periods of strain, the Board found it necessary to intervene forcefully to assist on two critical management issues.

In April 1997 and again in April 1998, the Board formally evaluated the quality of its own leadership, concurring with the Panel's judgement that the chair is in competent hands, and completed a lengthy questionnaire on its own performance, using the format suggested by the CGIAR Secretariat. On both occasions, members commented in writing on the need for more organized orientation for new trustees and, importantly, on their wish to structure meetings so as to reduce the number of presentations in favor of increased time for discussion of strategic, longer-term issues. Concern was expressed over the fact that the Board had been seriously distracted from its programmatic oversight responsibilities on two past occasions by the need to focus on urgent administrative matters. The results of the 1998 evaluations were reported but neither analyzed nor followed by discussion as to appropriate remedial action. **The Panel suggests that the Board study the self-evaluations carried out to date and come to consensus on appropriate follow-up action.**

Board and committee minutes record clearly, if briefly, the discussion and decisions taken during open sessions but fail to indicate what takes place when sessions are closed. Because this, too, is important Board business, there should be an official record of any decisions taken.

Between meetings, Board members receive copies of the weekly staff newsletter, the quarterly journal, trip reports from staff of the Director General's office and e-mails from management as warranted. A quarterly financial report, is currently sent only to the Board Chair and the Chair of the Audit Committee. In the Panel's view, this does not permit the Board to fulfill its fiduciary responsibilities adequately, and **the Panel suggests that a comprehensive financial report be sent quarterly to all members of the Board.**

The advance papers reviewed by the Panel for the April meeting were comprehensive but principally concerned with management issues. As indicated, the Board convenes as a Programme Committee only in the course of the second meeting of the year. Thus, in preparation for the December 1997 meeting, members received a draft copy of the Programme of Work and Budget for 1998. Oral presentations of achievements and plans were made during the meeting itself, following which the Board approved the 1998 work plan and budget.

Although the Panel understands that the December 1998 Programme Committee meeting will be structured in such a way as to minimize formal presentations and increase time for Board members to discuss issues with staff, the Panel remains concerned that the Board is not presented with sufficient information to fulfill its programme oversight function. For example, EPMPR members were given some twenty-two Centre- or donor-commissioned external reports on various aspects of ICRAF's programme and management. Only one of these had been reviewed by the Board or its Programme Committee, and none were Board commissioned. The CGIAR review procedures presume that a full set of Centre-Commissioned External Reviews (CCERs) will be carried out in advance of the quinquennial EPMPR. Ideally, these are scheduled and commissioned by Centre Boards as a means of keeping abreast of scientific and management quality within the institution. It is also surprising that too few programmatic matters have been referred to the Board to warrant a formal second meeting during the year of the Programme Committee. It is clear to the Panel that a greater involvement by the Board in programme matters would improve the effectiveness of the Board and would be welcomed by the staff as well as its own members.

Therefore, the Panel recommends that:

- a) **the Board strengthen its programme oversight by increasing the frequency of Programme Committee meetings, becoming more proactive in setting its agenda and seeking appropriate documentation from management; and**
- b) **the Board institute a formal procedure to schedule and commission Centre-Commissioned External Reviews and to discuss these, other external review reports and management's responses.**

5.2 Leadership and Organizational Culture

Since 1991, ICRAF has transformed itself from a Council to a well-regarded global research institution. This implies that it has benefited from strong and positive leadership, provided by a dynamic and committed Director General.

The Director General guides ICRAF with the assistance of a Management Committee, comprised of himself, the Deputy Director General (who is also presently Acting Director of Finance and Administration - known as FINAD) and the Directors of Research and Development. The Committee meets twice monthly to review and approve guidelines, keep abreast of finances, review progress on funding initiatives, approve new staff positions and appointments, agree on plans and discuss other management issues as they arise. The majority of decisions have been made by the Committee as a whole since it defined its decision-making rules in 1996 to ensure ownership; they proceed through consensus, vote, DG and DDG and, if all of these fail, decision by the Director General. Minutes are prepared by the Assistant to the DG and communicated to staff via the internal network that is an important source of centre information. Four times a year, members of the two staff associations (the GSSA, representing support staff, and IPSA, representing professional staff at both the national and international levels) meet with the Management Committee to convey and discuss staff concerns. The associations also meet with the Head of Human Resources with greater frequency and with the Board at each of its semi-annual meetings. A weekly staff newsletter conveys general Centre news to staff.

Staff at headquarters gather in the main courtyard for coffee every Friday morning, at which time the Director General introduces new staff and makes other announcements of general interest. The Panel observed his special effort at these events to acknowledge notable staff achievements. The Board also uses these gatherings to communicate with staff during its meeting weeks. In addition, seminars are organized every Friday to promote discussion on both scientific and management issues.

In recent years, the Management Committee has had five members, but on occasion this team did not function harmoniously. The lack of unity among senior managers over the last two to three years was, in significant part, responsible for an ebb and flow in staff morale throughout the Centre. With the formation of a new team in January 1998, the Board and staff are hopeful that a more cooperative spirit will emerge.

Several events contributed to the volatility reported to the Panel, notably management's response to a financial crisis in 1995 and the sudden departure of a senior manager in late 1997. In both instances, the Board found it necessary to intervene to calm staff fears and take steps to review and provide counsel on the specific conflict management procedures applied in each case.

While acknowledging that such storms take time to dissipate, the Panel found a remarkably positive attitude on the part of staff when it began its work in April of 1998. Persistent questioning of staff at many levels led the Panel to conclude that the wind had calmed. Staff consistently described the ICRAF culture as one in which a team approach is paid more than lip service, where individuals are given scope to exercise initiative, where there is a strong esprit de corps and sense of purpose. Above all, they described a non-hierarchical Centre, where accessibility and transparency are encouraged. The support staff association called the Panel's attention to the commendable relations between the national and international staff and the frequency of staff interaction both in and outside of the work environment.

As is the case in many Centres, the scientists' main concern at present is with time pressures brought on by work demands that divert their attention from research. They refer to the reporting required by the CGIAR System and donors as well as the time spent on assembling and managing "complex mosaics" of funding packages. The assignment of new tasks to a Projects Office may ameliorate these concerns to some degree, but the Panel has no panacea to suggest to this common Systemwide problem.

5.3 Managing the Matrix

The matrix structure of ICRAF is described in Chapter 2.

A broad range of middle managers and programme staff devoted considerable time and thought to the functioning of the matrix mechanism over the last year, leading to a decision to strengthen the regionalization of ICRAF and institute a number of changes as of 1 January 1998. Notably, primary responsibility for the supervision of staff posted to the regional offices and for both the management and raising of funds expended in the regions was transferred on that date to the Regional Coordinators with their strong support. This places the Programme Leaders in primarily a scientific advisory role, although they retain

direct responsibility for some global research. Despite their loss of authority, they too support the change, believing their relief from managerial responsibilities will enable them to spend more time in quality control, in standardizing methods across regions and in ensuring a focus on international public goods.

Approximately 60% of ICRAF's scientists are based in the regions. Each now reports directly to, and is primarily evaluated by, a Regional Coordinator, who is the focal point for establishing priorities, developing and implementing work plans and maintaining constructive collaborative relations in the respective region. As is inevitable in a matrix, regional scientists are also associated with a global Programme from which they receive technical guidance and direction on research priorities. Nonetheless, all research initiated by a Programme Leader must have the concurrence of the Regional Coordinator concerned. The scientists at headquarters conduct activities relevant to a number of regions; they report directly to their respective Programme Leader, with whom they plan and agree on all their activities, again with the concurrence of the Regional Coordinators in whose regions they expect to conduct research.

In the Panel's view, this regionalized approach could promote greater coherence within a given region and perhaps more immediate local impact and more opportunity for cross-programme activity. On the other hand, the cost may be a partial loss of the strategic dimensions of research and an increased difficulty in raising funds for strategic, cross-regional activities. Regional Coordinators will have to develop a more global view than has been required of them in the past so as to avoid devolution of the Centre into six separate mini-ICRAFs, and they are duly aware of their need for better interaction among themselves and with the Programme Leaders. The Panel notes with approval the fact that both Board and management are watching these developments carefully.

While seeing the potential pitfalls clearly, management, the staff, the Board and the Panel agree that there is no perfect structure. Over time, roles in this revised matrix must be further clarified and adjustments made to achieve an appropriate balance between response to regional issues (that are often location-specific in natural resource management research), and the production of international, if not global, public goods.

The Regional Coordinators and their staff will also need to discharge their new administrative functions more effectively, especially financial management, for which they will need both specialized staff and training. The Panel's comments in this area and in resource mobilization are covered in a later Section of this Chapter.

5.4 Financial Status of the Centre

ICRAF has experienced very rapid growth in the years since the last EPMP in 1993. Audited financial statements for 1997 recorded revenue of US\$23.5 million, an increase over 1996 of 11% and as much as 84% over that recorded in 1992. Similarly, expenditures in 1997 amounted to US\$23.2 million, a 14% increase over the amount in 1996, 92% above that in 1992. In 1998, however, ICRAF expects US\$22.7 million in revenue, a 3.5% decrease over 1997, and has budgeted expenditures at US\$21.8 million, a decrease of 7%. Management now predicts that both revenue and expenditures will be flat over the next several years.

As at 31 December 1997, assets totaled US\$18.9 million, including US\$5.6 million for the extension of ICRAF House recorded as a "capital work-in-progress" but now complete. Current liabilities amounted to US\$8.9 million, including US\$2.5 million set aside to cover staff accruals and provisions. However, management estimates the need for an additional US\$200K in this account to fully cover the liability for international staff repatriation and has been charged by the Board to include this amount in the budget as soon as feasible.

The Operating Fund, a stabilization mechanism that--in a not-for-profit context--indicates the financial capacity of an organization to adjust to unplanned changes in revenue, stood at US\$1.5 million at the end of 1997, amounting to 24 revenue days (total 1998 revenue divided by 365 days). Current CGIAR guidelines call for a Fund of 90 revenue days or 25% of revenue, although the 1997 System average was only 49 days or 13%. The Board has set a target for the Operating Fund of US\$4 million by the year 2000. Given the expectation that revenue will not increase and the fact that any contribution to the Fund must come from unrestricted resources, this will not be easy and may not be necessary.

ICRAF's liquidity, its ability to meet its short-term spending requirements in the face of delayed receipt of funds, can be measured in terms of its current ratio (current assets divided by current liabilities) and of available working capital (excess of current assets over current liabilities.) At the end of 1997, the Centre's current ratio was 1.27, somewhat below the CGIAR's normative range of 1.6 to 2.0 and a system-wide 1997 level of 1.72. The Centre has devised a plan, however, to reach a ratio of 2.08 by the year 2000. ICRAF's working capital stood at US\$2.4 million as 1997 closed, an amount sufficient to cover 42 days of 1998 operating costs.

On the other hand, if one makes the conservative assumption that not more than one-third of the staff accrual liability account is likely to be drawn down within twelve months, thus transferring a portion of the staff accruals from current to long-term liabilities, the current ratio would be recalculated at 1.8 and the working capital at 102 days. The CGIAR recommends a very conservative 120 days of working capital; the System averaged 103 days in 1997. (The Panel understands that the CGIAR Secretariat is rethinking a number of these financial guidelines, with the possibility of adjusting them downward.) All in all, therefore, the Panel judges the Centre's financial status to be reasonably secure and commends the Board and management's attention to improving these measures. **However, the Panel suggests that the Board revisit its policies regarding the accumulation of reserves in the light of ICRAF's current financial position.**

ICRAF experiences two interrelated problems that are endemic within the CGIAR System: the proportion of unrestricted to restricted funding and the inability to recover legitimate overheads on restricted projects. Since 1994, ICRAF has eliminated "complementary" (special project or non-agenda funding from its operations. Funds are, therefore, in only two categories: unrestricted and restricted.

In 1998, the Centre expects unrestricted revenue of US\$7.5 million, 35% of the total for the year, with 65% coming from restricted funding of US\$14.6 million. This is a deteriorating situation; restricted funding was 56% of the total in 1992. In this respect, ICRAF is considerably more constrained than any other Centre in the CGIAR System where the average is 36% restricted funding. On the other hand, restricted funding normally

carries the benefit of a longer time frame than unrestricted, which facilitates research planning and contributes to the financial security of an institution.

Coupled with the difficulty of negotiating the full cost of overhead on almost all restricted projects, this UR/R relationship leaves ICRAF with little room to maneuver. In the early days of the CGIAR System, unrestricted revenue was understood to enable a Centre to pursue research goals determined by its Board to be essential to its mandate and to do so whether or not they matched the particular interests of donors at a given point in time. It was meant to be a safeguard against deviation from the optimum research programme that can result when an institution is overly donor-driven. In ICRAF's current case, however, fully two-thirds of its unrestricted funds must be expended to support basic institutional overheads (Office of the DG, the Board, the Division of Finance and Administration) that should be allocated to the projects that these activities, in fact, support with essential services. The Panel shares the ICRAF Board's and management's concern at the low rate of overhead collection. **The Panel suggests that the issue of overhead collection should be debated more openly at the System level.**

ICRAF's accounting system appropriately enables the charging of most operating costs directly to projects. In addition, the Centre appropriately uses standardized costing to budget for staff. Based on an average salary plus benefit cost of the staff member's grade, standardized costs also subsume the costs for division direction and for information and biometric services. This system has reduced the overhead rate *per se* to a low 23% of project costs. Nonetheless, ICRAF's collection rate in 1997 stood at only 5% of direct project operating charges, a notably lower percentage than that experienced by other Centres. This suggests that staff meeting with donors may not be sufficiently attuned to the rationale for full overhead, nor appreciative of the services it covers, in order to negotiate firmly with even those donors who are prepared to entertain the concept.

It may also stem from the fact that overheads collected are considered to "belong" to the Programme or Region whose projects provide it. This may make it easier for scientists in negotiation with donors to budget whatever funds appear to be available to operating costs rather than to argue that projects must be supported by the services covered by overhead. **The Panel suggests that collected overhead be allocated against the services it is designed to pay for, releasing unrestricted funds for allocation wherever they are needed to cover priority research.**

5.5 Resource Mobilization

ICRAF was funded by 20 donors in 1993; their number increased to 36 by 1998 as the Centre's budget almost doubled. Still, both Board and management are making plans for a revitalized effort to attract new donors to the Centre's research agenda, seeking those supportive of both "cutting edge" research and development activities. The Board's *ad hoc* Resource Mobilization Committee will work with staff toward three goals:

- to reach out to American philanthropic foundations that have not previously been donors to CGIAR centres;
- to seek grants from the private sector, including private individuals;
- to establish an endowment of some US\$100 million from which, in due course, to return US\$5 million annually to unrestricted core.

Management will also look to donors from the South and to bi-laterally-funded development projects. With respect to the private sector, consideration is being given to an approach to commercial firms with the request that they underwrite specific positions, with due care to preserve the focus on international public goods. Management realizes that substantial resources, including perhaps additional personnel, will be needed to bring this plan to fruition but has not yet determined an appropriate level of action. ICRAF may benefit from Ford Foundation support for an activity aimed at assisting the Centres to develop sustainable funding mechanisms.

An effort to bolster public awareness activities is also considered key to future fundraising, and additional resources will be devoted to materials and activities that will attempt to demonstrate to a broader public the direct path from ICRAF research to development.

The Panel is aware that individual scientists, including those posted to the regions, often devote considerable time to raising project funds. It is not clear how the new, explicit transfer of responsibility to the regions will differ significantly from current fundraising practice. There is also a question, as mentioned earlier, as to how inter-regional activities will be funded and whether the regions will be in competition with one another for funds. There may be a need to clarify the roles individual scientists, Programme Leaders, Regional Coordinators and Senior Management play in project proposal development and negotiation with donors. In any event, the headquarters Projects Office is an active as a point of coordination, assigned the task of tracking proposals and ensuring that contractual obligations for both substantive and financial reporting are met in a timely manner as well as for researching new sources of funding. The Panel supports management's efforts to maintain a focus on strategic goals as it pursues and utilizes both restricted and unrestricted funds.

ICRAF is reasonably comfortable with the anticipated funding for 1999; 120 proposals are in the pipeline, although some are not fully developed. This figure should be seen in the context of the fact that ICRAF received over 35 new grants in 1997. Management has indicated that a fairly flat level of resources is expected for the next several years.

5.6 Financial Management

The Division of Finance and Administration (FINAD) is comprised of units that manage finance and budget (currently separate units but likely to be combined), human resources, information technology and operations. Led by a Director who is a member of the Management Committee, they are described and commented upon below. The Finance and Budget Units are currently staffed by one internationally recruited staff person, four national professional staff and approximately 15 support staff.

A Centre-commissioned external review of the Division was conducted in October 1996 that made a number of recommendations with respect to the Division's work, albeit principally regarding financial management. The reviewers generally focused on procedural details--most of which were subsequently attended to by Management--rather

than taking a strategic overview, but their report did assist the EPMR to identify areas that required the Panel's attention.

5.6.1 The Accounting Function

An upgraded version of the Sun Systems computer accounting package became largely operative at ICRAF on January 1 of this year. It will shortly incorporate the human resources data base and will enable regional offices to enter the reports of expenditures against their imprest accounts directly as well as to access their financial reports at will. Hopefully, this new package will go a long way to solving the remaining concerns of both headquarters and regional staff with respect to the timing and accuracy of reports. It is also expected to improve cash flow as donor reports are produced on time and to offer better budgetary control.

A slight adjustment of the reporting format to include columns that display current month entries by region and by headquarters should also help to counteract misunderstanding of what the regions sometimes regard as errors, but the procedure to clarify the figures needs to be made explicit as well.

All regions except Southeast Asia will have professional financial staff in place, trained in ICRAF procedures, within a few months as the regions assume primary financial responsibility for their budgets. A new Financial Controller will join the Centre at mid-year and will consider headquarters' staffing levels, the allocation of tasks and incorporation of the budget unit. Current staff believe there is opportunity to reduce some duplication of effort as well as to increase efficiency by cross-training staff to substitute for one another. The new Controller can make an important contribution by fostering a strong service mentality among his staff.

5.6.2 The Treasury Function

In accordance with policy established by the Board, ICRAF has arranged that any balances in excess of US\$50K in its principal US dollar current account will be "swept" into an interest-bearing account on a daily basis. Balances in that account in excess of expected disbursement over the next 30 days are invested in time deposits for from one to six months; amounts not needed for the foreseeable future are invested in bond funds or in bonds of AA-rating or better. Investment income from these sources amounted to US\$162K in 1997. The policy document includes stipulations regarding the building of reserves that are commented upon above and should be reviewed.

5.6.3 The Programme of Work and Budget

The annual Programme of Work and Budget (PWB) is the main internal management tool for planning activities, allocating resources, implementing work and monitoring progress. Late in 1996, the Centre established a staff "Total Quality Task Force" to review and revise the budgeting process and capture in both substantive and financial terms the plans for the subsequent year that are finalized at the Annual Programme Review in September. The resulting PWB for 1998, well integrated with the computerized accounting system, lists all the activities that are planned, the partners who will collaborate in the activity, the expected outputs and the ICRAF resources (staff and operating costs) required to undertake the work. The PWB also provides the basis for establishing the goals

and work programme for each scientist at the Centre, which are then incorporated into their performance evaluation forms. Monitoring and assessment can therefore be carried out at two levels: for individuals, as part of their annual review, and at the programme and regional level, where expected outcomes can be directly measured against real achievements for a given year.

At the Programme level, work is expressed in terms of 19 projects; at the regional level, in 30 themes. The PWB document itself does not make clear the relationship between projects and themes, although the relationship is embodied in the listed codes (i.e., project codes are listed in a separate column for each activity). Within both themes and projects, work is expressed in terms of activities--with partners, concrete outputs expected, staff and operating costs.

This effort to identify outputs, in particular, and link them to staff assignments, is highly commendable, but the Panel finds that the breakdown of budgets into such small units--there are 320 in total--reduces budget flexibility and makes it difficult to comprehend the connections between relatively small, if important, outputs and larger objectives and goals. In part, this can be solved by a different formatting of the document, which would greatly facilitate Board review in the first instance. Nonetheless, budgetary breakdowns detailed to the extent they are in 1998 also reduce desirable flexibility and raise the transaction costs of budget adjustment. The precise nature of an output may also change as research and other work progresses, and some flexibility to adjust projected outputs within a larger grouping is desirable as well.

The process is currently being refined with consideration being given to consolidation of "tasks" into "key activities," with a "convenor" who will be in a position to exercise some budgetary discretion, albeit in consultation with the relevant task managers and in accordance with contractual obligations. **The Panel suggests that the budget be made more flexible by reducing the number of units to which budgets and budgetary authority are assigned.**

A budget manual is in draft and, presumably, will be revised when decisions have been made as to system adjustments. The Panel notes that the Budget Officer monitors expenditures throughout the year and sends out variance reports periodically. A formal process of budget revision is carried out in July.

The computer records actual non-staff operating costs against activities as expenditures are incurred, together with one twelfth of the budgeted staff time each month. The system can accommodate instructions from staff as to when the activity will take place and when to record the time spent, but almost none takes advantage of that procedure. This means that donor reports due in the course of the year must be prepared manually.

It also means that the measure of staff costs, on average 60% of the total, is based on budget estimates made largely in proposals, rather than on actual staff time devoted to a given activity. Over time, estimates are based on past year accounts that, in turn, were based on estimates. This is not a problem unique to ICRAF. (Very few of the CGIAR centres attempt to track staff costs in terms of time.) In the course of their performance evaluations, however, ICRAF staff are asked to distribute their time in percentages over the activities they have worked on during the year. **The Panel suggests that management request staff annually to aggregate the information regarding distribution of staff**

time; FINAD can then consolidate the information to make comparisons with the budgeted and actual figures and feed the analysis into subsequent budgets. This exercise could also serve to improve cost consciousness and research efficiency.

5.6.4 Auditing

The Nairobi affiliate of Coopers and Lybrand has audited the ICRAF accounts since 1989. A partner of the firm meets with the Audit Committee and, in the meeting observed by the Panel, presented an exceptionally helpful report that included useful suggestions and management's comments as well, as well as the declaration that 1997 accounts are in order. Nonetheless, it is usual practice to change auditing firms every three to five years so as to eliminate any possibility of collusion. **The Panel suggests that the Board develop a policy regarding the appropriate duration of contracting with a single external audit firm.**

In line with the transfer of financial responsibility to the regions, there is a plan to retain the documentation supporting expenditures in the Southeast Asian region and to conduct a sub-audit there by local representatives of the same firm at the close of 1998. If this proves satisfactory, the practice will be extended to other regions.

5.7 Human Resources Management

The Human Resources Unit (HRU, within FINAD) includes one internationally recruited staff member, three national professionals and three support staff. The Unit carries out with great spirit and energy the full range of activities of a professional human resources office, including training and employee counseling. Its work is complex. ICRAF's 431 current staff members are comprised of 53 internationally recruited staff, 36 seconded staff from outside Kenya, 63 national professionals and 279 national support staff. Thirty-five nationalities are represented, posted at 20 duty stations in 15 legal environments. The HRS staff also supports about 50 staff members of sister CGIAR Centres and other institutions housed on the ICRAF campus and coordinates with the Centres that support ICRAF staff at their sites.

International staff represent 20 countries, with 40% coming from countries of the South that compares to the CGIAR figure of 40%. The Centre is concerned to maintain this diversity, especially as a number of staff from the South near the ten year tenure limit now in effect.

IRS women comprise 21% of the total (the CGIAR average is 16%), while one woman is at the senior management level (25% vs. CGIAR 7%), and two are in middle management (11% vs. CGIAR 12%). Approximately 40% of the national professional staff are female. The Board and management have set a target of 30% internationally-recruited female staff by 2003, so that the staff will be representative of the recruitment pool.

The Panel was especially interested to note the substantial number of seconded staff, including 10 senior and 26 junior staff, recruited for the most part via European donor programs. This adds valuable labor to the Centre's research agenda at minimal cost. **The Panel suggests that the Centre seek more seconded staff from collaborating NARS as well, in order to ensure that staff diversity is maintained.** This would also support

ICRAF's capacity strengthening mandate. (See also the Panel recommendation regarding a visiting scientist scheme in Section 4.3 above.)

A related issue is the ratio of national professional or junior associate staff to internationally recruited senior staff. **The Panel did not have sufficient time to consider this issue in depth but suggests that management consider whether a progressive change in the ratio of national professional to international staff would be a cost efficient measure without detriment to the quality of the research output.**

The 1993 EPMR highlighted three HRU issues that have been largely resolved: a grievance procedure is in place, there has been a study of salaries and benefits (in fact, a survey is conducted jointly with ILRI and ICIPE every two years, and the performance evaluation system has been improved and staff trained, although there is more to accomplish in this area according to HRU staff. The 1996 CCER's recommendations have also resulted in a needed addition to professional staff, a policy on employee counseling and consolidation of a complex set of benefits into salary.

Staff reported to Panel members a notable improvement in HRU services since the recruitment of the incumbent international professional who joined the Centre in 1994. She and her staff have been responsible for a new personnel manual that, commendably in the Panel's view, covers all staff and encourages a unified perspective. There are also five country working manuals; staff at three other outreach sites use the policies of their host Centres. The recruitment procedures have been delineated to make the process transparent, and a useful interview form designed that takes into account not only the professional training but also the personal characteristics desirable in a given job. This is especially important, in the Panel's view, as staff are recruited to undertake policy work and to collaborate with diverse partners. Training in interview skills is planned.

As noted, the staff have revised the performance evaluation process so that the outputs committed to in the Programme of Work and Budget will be one basis for the assessment of individuals. Experimentation with a 360 degree evaluation scheme is under consideration, as is a way to evaluate individuals whose output is achieved through teamwork.

The evaluation process also yields information as to staff career development needs to which the Centre tries to respond with appropriate training programs, formal and informal. Among others, Regional Coordinators were registered in what appears to have been a valued course in partnership management and teamwork early this year that should be repeated from time to time. Additional training in management and supervisory skills is also needed at all levels. Funds for these activities are in short supply, however, and the HRU staff is attempting to find a way to build training into funded proposals, arguing that ongoing training is a standard part of business today.

Two issues have come to the Panel's attention. The first is the policy that incoming IRS are given contracts for ten years at the outset. HRU staff argue that this reduces the causes of anxiety from two (Will funds be available? Will my contract be renewed?) to one. Concern for the availability of funds cannot be avoided. The Panel believes, however, that management should promote more staff flexibility. Research plans may change; the need for disciplinary skills may differ from time to time, and management should be in a position to respond promptly. With proper notice to staff, should the decision be made not to renew

a contract, and with the kind of outplacement assistance recently provided to those nearing their (current) ten year deadline, transitions could be eased. The Panel believes initial contracts should be restricted to no more than three to five years, with the possibility of renewal.

The ten year tenure rule was determined by the Board in an effort to ensure that the staff is renewed periodically. The policy stipulates that IRS should remain at ICRAF no longer than ten years, although exceptions to the rule have been introduced recently. The Panel believes that this policy can sometimes work to the detriment of ICRAF as staff could be released even when their services remain valuable. If contracts are more limited, staff renewal should occur without the ten year ceiling.

In view of the above, the Panel recommends that management restrict initial contracts to between three and five years, with the possibility of renewal and without the current ceiling of ten years.

A second issue was brought to the Panel's attention by national staff. They referred to a norm, rather than a written policy, that declares a national professional must resign from ICRAF if the person wishes to pursue a PhD degree. Staff are troubled by what they see as a limitation on their career development. The Panel views this more as a symbolic than a real concern. It is very unlikely that many would wish to pursue the degree even if the norm were revised. Certainly, it should only be revised with specific conditions in place: a) that the person can continue to perform his/her ICRAF work assignment successfully, b) that a senior scientist at ICRAF is prepared to supervise the dissertation research, c) that there is a clear understanding that the degree does not confer international status, rather that the staff member must await a position for which he/she is qualified and then compete in a worldwide recruitment effort--or seek a position elsewhere. **The Panel suggests that management review the applications of highly qualified individuals who make a proposal to pursue a PhD degree with the full support their supervisors.**

5.8 Information Technology

The Information Technology Unit (within FINAD) is comprised of one internationally recruited staff member assisted by one national professional and six support staff. The Unit is responsible for computer hardware and software as well as the centre's communication system, including IVDN. The Unit Head provides highly skilled technical advice with respect to software selection to meet both administrative and scientific needs, configures software and manages the local area network and the intranet; his staff provides hardware adjustments/repairs, assistance with software problems, the Centre's audio-visual and telephone/fax services.

ICRAF has consolidated some of its software and communications equipment purchasing with ILRI. Most of the need for customized software and some hardware repairs are outsourced. ICRAF purchases off-the-shelf software centrally and is careful to protect the applications for which it holds licenses.

The Unit Head promotes a service mentality among his staff, encouraging them first to understand the needs of the research and other administrative staff and then to select and provide the technology that will be responsive. He is collaborating with other ICRAF staff

in development of a proposal to introduce communications technology to selected NARS and participating in plans to set up a studio at headquarters that will facilitate distance learning programs.

5.9 Operations

The Operations Unit (within FINAD) includes one internationally recruited staff member, assisted by four national professionals and some 36 support staff. Four sub-units report to the Head: Transport (the driving pool), Procurement, Production (with photocopying and some printing services) and the Travel Office. The Unit Head handles most insurances for ICRAF headquarters and regions and is responsible for a number of outsourced services, including security, building and grounds maintenance and food services. He also assisted in oversight of the construction of the new research building that has now been inaugurated and is all but complete.

A good deal of the headquarters purchasing is done on the Nairobi market as most goods are available at competitive prices. The Unit also purchases vehicles, computers and other major capital items for the regional offices. The Procurement office has recently improved notification to staff of the status of outstanding purchase requests.

ICRAF is a member of the United Nations Security system that has designed an area warden system to provide protection to international staff in their residences. The Centre pays for day and night guards for each staff residence and sends in specialists to advise on security for the premises.

The work of the Unit appears to be effective and appreciated, as no issues were brought to the Panel's attention.

5.10 Internal Audit

The Internal Auditor has been at ICRAF for almost four years and appears to be reasonably well established. He prepares his annual work plan in consultation with the DG (to whom he reports directly) and members of the Management Committee and seeks the approval by the Audit Committee of the Board, to whom he also presents his findings at the end of the year. The Internal Auditor also checks that follow-up action is taken by the staff responsible for the operation in question. This will be tracked more systematically in the coming years. He also interacts with the external auditors during the course of their work and has free access to the managers, staff and information needed to carry out his internal audit function.

During the past few years--mainly as a function of his accounting and finance background and the manner in which his responsibilities have been defined by management and Board--the Internal Auditor has focused principally on issues of compliance with financial policies and procedures, particularly at ICRAF's regional offices. He has occasionally conducted an audit of other areas as well, such as the stores' inventory and travel expenses. The reports produced are clear, concise and forthright, for which he is to be commended.

The Panel notes that most of the areas audited deal with routine financial and administrative matters and focus almost entirely on ensuring compliance with established procedures. While this is important, **the Panel suggests that the Internal Auditor also undertake, on a selective basis, an audit of the operational systems themselves--for example ICRAF's policies and procedures in such areas as cost control, management accounting and reporting, human resources and institutional/research management.** This would increase the value added to ICRAF by the Internal Auditor and make the function more challenging and effective.

CHAPTER 6 - ICRAF INTO THE TWENTY-FIRST CENTURY: A Focus on Integrated Natural Resources Management

When land users started blending trees with annual food crop production thousands of years ago, they most likely did so because they could obtain closer to home a better, more appealing diet from fruits and nuts. They also may have enjoyed the shade of trees and other direct, visible benefits from trees on their farms. In many areas, agroforestry started with people introducing annual crops in among trees, rather than introducing trees into agricultural fields. The users of trees, and the farmers leaving the existing trees in the “fields” they created, most likely left them because they liked the fruits and other direct products they could harvest from them – or because it was too much work to remove them. Over time, people learned from experience about the more hidden benefits from having trees in and around the fields - for example, they found that crops growing behind a sheltering row of trees in some areas yielded more, or that they could farm their fields longer before having to move on to clear the next forest patch.

In the early days of agroforestry, population pressure was not a problem in most areas, and shifting cultivation was the norm, rather than the exception in the tropics. Fallows could be as long as needed, because the pressures on land were slight. Fuelwood and building poles were available nearby, and certainly timber was not of interest as products to be grown by people who had very short life expectancies. In sum, agroforestry in the early days likely was a response to quite obvious needs and wants that trees can satisfy. Only later did agroforestry become popular as a means of taking maximum advantage of the biophysical conditions of the soil and the climate. Farmers learned to respond to the environment they faced by including trees in mixed cropping systems that fit the conditions.

As ICRAF has found, trees on farms are still attractive as a response to immediate needs and wants - farmers still plant trees for the fruit and nuts they yield, for the animal feed they produce, for the shade they give, and so forth. ICRAF and its partners are learning more about the interactions of trees with soil, water, nutrients, other crops and pests, and that learning is put into practice to improve on what the farmer has learned and liked from experience. ICRAF understands very well that most of what it can do, on the technical side of agroforestry, is to improve existing practices. In fact, much of the best output from ICRAF research is built directly on existing farmer practices, for example, in the case of the improved fallow work.

ICRAF now, and by design, is focusing more on what did not exist in the early days of agroforestry, namely, the sophisticated and powerful institutional, policy and electronic communication mechanisms that permit rapid and effective transfer of information and knowledge. This can make credit and technology widely available, can provide easy access to technical support in various areas and can provide the means to process and market agroforestry products. These mechanisms, which have been developed only recently in human history, can be backed up by advanced intellectual power that can make adoption of new and improved practices much easier and less risky.

The Panel supports ICRAF in its evolution towards research and development activities related to the introduction of new institutional and policy approaches, watershed and landscape level systems studies and, more fundamentally, improved understanding of all the components along the research to development continuum. ICRAF needs to preserve its basic skills and continue contributing to the understanding of agroforestry on the farm; and its needs to continue its work on understanding the basic biophysical processes that govern tree-crop-environment interactions. However, it also needs to move more into the areas of research that are critical ones for the future of agroforestry, yet more difficult for smaller, less integrated and less multidisciplinary groups to deal with in a realistic and productive manner.

The priority areas for ICRAF's future activity include national and local level institutional and policy issues and the opportunities for many countries to learn through, and benefit from, its synthesis research and other approaches that permit the production of true international public goods. While there always is the need for more and better technology research, ICRAF has recognized that much of the technology already on the shelves of research institutions is far ahead of practice and the ability, resources and motivation to adopt it in the fields. ICRAF is attempting to discover why this is so and doing research on how to overcome the barriers to adoption of new and improved systems. Oftentimes, the barriers prove to be quite amenable to research, and the constraints small and easy to solve through research and development support.

The Panel sees ICRAF's current evolution as being very positive. ICRAF should continue pursuing its more conventional technologically oriented agroforestry research and development activities ("putting improved trees on farms to benefit farmers and the environment"). However, the Panel urges ICRAF to also continue moving more intensively towards:

- **development of a dynamic perspective planning framework** that will permit analysis and prediction related to expected trends and conditions farther into the future than presently considered by ICRAF. ICRAF's evolving integrated natural resources management framework, and its on-going systems analytical work on priority setting and planning, provide a start in this direction. ICRAF should be encouraged to work with others in carrying this work further. The most sophisticated tools and technologies need to be drawn upon in looking into the future to anticipate, detect early and prevent agroforestry-related problems. The present approach is more one of reacting to existing problems with often costly rehabilitation and restoration strategies. Many different types of input are needed in addition to the traditional farm-level biophysical research inputs. Large scale simulation modeling, trend analysis tools, GIS input and social science research to analyze trends and predict developments, are all needed. ICRAF already has in place many of the skills that will be called upon. It also has linkages with other ARIs interested in these problems, although such linkages could be strengthened over time.
- **landscape and watershed level research** to understand interactions. Such research requires significant resources, interdisciplinary approaches, long term presence at sites, and concern for understanding externalities - all conditions that ICRAF and its CGIAR partners can meet but most others cannot or will not meet.

- **policy research** to help countries set the context for agroforestry development. The incentive for countries is that agroforestry can contribute both to increasing rural welfare and to the broader national objective of environmental enhancement and protection, particularly related to soil conservation and prevention of downstream damages from poor land use.
- increasing its and its partners **understanding of all the enabling components along a successful research to development continuum**. ICRAF and others realize that technology development is only the tip of the iceberg, so to speak, if the ultimate goals are poverty alleviation, food security and environmental enhancement. From technology to adoption and implementation is a long way, as evidenced by past experience. ICRAF is beginning to develop an understanding of the appropriateness of varied dissemination and adoption pathways under different social, cultural and environmental conditions.

Toward An Integrated Natural Resources Management (INRM) Research Paradigm: All the thrusts mentioned above require a longer term perspective and a broader view of agroforestry within a more holistic Integrated Natural Resources Management (INRM) framework than is now implied by ICRAF's strategic plan and program of activities. Yet, one cannot avoid moving towards this broader perspective, if the hope is for effective contributions to sustainable development and the goals of the CGIAR over the longer term. The INRM perspective on sustainable development issues is essential and will become more so as the linkages between resource utilization, management, and conservation practices become stronger and more interwoven.

INRM is not a new concept, in fact, it is closely parallel to the ideas that have existed in the field of watershed management for many decades, as well as in some other fields. Basically, the Panel sees INRM as an conceptual organizing framework for considering five key linkages, namely: 1) spatial or scale linkages – e.g., between upstream and downstream land users; 2) temporal linkages – e.g., between present and future generations; 3) institutional linkages – e.g., between different levels of government, between government and the private sector; 4) linkages between resource conserving technologies and productivity enhancing technologies; and 5) linkages between social, biophysical, and other disciplines and sciences. Within the broad organizing framework, ICRAF, has a contribution to make, since it in fact has considered agroforestry already within an INRM framework.

The integrated framework involves inter- or multidisciplinary research. The Panel's view of this approach is one where the partners from different disciplines come together to understand the issue(s) being addressed and the roles of each discipline in a common framework as contributed to by all the disciplines involved. Each discipline then goes off to do the components agreed upon. In a simplified sense the partners then come together again to reach consensus within the common interdisciplinary framework on the issue(s) addressed. In reality, this is an iterative process of successive approximations as the team moves towards acceptable solutions and advancements in terms of the common INRM context.

The Panel stresses here that the outputs of INRM research will for the most part be very relevant for the small-scale farmer or land user, since every day the land user deals with INRM issues facing him or her, i.e., taking advantage of the synergies between all the components in the farm environment, and in the context of the broader institutional environment faced. This

INRM approach is very important for the land user and so critical for survival and success, particularly for the small mixed farming systems of the developing world. The successful ones truly are the practitioners of INRM.

Focusing on Partnerships: The Panel stresses that ICRAF is only one of the entities in the broader mosaic of groups with common interest in the INRM approach and associated issues in the world. As mentioned, many of the other CGIAR centers have equal claim to this thematic area, as do many NARS, ARIs and even non-research focused NGOs. The Panel emphasizes that none of them, including ICRAF, can or should lay claim to dominance and leadership in the whole INRM area. *Effective* partnership is the order of the day, which implies a productive marriage of ideas, activities, actions, *and* responsibilities. Effective partnerships have to start right from the beginning with a “partnership building,” strategic planning meeting of the partners to openly discuss and agree on what is being done and who will do what. The result is communication and understanding of mutual benefits, but not necessarily resulting in equal roles and responsibilities for all. ICRAF brings to the table, in such a partnership, the special expertise on agroforestry’s contribution to INRM and to meeting the associated goals of the CGIAR.

ICRAF cannot do all of this alone, nor is it trying to do so. It needs partners. In some cases, it needs to concentrate on strengthening the capacity of those NARS partners who need such support and are essential partners in the tasks at hand. In other cases, it needs to seek out the best means of strengthening its own capacity by learning and gaining from interactions with other, specialized and advanced research and development institutions. Recognizing that it cannot work with everyone, ICRAF needs to develop a more systematic and analytically based understanding of what makes partnerships productive, and what makes them weak and a drain on resources. ICRAF has made a start in this direction. It should now pursue the task much more directly and intensively, for such understanding should be a key input into its advancing effort to develop an improved planning and priority setting framework.

A network of national and international institutions is required to deal effectively with the related issues described above, and so that sustainable natural resources management issues and options can be researched and developed on an integrated basis across countries and regions, thus producing international public goods. In the case of the CGIAR, centers such as IIMI, CIFOR, ILRI, IFPRI, CIAT, ICRISAT, and ICARDA need to be involved as partners; and ICRAF needs to collaborate more with such other international institutions as IBSRAM, ICIPE, TSBF and IFDC. Indeed, several of the existing Systemwide Programs deal directly with key ingredients of the approach to ICRAF’s future described above. The possible modalities for managing such partnerships are several. In one scenario, ICRAF could be the global contributor of *agroforestry* expertise to INRM research. In another scenario, ICRAF could become a regional node in a consortium of regional centers that all have agroforestry as one of the INRM components.

A future such as envisioned will require increased funding for INRM work (not only for ICRAF, but also for the other partners in various INRM consortia). To bring this about, and to complement and create conditions for achieving the full benefits of INRM research, there is need for large scale and intensive public education programs that will raise awareness of the issues and create the political will to put in place the required resources and policies for a much stronger focus on the issues embodied in the INRM framework. This implies creation of a broader demand for the goods and environmental services from INRM – many of them were

mentioned above, including the global change and biodiversity preservation benefits, the water management, and the energy output and conservation benefits.

Implementation of the INRM approach requires a broadening of ICRAF's perspective on the potential benefits of agroforestry beyond the farmer's fields and home. Above all else, it requires establishment of *effective* partnerships that focus on a "participatory adaptive management" approach to resource utilization and conservation and the contributions that INRM can make to poverty alleviation, food and nutritional security and environmental enhancement.

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Experience: 1967 - 1972: Research assistant at the Institute for Forest Growth and Yield Science, Forest Faculty, University of Freiburg; 1972 - 1980: Forest scientist at the Institute for World Forestry, Federal Research Centre for Forestry and Forest Products, Hamburg; field research in Venezuela, Amazon region, between 1975 and 1980 in total 2 years; 1980 - 1984: Temporary leave. Contract with the German Agency for Technical Cooperation (GTZ); at the "Centro Agronomico Tropical de Investigacion y Ensenanza (CATIE)", Turrialba, Costa Rica; 1984: Retirement from Federal Civil Service (upon own request) and permanent contract with GTZ; 1984 - 1986: Cont: Team-leader of above mentioned GTZ-project at CATIE; 1986 - 1989: GTZ Headquarters in Eschborn, Germany, Department of Forestry and Forest Products. Project coordinator, general management and administration of forestry and forest related projects in Kenya, Yemen, Pakistan, Indonesia, Malaysia, Philippines, China and Fiji Islands. 1989 - 1992: Team leader in Sabah, Borneo, within the Malaysian-German Forestry Research Project, FRIM, Malaysia. Since July 1992: University Professor, Director of the Chair of World Forestry, University of Hamburg, and Head of the Institute for World Forestry at the Federal Research Centre for Forestry and Forest Products (Hamburg). He has been member of various committees such as the German office within the European Tropical Forest Research Network (ETFRN) since 1992, the ATSAF since 1992, Chairman of the Scientific Support Group to the CIFOR-Project Testing Criteria and Indicators for Sustainable Forest Management since 1995; and a member of CATIE Board (Junta Directiva) since May 1998. Speaks and reads: German, Swedish, English, Spanish.

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Experience: 1954-1967: held administrative positions primarily in educational and educational exchange institutions; 1968-1981: served in varied positions with the Institute of International Education, New York, including Manager, Study Abroad Programmes (1968-1975) and Vice President, Educational Services (1975-1981); 1982-1983: Director of Administration, ICARDA; 1983-1998 as independent consultant: conducted recruitment campaigns and carried out management studies relative to organizational structure, administrative procedures, personnel policies, gender equity and board of trustees structure and operations for CGIAR Centres and Secretariat, TAC and Council for International Exchange of Scholars; also managed USAID grants to private voluntary organizations funding public education programmes relating to international development. Member External Review Panel of IITA (1984), CIMMYT (1989), CIAT (1989), IIMI (1990), ICLARM (1995) and TAC Secretariat (1988). Member Board of Trustees, ICLARM.

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TERMS OF REFERENCE
FOR EXTERNAL PROGRAMME AND MANAGEMENT REVIEWS
OF CGIAR CENTRES

BACKGROUND

Context

1. The Consultative Group on International Agricultural Research (CGIAR) is an informal association of over 50 members that supports a network of 16 international research centres in agriculture, forestry and fisheries. The CGIAR aims, through its support to the Centres, to contribute to promoting sustainable agriculture for food security in developing countries. Because the Centres constitute the core of the CGIAR, the effectiveness of each Centre is crucial to the continued success of the CGIAR (as a System).
2. Each Centre is an autonomous institution operating within the mandate assigned to it by the CGIAR, and is governed by a legally constituted Board that has full fiduciary responsibility for managing the Centre. To ensure accountability in an essentially decentralized system, each Centre is expected to be responsive to the CGIAR, which provides financial support for its work.
3. The CGIAR has established a tradition of External Programme and Management Reviews (EPMRs) to provide a mechanism of transparency and accountability to the Members and other stakeholders of the CGIAR System. EPMRs are the joint responsibility of TAC and the CGIAR Secretariat, and are conducted for each Centre approximately every five years. As each Centre is autonomous, EPMRs provide a measure of central oversight and serve as an essential component of the CGIAR's accountability system.

Integrated System of Reviews of Each Centre

4. Besides the EPMRs, Centre Commissioned External Reviews (CCERs) are undertaken at each Centre. These CCERs are commissioned by the Centre Boards to periodically assess the quality and effectiveness of particular aspects of a Centre's work. The terms of reference (TORs) for each CCER are determined by the Centre, based on broad principles endorsed by the CGIAR at ICW95 (ref. document entitled *Improving the Quality and Consistency of CGIAR's External Centre Reviews*, dated October 24, 1995).
5. EPMRs complement the CCERs by providing a CGIAR-commissioned and comprehensive external assessment of the Centre's programme and management, especially its future directions and the quality and relevance of its research. The TORs for the EPMRs (which update the "standard TORs" endorsed by the CGIAR at MTM95) are provided below. Guidelines for undertaking the reviews are issued separately.

TERMS OF REFERENCE

Objectives and Scope

6. EPMRs seek to inform CGIAR members that their investment is sound, or recommend measures to make it so. Members of the CGIAR and other stakeholders can be informed whether the Centre is doing its work effectively and efficiently. EPMRs are both retrospective and prospective; and help ensure the Centres' excellence, relevance and continued viability, and the CGIAR System's coherence. Each review is expected to be strategic in orientation and as comprehensive as the situation warrants.

7. The broad objectives of EPMRs are to: a) provide CGIAR members with an independent and rigorous assessment of the institutional health and contribution of a Centre they are supporting; and b) to provide the Centre and its collaborators with assessment information that complements or validates their own evaluation efforts, including the CCERs.

8. The EPMR panel is specifically charged to assess the following:
 - a. The Centre 's mission, strategy and priorities in the context of the CGIAR's priorities and strategies;
 - b. The quality and relevance of the science undertaken, including the effectiveness and potential impact of the Centre's completed and ongoing research;
 - c. The effectiveness and efficiency of management, including the mechanisms and processes for ensuring quality; and
 - d. The accomplishments and impact of the Centre's research and related activities.

9. The topics expected to be covered by the EPMRs are listed below.

TOPICS TO BE COVERED

A. Mission, Strategy and Priorities

- The continuing appropriateness of the Centre's mission in light of important changes in the Centre and its external environment since the previous external review.

- The policies, strategies, and priorities of the Centre, their coherence with the CGIAR's goals (of poverty alleviation, natural resources management, and sustainable food security), and relevance to beneficiaries, especially rural women.

- The appropriateness of the roles of relevant partners in the formulation and implementation of the Centre's strategy and priorities, considering alternative sources of supply and the benefits of partnerships with others.

B. Quality and Relevance

- The quality and relevance of the science practised at the Centre.
- The effectiveness of the Centre's processes for planning, priority setting, quality management (e.g., CCERs, peer reviews and other quality and relevance assurance mechanisms), and impact assessment.

C. Effectiveness and Efficiency of Management

- The performance of the Centre's Board in governing the Centre, the effectiveness of leadership throughout the Centre, and the suitability of the organization's culture to its mission.
- The adequacy of the Centre's organizational structure and the mechanisms in place to manage, coordinate and ensure the excellence of the research programmes and related activities.
- The adequacy of resources (financial, human, physical and information) available and the effectiveness and efficiency of their management.
- The effectiveness of the Centre's relationships with relevant research partners and other stakeholders of the CGIAR System.

D. Accomplishments and Impact

- Recent achievements of the Centre in research and other areas.
- The effectiveness of the Centre's programmes in terms of their impact and contribution to the achievement of the mission and goals of the CGIAR.

ICRAF'S RESPONSES TO THE RECOMMENDATIONS OF THE LAST EPMR

Recommendations	ICRAF's Responses and Panel's Comments	Score *
<i>1. The Panel recommends that ICRAF develop a more transparent and systematic research programme planning process, including priority setting, monitoring and evaluation. This process must be sensitive to the cross programme issues, regional differences, and the need to build confidence among researchers, partners and donors.</i>	ICRAF's response: ICRAF has developed a detailed process of priority setting, programme planning, implementation, monitoring and evaluation. The steps in this process are outlined in the ICRAF policy document Making the Matrix Work, and described in our 1998-2000 Medium-Term Plan. The process starts with annual regional planning meetings that assess the ongoing activities and plan future work. These regional planning workshops involve all of the partners ICRAF is working with in the region as well as the ICRAF programme leaders based at headquarters. After the Regional Planning Meetings, ICRAF holds its Annual Programme Review (APR) Meeting. This is held every year in September. The outputs of the APR are the work plans for the following year, which are captured in the Annual Programme of Work and Budget (PWB). The PWB lists all activities that are planned, the partners who will collaborate in the activity, the expected outputs and the ICRAF resources (financial and staff time) required to undertake the work. The PWB also provides the basis for establishing the goals and work programme for each scientist at ICRAF, which is then incorporated into their personal assessment form. Monitoring and evaluation is therefore incorporated at two levels: for individuals, as per their annual personal assessment; and at the programme and region level in the following PWB, where expected outcomes are directly measured against real achievements for a given year. Site, regions and programme are also subject to internally commissioned reviews, which are an important evaluation tool for Management. Similarly, the Centre is increasingly articulating quantifiable and time-bound outputs in project proposals that are then easily monitored by donors. In addition to these efforts, ICRAF is striving to further improve both priority setting and the links between priorities and resources allocation. Through this initiative, which involves decision making at the Senior Management, Division, and Region and Programme levels, a more transparent and open process should emerge. Since the last EPMR a new MTP has been produced that involved institutional-level research planning and priority setting at a strategic level and had significant input from staff, management and the Board. Panel's comments: Agreed. ICRAF's APR and PWB are important elements of an (annual) systematic planning and monitoring process. However, there is a tendency to get into too much detail at the project and activity level. As a result, institution-level research planning and priority setting on the basis of longer-term strategic considerations does not receive adequate attention. Cross-programme issues and regional differences/strategies need to be incorporated more systematically into ICRAF's strategic plan and MTP.	1+

Recommendations	ICRAF's Responses and Panel's Comments	Score *
2. <i>The Panel recommends that ICRAF give priority to socioeconomics and policy research by appointing more in-house expertise in social sciences. If ICRAF intends to enter strategic policy or socioeconomics research while at the same time providing the necessary input to the overall ICRAF research process, it will need to appoint at least two researchers in socioeconomics additional to the number specified in the 1992 draft Medium Term Plan</i>	ICRAF's response: Socioeconomics and policy research is one of ICRAF's three pillars of research, and the characterization and policy research work at ICRAF continues to assist in shaping the priorities in the other programmes and projects. We consider technology and policy as sides of the same coin, since most technological improvements require policy reform and vice versa. ICRAF is therefore one of the few IARC's that explicitly combines biophysical with socioeconomic research at the same time and spatial scales. Indeed, the success of our work depends on the two biophysical pillars together with policy research. Furthermore, we recognize that many of the bottlenecks to wider scale adoption of agroforestry alternatives are due to inappropriate policy at the local/community level as well as at the national level. In some regions such as Southeast Asia, the main focus of our programme is aimed at the policy issues related to land and tree tenure, since improved land management will only be practiced when farmers are convinced that they have security over their natural resource base. In November 1995, ICRAF management prepared a document for the Board of Trustees that outlined our position on the Role of Social Sciences at ICRAF (BOT 27 No. 7). Overall, we have consciously expanded our capacity in the social sciences. In 1993, 13 (17%) of the international professional staff were social scientists, whereas in 1997, 20 (23 %) of the same category of staff are of that discipline. This increase is principally due to the recruitment of a policy economist at headquarters in 1997 and an increase in the number of Research Associates (P4 level with MSc. Degrees) who are seconded to ICRAF. In addition, by the end of 1997, ICRAF had recruited approximately 15 national professional social scientists. An additional position for an economist in Southern Africa will also be filled in 1998. Our present Director of Research is an economist, bringing that perspective to Senior Management. All our regional offices have at least one internationally recruited social scientist, except for Latin America, which at present has a nationally recruited social scientist. We are looking for additional funds to overcome that gap. ICRAF aims to continue to increase the percentage of senior social and economic scientists. Panel's comments: ICRAF has made commendable progress in incorporating the socioeconomic and policy perspectives into its research programme. However, ICRAF is still oriented towards elements more than to systems. This applies mainly to regional or ecosystems, but also in part to farming systems. In the case of the latter, ICRAF has responded to this recommendation but not sufficiently to enable coverage of economic, social and policy aspects connected with broadening of scope. A socioeconomist is also required for Programme 2 to look into aspects of marketing, market intelligence, value addition, private sector collaboration, output delivery, etc. Programme 2 needs are of high priority, as trees of high value will produce marketable products. This person should have an input in the regional programmes also.	

Recommendations	ICRAF's Responses and Panel's Comments	Score *
3. <i>The Panel recommends that ICRAF strengthen the two steps in its research process, which seek compatibility between agroforestry technologies and production systems:</i> <i>The understanding of target production systems, including time-related resource use patterns and gender issues</i> <i>The specification of time-related resource use requirements of each management option for candidate agroforestry technology.</i>	ICRAF's response: ICRAF has made major progress in the ex-ante characterization of target production systems, including specific studies on indigenous knowledge, wealth ranking, gender issues, the temporal and spatial constraints to labour use and financial analysis. This has been particularly relevant when working with farmers in the adoption of improved fallows and leguminous fodder for smallholder dairy production. The joint results obtained from both farmers and researchers have provided a better fit of the new technologies with farmer resources. The development of research activities in land-use dynamics and the creation of a GIS / remote sensing laboratory (now called Decision Support System Laboratory), have enabled ICRAF to substantially increase its understanding of target land-use systems, their constraints and potential for agroforestry adoption. Panel's comments: There is a significant increase in the understanding of the production system at farm level and the compatibility of agroforestry technologies. Corresponding statistics based on monitoring provide the supporting evidence. It is not easy to judge how far the models are used or if input data are at hand for analysis of long-term impacts due to a variety of induced changes. ICRAF's approach is directed to existing situation and present problem scenarios.	2-
4. <i>The Panel recommends that the Board and Senior Management should review ICRAF's expansion plans to ensure that these will not interfere with the further enhancement of science quality.</i>	ICRAF's response: ICRAF has expanded its activities since 1993 in line with the plans as outlined in the Medium-Term Plan 1994-1998. The number of international professional staff (including secondments) has increased from 76 in 1993 to 88 in 1997. The budget has expanded from US\$14 million in 1993 to US\$23 million in the same period. ICRAF has also successfully established its presence in Latin America and Southeast Asia. At the same time, we have expanded our physical campus in Nairobi by more than doubling the space at headquarters, which now include research laboratories. However, over this period, Management has taken steps to assure that ICRAF's staff and activities are not spread too thin. ICRAF staff have been consolidated at central sites in the Sahel (Mali) and humid West Africa (Cameroon) and the number of sites has been reduced in Southern Africa. Activities at the Machakos Research Station have also been scaled down. Further a policy of 'no geographic expansion', agreed in 1995, and has been firmly adhered to, despite pressing requests from several donors for ICRAF to operate in new countries. To ensure that activities can be implemented and outputs generated as planned, the Centre takes care to budget only on firm agreements with donors, and to ensure an overall ratio of 60:40 staff to operational funds. Over this period, ICRAF has also paid great attention to increasing the quality of our output and services. The increased quality of research is reflected in the quality of our publications (note the ICRAF Annual Report) and the increase in the number of internationally refereed journal articles that ICRAF staff have published. ICRAF's work is also cited more often by other scientists and scientific establishments (see EPMR document 10 prepared by the Information Support Unit, 'The literature generated by ICRAF's research: a preliminary impact assessment'). Similarly, we have sought to improve the efficiency of our operations by implementing clearer administrative procedures, supporting field scientists with financial and administrative staff, increasing the number of Human Resources Specialists, and seeking better ways of planning and executing research and development activities with	2-

* 0 - Not implemented; 1 - Partially implemented; 2 - Fully implemented

Recommendations	ICRAF's Responses and Panel's Comments	Score *
	our partners. In short, we are satisfied that we have significantly improved the quality of our work while retaining its relevance to the needs of smallholder farmers in the tropics. Panel's comments: ICRAF has followed a sensible policy of geographical expansion, but its programmatic growth has, in some instances, resulted in staff being spread too thin e.g. in HULWA and LA Regional Programmes. Quality of output has generally been good to excellent, especially in the areas of policy research, soil fertility, tree ecophysiology and systems evaluation.	
5. <i>The Panel recommends that the Board consider establishing the position of Deputy Director General for Research and eliminating the current position of Director of Research.</i>	ICRAF's response: At the time of the EPMR report, the Board did not see any justification in establishing the post of Deputy Director General for Research and informed the EPMR Panel of their views. The issue was discussed again as ICRAF prepared the Medium Term Plan 1998-2000. Again senior management did not see any justification in creating the post of DDG Research. Panel's comments: The Centre currently has Directors of Research and Development. The Panel agrees that these are appropriate positions, and that there is no need for a DDG Research position.	0
6. <i>The Panel recommends that an additional biometrician be appointed now to maintain essential research support and strengthen science quality</i>	ICRAF's response: ICRAF appointed a second internationally recruited professional biometrician in 1995. In addition, the biometrics unit has been strengthened with two national professionals at headquarters. In 1997, an additional biometrician was supplied to ICRAF as a DfID-sponsored Associate Professional Officer. ICRAF has also developed arrangements with IARC's based in the respective ecoregions where ICRAF is active to provide biometrics support to our field operations. This has occurred with ICRISAT in the Sahel (SALWA), CIP for our Latin America programme and CIFOR in Southeast Asia. ICRAF has also worked closely with other international centres in designing and delivering training courses in experimental design and biometrics in all of the ecoregions where we work and in the principal working languages of the regions. Panel's comments: Additional biometrician is not required as the present situation satisfies the needs. Most of the staff are conversant with research methodologies. Further, most of the regional programmes are serviced by other CGIAR Centres, and also by regional NARS.	2
7. <i>The Panel recommends that the Board request Management to submit a financial strategy for the next five years that covers alternative scenarios, identifies potential sources of funds (CGIAR and non-CGIAR) and describes the specific steps to further improve its financial condition</i>	ICRAF's response: Since 1993, Management has held regular discussions with the Board of Trustees on the issue of resource mobilization. The Board and Management have established a sub-committee to explore various options. Several discussion papers have been prepared and thoroughly discussed by the Board. During the past five years, ICRAF's resource mobilization strategy has focused on securing restricted grants from donors to fund components of our MTP and PWB and to widen the donor base, including the private sector. To achieve this, in 1996 ICRAF established a Projects Office which develops and tracks project proposals with donors and monitors all of the reporting requirements to donors on all approved projects. Currently ICRAF has over 100 project proposals under discussion with donors and about 85 projects that are funded as restricted grants. As a result of this effort, the major part of the expansion of our budget during the past 5 years has been from restricted grants. Currently ICRAF Management and Board are examining different options for the next five years, recognizing that the existing strategy is not likely to be sustainable in the medium term. Panel's comments: Resource mobilization remains a continuing concern at ICRAF (as at other CGIAR Centres) despite the	2-

* 0 - Not implemented; 1 - Partially implemented; 2 - Fully implemented

Recommendations	ICRAF's Responses and Panel's Comments	Score *
	considerable efforts by the management and staff. The funding situation is not likely to improve substantially in the next few years. Hence continued attention to resource mobilization strategies would be essential. The ICRAF Board and management are already taking steps to maintain a sound financial position for the Centre. A five year financial strategy was not developed, but the Projects Office was established, and a resource mobilization plan is being developed by management and Board. ICRAF plans to invest considerable resources in resource mobilization activity although it hopes to benefit from Ford support of a fundraising consultant who will shortly visit the Centre.	
8. <i>The Panel recommends that the Board approve an investment policy for ICRAF.</i>	ICRAF's response: ICRAF developed a financial strategy that was approved at the 29th Meeting of the Board of Trustees in April 1996. Included in the strategy is a policy on developing an Operating Fund, previously referred to as working capital, whereby ICRAF must retain up to three months of operating expenses in the Operating Fund. The target for this is US \$ 4.0million and is expected to be achieved by December 2000. ICRAF has also fully accrued for termination benefits and repatriation costs for all staff. Panel's comments: The policy needs review. It will be both impossible and unnecessary to reach a target of \$4 million by 2000.	2
9. <i>The Panel recommends that ICRAF develop as soon as possible a joint strategy with the NARS for devolution of ICRAF's country level agroforestry research to the appropriate NARS, while maintaining a strong support role through regionally based teams and headquarters staff.</i>	ICRAF's response: ICRAF developed a strategy with NARS on the issues of partnerships in agroforestry research and development. The strategy was then transformed into a policy document (Policy Document No. 4) and approved by the Board of Trustees. It remains the main policy guideline that outlines the criteria and principles that shape ICRAF's philosophy on partnership with NARS. ICRAF continues to recognize the importance of collaborative research with NARS and other partners. We also continue to see that we have a role to play in assisting to strengthen NARS' capacity to undertake agroforestry research. Finally, as the capacity of NARS to implement agroforestry improves, their role in the management and implementation of regional programmes will increase and ICRAF's presence in these regional programmes will be increasingly one of research partner. Devolution has taken place at all sites in Senegal, Burkina Faso, Niger and Brazil, and at specific sites in Tanzania (Tabora), Zambia (Chalimbana) and Zimbabwe (Makoholi). In line with this trend, ICRAF has worked with NARS institutions to support them in providing general introduction to agroforestry training courses. This has allowed NARS to take over the responsibility and ICRAF to concentrate its training programme on specialist courses. Panel's comments: CRAF's partnership approach is sound, and it has significantly improved its regional presence. However, it does not yet have a long-term strategy for shared research partnership with NARS. For the time being it seems more important to clearly define what is devolution, when and how to apply strategies for implementation. Quality of collaboration behaviour is a different aspect of this same process that needs further attention. The Panel comments extensively on this issues in various sections of Chapter 3.	1

* 0 - Not implemented; 1 - Partially implemented; 2 - Fully implemented

Recommendations	ICRAF's Responses and Panel's Comments	Score *
10. <i>The Panel recommends that ICRAF's Board propose to CIFOR's Board a joint approach to seek complementarity. This would identify areas of work in the forestry-agroforestry continuum, which is the sole interest of one or the other centre</i>	ICRAF's response: In general terms, CIFOR deals with issues related to natural forests and plantation forestry. ICRAF deals with trees in farming systems, or those areas that fall outside forestlands. There are clearly areas of potential overlap, and both institutions have seen this as areas of opportunity for collaboration. In 1994, ICRAF and CIFOR prepared a common statement to outline these areas of difference and commonality. In 1996, CIFOR completed its longer-term strategy and both institutions have recently completed their respective Medium Term Plans (1998-2000). During the past five years, the area of closest collaboration has been in the systemwide programme dealing with Alternatives to Slash and Burn (ASB) agriculture. CIFOR and ICRAF have clearly defined roles to play in ASB, based on their comparative advantages. This collaborative work is taking place in Indonesia and Brazil. Recently ICRAF, CIFOR, CIAT and IFPRI have decided to join forces to develop a common strategy in the Peruvian Amazon, based in Pucallpa, Peru. Again, ICRAF and CIFOR have clearly defined roles to play in these consortia, based on the common strategy and each other's comparative advantage. The Directors General of ICRAF and CIFOR meet and talk regularly, and thereby prevent issues arising and are quick to iron out any problems as they arise. The Board Chairs of each centre sits on the Board of the other to report on activities from their centre and influence the programmes of each. Further, in 1997, both CIFOR and ICRAF decided that it was timely for the respective Directors of Research to meet annually, to exchange information and identify additional areas for collaboration. Finally, ICRAF's Regional Office for Southeast Asia is based on the campus of CIFOR's headquarters in Bogor, Indonesia. ICRAF is satisfied that different but complementary roles have been clearly identified for each institution and that good working relationships have developed to ensure close collaboration exists. Panel's comments: ICRAF and CIFOR have taken a number of steps to ensure that their programmes are complementary, and that areas of overlap are reduced as far as possible. There is much room for intensive collaboration as all basic requirements are in place.	2-

ICRAF'S REGIONAL AND GLOBAL PROGRAMMES AND SUPPORT UNITS

This Appendix provides a descriptive summary of ICRAF's six regional programmes, five global programmes, the two Systemwide ecoregional programmes coordinated by ICRAF (Alternatives to Slash and Burn and the African Highlands Initiative) and the support units attached to the Research and Development Divisions.

SIX REGIONAL PROGRAMMES

HUMID LOWLANDS OF WEST AFRICA (HULWA) REGIONAL PROGRAMME

Context: In 1986, ICRAF and the Institut de la recherche agronomique (IRA) made a decision to undertake collaborative agroforestry research in Cameroon in order to develop alternatives to the traditional practice of shifting cultivation in the humid lowlands of West Africa. The programme was designed to focus on the reduction of deforestation and the alleviation of poverty through promotion of high-value agroforestry. It built upon agroforestry-related research and development activities, mainly related to alley cropping (started by ICRAF in Cameroon), undertaken by IITA in the 1970s. The original strategy was to seek partnerships with national and international research organizations so as to pursue an integrated, holistic approach.

In March 1987, the IRA/ICRAF Collaborative Agroforestry Project was established, thus creating the nucleus of the Humid Lowlands of West Africa (HULWA) network. Cameroon was included in the global ASB programme with three benchmark sites (at Yaounde, Ebolowa and M'Balmayo), with the intention of subsequently expanding to other countries within the West Africa region. The Project's mission was: (a) to mitigate deforestation and the loss of bio-diversity and contribute to poverty alleviation; and (b) to strengthen NARS capability in natural resource management research and development.

Since the beginning of the regional programme, ICRAF staff have been based at IRA (now IRAD). At present, the Regional Coordinator is stationed at the HULWA office, together with one other international staff member, one seconded scientist, and ICRAF support staff. They share facilities with IRAD collaborating staff.

Planning: HULWA has strong programmatic links with ICRAF's Programmes 2 and 4. IRAD leads and coordinates research planning and implementation. An internal inter-programme review in 1993 identified five priority areas of research, four of which have been maintained: improved fallow systems; tree domestication; diversification, comprising assessment of natural resource management options and resource policy development; and capacity building. Closer collaboration with IITA and ILCA was also recommended.

Since 1993, IRAD and the national research system in Cameroon have become stronger. The Ecoregional Programme for the Humid and Sub-humid Tropics of Sub-Saharan Africa (EPHTA) was launched in 1996 as a CGIAR ecoregional initiative to support partnerships among forestry and agricultural research institutions of the humid and sub-humid regions of

Africa. At the ICRAF regional meeting in 1996, major research results were reviewed, and activities and strategies for further collaboration were identified.

Links: HULWA was created to cover one of the four AFRENA regions. The original idea of expanding the programme within the West Africa region and establishing collaboration with a number of ARIs, NARS and NGOs has not been pursued. Although IRAD became the main partner organization, and some interactions were initiated through IITA with several NARS (e.g., in Nigeria and Ghana), the anticipated close collaboration with IITA has not materialized, and links with ILCA (now ILRI) were not established. As recommended in the 1993 EPMR, however, the activities in technology transfer are lead by local NGOs.

Programme 2 activities in this region are carried out in collaboration with Kew, the Scottish Crop Research Institute, the Oxford Forestry Institute, WWF and Cameroon's Ministry of the Environment and Forests. A joint proposal on livestock management was prepared with ILRI in 1996, to be implemented under EPHTA. Research collaboration has focused on partnerships with IRAD, IITA and the Office National de Developpement des Forets (ONADEF) for field trials on improved multi-strata agroforestry systems. This, together with the research on improved fallows, constitutes a direct contribution to ASB and EPHTA, the two Systemwide initiatives through which HULWA is linked to NARS and IARCs.

However, HULWA's research and development activities have remained limited; activities relevant to the agendas of Programmes 1, 3, 4 and 5 has been accomplished mainly by IRAD, IITA and TSBF. Since IITA has been the regional lead agency within the global ASB since its inception, and since ICRAF will contribute to the ASB largely through Programme 2, there are no plans to expand HULWA's present activities outside Cameroon.

Accordingly, funding is being reduced; it now totals US\$0.5 m for all themes (of this, more than 50% is from core funds). The decision by ICRAF to concentrate on tree domestication is thus a logical step, based on its comparative advantage and the fact that this will represent a major new contribution to ASB.

Management: By the end of 1998, the Regional Coordinator will be stationed at Nairobi, leaving two ICRAF staff, who may be posted at IRAD in 1999; the seconded scientist will likely leave ICRAF at the end of that year. In short, only one ICRAF international staff member will remain with HULWA to be responsible for the management and research activities of Programme 2 in the region. Although the MTP for 1998-2000 includes an additional position for a policy economist for 1999, this recruitment is frozen for the time being.

Output: Significant results have been achieved in the on-station and on-farm trials for improved fallows. The first on-station trials were established in 1988 and have been successively refined in design and implementation. The results from these long-term trials show clearly that the crop-improved fallow rotation system will result in higher maize production. Multi-strata agroforestry systems have shown encouraging results as well and are well received by both scientists and farmers as alternatives to slash and burn agriculture. Promising tree species for domestication have been identified for further investigation. In particular, *Calliandra* provenances have been successfully integrated on farmlands, and *Prunus africana* is one of the target species.

Capacity building has been done through in-service training of one to three months for individual scientists and staff from national organizations and NGOs as well as through degree-related training. Over 100 technicians have participated in courses organized through this programme. Opportunities for field study have been provided to 35 BSc, five MSc and three PhD students.

Future: ICRAF management has decided that HULWA will be discontinued as a regional programme but will become an activity within Programme 2, contributing to ASB and EPHTA. Emphasis will be given to the diversification and intensification of sustainable land use through domestication of agroforestry trees. This will help focus the research on an area of distinct comparative advantage in an important Systemwide initiative and ecoregional programme. Strengthened collaboration with IITA will further enhance the quality and impact of the overall development effort and will provide the basis for continuing activities of Programme 2, thus facilitating ICRAF's research and development activities in the region.

SEMI-ARID LOWLANDS OF WEST AFRICA (SALWA) REGIONAL PROGRAMME

The SALWA programme (the AFRENA for the Sahel) covers four countries in West Africa: Burkina Faso, Mali, Niger and Senegal.

Context: The mission of the programme is to develop sustainable natural resource management options that will help alleviate poverty, decrease desertification and ensure food and nutritional security in the Sahelian region. The objectives are to develop agroforestry technologies and systems that are effective and efficient for local farmers, given both water and nutrient requirements and limitations in the region. In the process of addressing this overall objective, the programme aims to influence agroforestry-related policy in the region and help strengthen the capacity of local partners.

The programme's mission and objectives are being implemented through four agroforestry themes:

- rehabilitation and sustainable management of parkland systems through tree domestication, soil water conservation and nutrient replenishment;¹
- intensification and diversification of agricultural production through live hedges;
- fodder production and utilization; and
- capacity building and institution strengthening.

The programme evolved in 1994 by consolidating all ICRAF staff posted individually in the member countries at one site in Samanko, near Bamako, Mali.

Planning: Within the past couple of years, there has been a consolidation of activities and a narrowing of focus to concentrate on the most relevant issues and agroforestry systems in

¹ Traditionally, farmers preserved useful tree species on their farmland to provide them with some of their daily nutritional needs and cash income. This system is what is commonly referred to as "parklands." This is the dominant agricultural system in the region.

the region. The programme is evolving and changing and will increasingly do so in the future, now that an expanded funding base appears likely. A draft strategy document for the region is being prepared. Prioritization of activities takes place through input and feedback from regional planning and evaluation workshops. Input from these sources is considered in the context of ICRAF's MTP and its mission and objectives, and the annual and medium-term plans develop accordingly, subject, of course, to funding availability.

Funding prospects for the programme appear to be good, and management foresees a programme with funding in the US\$1 to 2 million per year range. However, past funding constraints have meant that the staffing of the regional team has been incomplete, for example, in the areas of soil fertility replenishment and tree domestication, now that the Regional Coordinator post is full time. It is anticipated that these constraints will be overcome in the near future as a more solid funding base is put in place.

Links: Initially, the programme had collaborative arrangements mainly with the traditional NARS. Recently, however, the partnership base has broadened to include educational institutions and NGOs. A number of country institutions in the region have signed MOUs with the programme.

The SALWA programme represents ICRAF's contribution to implementation of the International Convention to Combat Desertification. It also represents ICRAF's participation in the CGIAR Systemwide Desert Margins Initiative (DMI), led by ICRISAT. Other centers involved in the DMI include ILRI, the Institut du Sahel of CILSS, the SAFGRAD programme of the Organization of African Unity and CORAF. It should be noted, however, that so far no significant funding has materialized to support the DMI.

Management: The programme is managed by the Regional Coordinator, located in Samanko, near Bamako, Mali. Headquarters' staff from global Programmes 1, 2, 4 and 5 make inputs into this regional programme. Programme 4 has a staff member in the region, as does Programme 1. The Economist from the latter Programme is being replaced shortly. Links with (ANAFE) are maintained through Programme 5. The programme has eleven field sites: one in Burkina Faso, three in Niger, two in Senegal, and five in Mali. There are ICRAF paid support staff at all sites.

Outputs: The programme has had a few direct research outputs despite the intractability of the problems in this region. However, at the same time, ICRAF's technical backstopping and advice in the region have contributed to a number of solid research results and outputs from partners, with ICRAF input as detailed, for example, in ICRAF's most recent annual report. The outputs relate to work with *Pterocarpus erinaceus*, *Faidherbia albida*, *Parkia biglobosa* and a number of other species as well as work on understanding the dynamics of social changes in the region. Section 2.4 of the Panel's report covers the main achievements of the programme over the past five years.

Training and capacity strengthening also have been major areas of focus. Thus some 216 persons working in agroforestry and related areas had received training as of July 1997. Additionally, some 15 professionals have received support and assistance at the university and postgraduate levels.

Future: Eventually, once solid funding and research bases have been established in the existing four countries, the programme will explore whether there is potential to expand into most or all of the SILS countries. In the meantime, it is intended that work will continue on

the earlier discussed themes related to parklands management, fodder production and utilization, live hedges and capacity and institution strengthening.

EAST AND CENTRAL AFRICA (ECA) REGIONAL PROGRAMME

Context: The programme was initiated in 1987 and currently focuses on the highlands of Kenya, Uganda, Rwanda and Burundi, representing about 23% of the land area of the region. The initially high agricultural potential has been depleted in much of the region by high population densities, resulting in land fragmentation and continuous cropping in the two rainy seasons with virtually no fertilizer use. Fodder and fuelwood are scarce.

ICRAF's agroforestry interventions in ECA are aimed at enhancing soil fertility and productivity, diversifying land use (including growing fodder tree legumes for small holder dairy production) and integrating high value trees into the landscape. Policy research focuses on development of spatial decision support systems and modeling of integrated nutrient management. Pilot research and development projects in Kenya are based at Embu and Maseno (collaborating with KARI and KEFRI). Short-duration improved fallows and biomass transfers are being tested as the means to improve soil fertility. Shrub and herbaceous legumes and nutrient-rich plants such as *Tithonia diversifolia* are being compared for their efficacy in capturing nutrients from the deep soil. Different forms of phosphorus are being compared for their role as fertilizers for nutrient replenishment, along with the development of a farming system involving legume shrubs that enrich the pool of nitrogen in the soil available to the plant. The main themes of the programme are poverty alleviation and natural resource management.

In 1997, ICRAF's research activity in the semi-arid tropics of the region, mainly based at Machakos in Kenya, was terminated (except for the completion of some postgraduate studies). The main thrust of the programme in Uganda and Rwanda is on soil conservation and terrace management through agroforestry interventions. There are five internationally-recruited staff (IRS) posted in the region and a Regional Coordinator based at headquarters. Since 1998, one IRS member has been posted in both Rwanda and Uganda, one in Embu and two in Maseno, Kenya, and much additional support is provided from Programme staff at ICRAF headquarters.

Planning: The ECA-AFRENA steering committee meets annually to plan regional activities but does not deal with bilateral project funding. Much of the ECA programme activity contributes to the ASARECA African Highlands Initiative (AHI), which is also coordinated by ICRAF.

Links: The programme has close links with NARS on a formal basis, mainly through the research stations. The links to other CGIAR Centres are mainly through the AHI framework, but ILRI's programmes in the region also complement part of ICRAF's agenda. The pilot project at Maseno is a collaboration with KEFRI, but it also works with KARI, the national agricultural extension system, several NGOs (mainly CARE and the Organic Matter Management Network) and TSBF. There are about 70 staff at the Maseno station, including eight scientists from KEFRI and KARI and seven from ICRAF.

Management: Operational funds for the KEFRI and KARI components of the pilot projects come directly to these organizations. Funds to build the station at Maseno, where

ICRAF staff are also housed, were obtained jointly with KEFRI. ICRAF's activities in the pilot projects are funded from both unrestricted and restricted core funds, including funds from KARI. The detailed work plans for the Maseno pilot project, which operates at three districts in Western Kenya, are developed by staff of various ICRAF Programmes in collaboration with KEFRI and KARI staff. The level of input from NARS partners in the on-the-ground activity varies with the project. Some components operating from Maseno (e.g., the soil microbiological characterization and some of the soil analyses) are overseen by KEFRI, but the financial support for these can be a limiting factor.

The Embu and Maseno stations have both attracted seconded staff from donor countries and postgraduate students. Operational funding for these scientists often comes from unrestricted core (particularly in Programme 3) and at times has been insufficient.

Outputs: The work at Maseno has concentrated on the management of nutrients, and a good understanding of the factors affecting soil fertility and ways to ameliorate this has been obtained. Ways to manage erosion using agroforestry approaches have also been demonstrated. In a trial conducted over seven seasons, improved fallows with *Sesbania sesban* produced an increase in on-farm yields of maize cf. continuous maize, but adding P fertilizer greatly, and economically, increased this benefit. On-farm testing of these technologies and their dissemination is now a major thrust of the pilot project, with more than 1,500 farmers involved in 17 villages. The ways to use fertilizer, particularly different forms of P (including rock phosphate available in the region), to build up the productivity of the farming system is an ongoing area of concentration. Screening germplasm for root knot nematode resistance has identified some lines of *S. sesban*, *Crotalaria* and *Tephrosia* that are tolerant or resistant.

At Embu more emphasis has been placed on fodder in smallholder dairies and control of erosion by boundary plantings and contour hedges of *Calliandra calothyrsus*. Over 200 NARS scientists have been trained since 1993, and 20 postgraduate traineeships have been awarded.

Future: The key issues relating to the sustainability of the farming systems that still need to be addressed by ICRAF are the variation in the soil nutrient depletions and their status in the ECA Region, the testing of technologies developed and the willingness of farmers to adopt them when there is less intensive project support. The capacity of farmers with different levels of financial and other resources (including ownership status) to adopt new technologies will also be monitored. Transfer of the responsibility for these more development-oriented aspects to the NARS is a priority issue. ICRAF will be using a systems analysis approach to both document and model the change in status of soil fertility depletions and land productivity over time as agroforestry interventions are adopted. The effect of land use changes on the patterning of activities in the landscape and the effects these changes have on watershed-scale events will be assessed. The capacity building aspects of ICRAF's activities in the region, through collaboration and postgraduate student and scientist training, will be another important area for future impact.

SOUTHERN AFRICA (SA) REGIONAL PROGRAMME

Context: ICRAF's activities in Southern Africa began in 1985, initially with advice to NARS in the Zambesi Basin following diagnosis of the problems facing agricultural production in the region. This focussed on the role of agroforestry in overcoming these constraints, particularly in the area of integration of the maize and livestock production systems, low soil fertility status and scarcity of fuelwood. The region has a mean annual rainfall ranging from 800 to 1200mm and altitude from 600 to 1200m. Population growth exceeds 3% and threatens food security with the need for maize imports increasing rapidly. Research has focussed on improved fallows and intercrops based on shrub legumes; fodder for rural and peri-urban dairy systems, fuelwood from fallows or rotational woodlots and domestication of indigenous fruit trees. On-station experiments began in Zimbabwe, Tanzania, Zambia and Malawi in 1987, leading to on-farm research and tests of best-bet technologies from 1992. The on-farm activities have increased rapidly since 1997 developing the participatory approach to technology transfer through facilitating the formation of farmer groups. The present international scientist staffing is one from Programme 3 at Chipata, Zambia; one from Programme 4 at Shinyanga, Tanzania servicing also the Tabora region; one each from Programmes 2 and 5 at Makoka, Malawi with one from Programme 1 to be stationed in Zimbabwe in September 1998. These staff are supported by six national professionals, twelve scientists seconded by governments and two from donor countries, a regional total of 26.

Planning: Research, extension and capacity building activities are reviewed and planned through regional workshops, the 11th one held in 1997 at Chipata with over 70 participants from partner institutions, four regional universities, NGOs and ICRAF. The proceedings are published by ICRAF under the auspices of the Zambesi Basin Agroforestry Project. National AFRENA steering committees establish detailed research plans and fund allocations and review progress. The production constraints researched vary among countries. ICRAF country programmes have produced detailed annual reports and outlines of the programme activity on Miombo indigenous fruit research and on regional dissemination and development. A very comprehensive Regional Progress Report to March 1998 outlines ICRAF staff activities, constraints, outcomes and plans. The closest links are currently with headquarters Programmes 2, 3 and 4 but the posting of an economist from Programme 1 in Zimbabwe during 1998 will broaden this and strengthen the policy research. The IPG outcomes of the regional programme relate to the maintenance of biodiversity and carbon storage as a component of climate change through reduction of the logging and the conversion of the Miombo woodlands to farmlands. Across the region there has been an evolution from predominantly on-station research to a more on-farm, participatory research and development orientation.

Links: The Regional Coordinator was originally stationed in Lilongwe, Malawi, but has now relocated to the Makoka Research Station near Zomba in Southern in Malawi. In Malawi, ICRAF collaborates principally with the Ministry of Agriculture, the Departments of Agricultural Research and Technical Services and of Extension Services, the Forestry Research Institute, the University of Malawi Bunda College of Agriculture, the Chancellor College Departments of Chemistry and Food Science and Technology, PROSCAP and the Rockefeller Foundation. The ICRAF offices have recently been built on the Makoka Agricultural Research Station. In Zambia, ICRAF has built offices and a laboratory on the Msekera Research Station of the Soils and Crops Research Branch of the Department of

Research and Specialist Services, Ministry of Agriculture, Food and Fisheries. Msekera is near Chipata in the Eastern Province. There is collaboration with the Soil Conservation and Agroforestry Extension Project, the Lutheran World Federation, World Vision International, many other NGO's and the Forestry Department. In central Tanzania, ICRAF operates from the Hifadhi Ardhi Shinyanga (HASHI) in Shinyanga and supports the Agricultural Research and Training Institute, Tumbi, serving the Tabora regions. It supports the natural resource management project, collaborates in training students from the Sokoine University of Agriculture and the University of Dar-es-Salaam, with the Tanzania Forestry Research Institute, World Vision International and the Moravian Church. In Zimbabwe, ICRAF operates from the Headquarters in Harare of the Department of Research and Specialist Services of the Ministry of Agriculture, with field work at Domboshawa and Makoholi. There is some collaboration with the University of Zimbabwe, CIMMYT and ICRISAT. The links with the CIFOR office in the University of Zimbabwe will be strengthened by the posting of the ICRAF policy economist to Zimbabwe in September, 1998.

Management: Links with headquarters in Nairobi are maintained by visits from Programmes 1, 2, 3 and 4 scientists to assist in planning research and establishing appropriate methodologies. These may not have been frequent enough in the past to evaluate critically and advise on the country experimental programmes, particularly from Programme 2, but this is currently less of an issue. There is good support with laboratory analyses and statistical advice, including site visits. Unrestricted core funds have been used to support seed collections, e.g., of *Tephrosia spp.* The regional management operates through the regular steering committee meetings and visits by the Coordinator, but the national steering committees have met less frequently. This is now being addressed. Financial control systems are being put in place following the devolution of the management of funds to the regions. Although the overheads for the Zambesi Basin Project are set at 10%, the time spent by headquarters staff in the region and travel costs are charged to the respective project. The Regional Coordinator will in future be undertaking increased responsibility for relations with donors.

Outputs: A major output has been the confirmation that farmer planting of improved fallows of *Sesbania sesban* in the impoverished soils of the region can result in greatly increased yields of several subsequent maize crops. This produces a much improved economic return to the farmers for their labour than for continuous maize, with or without the input of costly fertilizers. Use of the stems for fuel is an ancillary benefit. The increase in prices of fertilizer following structural adjustment programs has much increased the impact of the improved fallow technology on rural poverty and food security. The demonstration of the potential to use *Gliricidia sepium* for soil fertility enhancement is also important, although the systems aspects of this are still being developed. Adoption of the rotational woodlot system using the Australian species, *Acacia crassicarpa*, *A. leptocarpa* and *A. julifera*, will do much to reduce the destruction of the Miombo woodland for fuel, particularly for curing tobacco in Tanzania. The potential wood yield from these Australian acacias is 112t/ha in three years, whereas the Miombo woodland produces about 60t/ha in 30 years. Newly introduced species such as psyllid tolerant *Leucaena spp* and *Acacia angustissima* have also shown promise for fodder production

Over 7,000 farmers have now planted the improved fallows or fuelwood species in the region.

Germplasm collections have been made of the promising indigenous fruit trees *Uapaca kirkiana* and *Sclerocarya birrea*. Evaluations have shown that several Miombo fruit trees are easy to propagate and bear fruit within two years of planting.

The region has been active in recording the results of work done with 57 journal articles, 30 conference papers and numerous other reports and notes since 1992.

Future: Once an extension methodology is “proven” on a pilot scale, then the strategy is that other, more development-oriented, agencies will undertake more widespread dissemination. Such a pilot testing of improved fallows is being developed with World Vision International for southern Zambia. The policy research to be conducted by ICRAF from Zimbabwe will provide an important strengthening of the priority setting and rationalization for ICRAF’s regional activity.

LATIN AMERICA (LA) REGIONAL PROGRAMME

Context: ICRAF’s activities in Latin America are located in the selva of Peru (Pucallpa and Yurimaguas), the state of Quintana Roo in Southern Mexico and the western Amazonian states of Rondonia and Acre in Brazil—all representative of the lowland tropical forest agroecosystem. Pucallpa serves as the consolidated regional headquarters, with staff located at INIA’s CENFOR station. This ecoregional centre has just been refurbished with Spanish funds and inaugurated; it houses under one roof staff from ICRAF, CIFOR, CIAT, CODESU and Winrock International. Three international staff are posted there, working with approximately eighteen national professional and support staff, including several in Yurimaguas. One additional international staff, two consultants and five national staff are located at Chetumal in southern Mexico.

The regional office is fairly new, having been established in 1993, when Peru and Brazil were selected as ASB benchmark sites. Originally, one ICRAF scientist was posted in Brazil to work with EMBRAPA and one in Peru to work with INIA, but staff had to be withdrawn from Brazil due to the shortage of funds in 1995. Nonetheless, the experiments initiated there are still being supported and monitored.

Almost all of the research conducted in the Latin American Region is concerned with identifying best-bet alternatives to slash and burn agriculture. Specifically, staff work to:

- improve understanding of the land- and resource-use dynamics;
- increase and diversify sustainable production systems at the farm scale;
- through use of farmer participatory methods, develop improved agroforestry production systems for soil fertility maintenance and replenishment (short-term fallows in rotation with annual crops);
- reduce the degradation of secondary and residual forests (long-term enrichment fallows);
- increase the sustainability of livestock production systems (silvopastoral systems); and
- diversify the farmers’ production capacity (multi-strata systems).

The work by ICRAF staff in Latin America builds on research initiated in Yurimaguas almost two decades ago by North Carolina State University and is closely integrated with the goals and workplans of Programmes 2, 3 and 4.

For 1998, the region's themes are:

- domestication of agroforestry trees for community development;
- improved land-use management for environmental and economic benefit; and
- capacity building.

Planning: When funds permit, an annual regional planning meeting is held with collaborators, but informal consultation takes place regularly in various settings. Despite pressure to focus on local issues, the region has maintained its focus on broader questions. Its participation in ASB research, its effort to identify economically viable substitutes for coca production and its role in reforestation programs are all in response to major region-wide problems and contribute to the global ASB knowledge base. Staff collaborate especially closely with headquarters' Programmes 2 and 3 in tree domestication and soil nutrient replenishment. Those stationed in Peru focus more on research than development, but the opposite is true in Mexico, where staff are more intensely involved in participatory research and extension through highly organized local communities.

Links: ICRAF works in Latin America with a number of partners, including CIAT and CIFOR, TSBF, CATIE; INIA, regional organizations and the Ministry of Agriculture in Peru; EMBRAPA in Brazil, INIFAP in Mexico, and a number of NGOs, universities, farmer organizations and individual farmers. In Pucallpa, it is a member of CODESU, a consortium of organizations concerned with development of the Peruvian State of Ucayali. Working relationships appear collegial and effective; at least two of the international staff have long-standing collaborative ties to major partners. The region was recently visited by the DGs of ICRAF, CIAT and CIFOR to develop a consolidated workplan.

Management: The regional programme is managed from Pucallpa, with backstopping from Lima, where CIP provides office space as well as a variety of valuable administrative and financial services. Commendably, CIP does so without charge to ICRAF. No significant management issues were raised with the Panel, but regional staff are concerned with the time spent in financial management. They look forward to a more streamlined and simplified financial management system.

Outputs: In addition to achievements listed in Section 3.3 staff in the Latin American region highlighted their work in:

- developing a process for participatory tree domestication, working with farmers for the sustainable use and conservation of valuable tree genetic resources;
- conjoint analysis of farmers' preferences for agroforestry systems, including a methodology to relate those preferences to the farmers' socioeconomic characteristics and natural resource endowment;
- establishing seed orchards on farms and laying plans for a seed certification system;
- identifying, among best-bet alternatives to slash and burn agriculture, effective means to introduce into farmers' fields the peach palm that has high commercial potential;

- establishing a data base derived from long-term experiments with five different land use systems enhancing sustainability and nutrient management; and
- conducting a well-received training programme in experimental design.

Work on these issues has appeared in refereed journals, bulletins, monographs, book chapters and conference proceedings. Some of the best-bet alternatives have also been adopted by the participating farmers and are being closely observed by their neighbors.

Future: The staff have prepared detailed research plans for the next four years. As part of the ASB Systemwide Programme, they also help implement the research agenda established by the ASB Steering Committee. Currently, however, they have neither senior staff nor partnership arrangements to provide the socioeconomic input needed to bring these plans to full fruition although CIAT has recently stationed a post doctoral natural resource economist in Pucallpa.

SOUTHEAST ASIA (SEA) REGIONAL PROGRAMME

Context: ICRAF established the programme in 1992 with the appointment of a Regional Coordinator, plus a policy economist and a soil ecologist in 1994 and 1993 respectively. Much of the current activity has developed from considerable previous work in Indonesia by ORSTOM, CIRAD and the Harvard Institute for International Development; in the Philippines by IRRI and the SANREM Project; in Thailand by the Ford Foundation. ICRAF now provides an umbrella under which this earlier research can be integrated and the agroforestry aspects of the earlier projects' outputs developed. The offices were originally located in the Indonesian Forest and Nature Conservation Research and Development Centre in Bogor but in 1998 moved to a building in the new CIFOR headquarters outside Bogor. There are currently three ICRAF IRS, three senior scientists seconded from ORSTOM, two from CIRAD, one from WINROCK, one from DGIS, one from IDRC, one from SIDA, one from CASER and one associate officer each from VVOB, JIRCAS and UNESCO. The Thailand component started in 1995 with one IRS, and is now augmented by a seconded IRS from WREI, a global NGO. Much of the programme activity in Indonesia and Thailand operates under the auspices of the Systemwide ASB ecoregional programme that ICRAF coordinates for SE Asia. There are also seven nationally recruited scientists and associates in Indonesia, one in Thailand and one in the Philippines along with a senior fellow.

The programme has five themes: policy evolution to enhance sustainable land use, agroforestry alternatives to slash and burn for forest margins, agroforestry options for imperata grasslands, agroforestry options for sloping farmlands and capacity building of national institutions and scientists. An integration of these issues is currently being developed through examination of the effect of diversity at the landscape level on the functioning of critical watersheds. The activity has been very problem driven, with close integration of the ICRAF Programmes.

Planning: The ASB activity in Indonesia has been underpinned by a considerable and very effective input in the area of policy. This has set the framework for the process research. Much of the programme's strategic planning has been undertaken in the context of the ASB. A major future emphasis in natural resource management will be at the landscape and watershed level. A sound basis for understanding plant production processes, soil

nutrient/water interactions and soil organic matter status has been developed from systems modeling. This generic research on policy and modeling has a considerable IPG aspect, especially the ability to predict the effect of land management on carbon sequestration. The regional staffing pattern covers all five ICRAF global Programmes with scientific support from some of the headquarters scientists in Nairobi [note: programme 1 in particular has provided many inputs into the regional agenda]. The activity in Programme 2 is recent and started with an evaluation of the farmers' needs, resulting in a current emphasis on developing mechanisms for dissemination of already identified, useful germplasm to farmers rather than identifying new, high value species to develop. The policy research in Indonesia and Thailand and the systems research in the Philippines has led to a strong development component to the programme, where farmer groups have been given the capacity to take up new agroforestry-related technologies or to further develop existing practices under a more assured tenure situation. The ICRAF work in this area has provided the basis for further developments at a national level by government agencies and NGOs in Indonesia and the Philippines

Much of the ASB project planning is undertaken during site field visits by the ICRAF and NARS collaborators. This has a strong capacity building element and is an excellent way to develop a common vision of the problem.

In Thailand there are three themes for the ASB for Mountainous Mainlands of South East Asia programme: assessing the agroforestry advantage from both a biophysical perspective and that of the economics of land use options; land-use tenure and institutional and national policy involvement in watershed management; and linkages on policy research with neighbouring countries

Links: The links to national programmes in Indonesia, through the ASB network, have involved the FNCRDC, AARD, CRIFC (the national coordinating agency), four major universities and NGOs. The ASB benchmark site in northern Lampung was developed by Brawijaya University during a long period of collaboration with ARIs in Europe. This gave the ASB research on the biological management of soil fertility that started in 1994 a sound basis from which to develop. The collaboration of scientists from ARIs has been an outstanding feature of the SE Asia ASB activities. There is potential to develop links with CIFOR and IBSRAM in future work on watershed management. The Thailand programme is quintessentially one of setting a framework for collaboration among the NARS, international institutes and NGOs in an ASB context, both in the area of policy and biophysical research.

The links with CIFOR in the areas of socioeconomic policy on the use of forest margins, biodiversity evaluation and modeling the role people in the diversity of land uses and of trees at a landscape level have been very productive and complementary.

Management: Links with headquarters have largely been through scientists in Programmes 1, and 3, and more recently Programme 2. The devolution of much of the financial management will make a great deal of difference to the efficiency of the regional operation. Management of the regional programme has been extremely effective in creating a team approach and a very conducive atmosphere for innovative and across discipline interaction. Future funding seems to be secure except for Programme 2 activities. There is potential funding for future activity in Vietnam and Laos.

Outputs: The research on NTFPs such as improved rubber production and damar (a resin produced by the dipterocarp *Shorea javanica*) at the forest margins in Indonesia is aimed at poverty alleviation. The policy research has led to a change in the Indonesian Government policy on management of the Krui region forest margins that could provide a model for similar agreements on very large areas of forest margins in other parts of Indonesia. Similarly the approach to community involvement in land care of watersheds in Mindanao in the Philippines, developed with ICRAF input, has been taken up by the Government as a national model. The uptake by farmer groups of natural vegetation strips as a way to control erosion and to use trees in the landscape is expanding rapidly. ICRAF research has shown how rubber production in Indonesia by smallholders on the forest margin, collectively the sector with the largest production, can be improved while maintaining the biodiversity.

Because of the policy work done on management of the forest margins, ICRAF was able to make a significant contribution to the understanding at both a national and international level of the causes for the recent, extensive forest fires in Kalimantan and thereby the policy approaches that may reduce the likelihood of their reoccurrence on that scale.

Future: The model for capacity building activity with NARS using ICRAF resources to leverage personnel support from other agencies that has developed so successfully in Indonesia and Thailand, and that is developing in the Philippines, will continue with the NARS increasingly taking more of the operational activity in a genuinely collaborative manner. The development of ICRAF activity in other countries of the region such as Vietnam and Laos will use this model

FIVE GLOBAL PROGRAMMES

PROGRAMME 1 - NATURAL RESOURCES STRATEGIES AND POLICY

Context: This is the newest programme in the Research Division. It was created in 1993 when two previous programmes (Environmental Characterization and Policy, Adoption and Impact) were merged. The Programme has had a substantial staff turnover during its initial growth stage. In 1993 it had six senior social scientists, one senior biophysical scientist and two postdoctoral fellows (one social scientist, one biophysical scientist). In 1998 it still has six internationally recruited senior social scientists, only two of whom were at ICRAF in 1993, and three senior biophysical scientists.

The staff turnover reflects a shift in priorities and emphasis within the Programme as well as the institutionalization of more social science positions in the IRS of ICRAF. This shift involved the development and implementation of a natural resource management approach to agroforestry research. In early 1993, qualitative diagnosis work and on-farm testing constituted the principal activities. Impact assessment existed as a project, but it was not staffed and had no budget. After 1993, quantitative approaches to characterization, diagnosis and adoption were emphasized (a small GIS/remote sensing laboratory was created in 1994), and so was policy research. ICRAF's in-house policy work began in mid-1994 in Indonesia, in mid-1995 in Thailand and in late 1997 in the Philippines, all as integral components of ASB. A senior position for policy research in Eastern and Central Africa Regional Programme was added in mid-1997, and a similar position has been created in Southern Africa Regional Programme in 1998.

The four projects in the Programme are:

- 1.1 - Land-use and agroecosystem dynamics
- 1.2 - Integrated assessment of natural resource management options
- 1.3 - Natural resource policy development
- 1.4 - Ecological, social and economic impact assessment.

Management: The Programme has been directed during recent times by an acting Programme Leader (located in Bogor with the SE Asia Regional Programme) due to the hiring, through an international search, of the previous Programme Leader as Director of Research in August, 1997. This individual also is the lead scientist on Project 1.3. A permanent head of Programme 1 was hired recently. Of the global programmes at ICRAF, Programme 1 is the most reliant on seconded senior scientists from other institutions. While this has certain financial and outside linkage advantages for ICRAF, it also could potentially create some institutional disadvantages related to continuity and cohesiveness of the overall research, if the situation is not carefully monitored and controlled by senior management. So far, such disadvantages do not appear to have surfaced in the case of Programme 1.

Outputs: The main outputs of the Programme, as detailed in Section 2.4 of the report, include contributions in the areas of: methodology development; linked case studies of key policy issues and solutions; software for spatial characterization for use by ICRAF and its collaborators in Africa and Latin America; studies of land degradation processes and potential solutions; adoption and adaptation studies; farm-scale ecological-economic simulation models; impact assessment; geo-referenced databases for most characterization parameters for all ASB and AHI sites and for southern Africa; workshops at the international, national, and local levels; analysis of adoption and sustainability of different agroforestry practices that have guided priorities for ICRAF's other research and development programmes; advice to government agencies based on ICRAF policy and other research; and methodological inputs to workshops organized by the World Bank and USAID on land quality indicators and indicators for use in impact assessment.

Planning: Adoption of ideas from the Programme by partners and by other agroforestry research and development groups indicates relevance of the work done by Programme 1, e.g., the policy-related research and outreach work utilized by the Government of Indonesia in its social forestry legislation. Work from Programme 1 scientists is cited regularly by outside researchers.

Links²: Programme 1 scientists appear to have good linkages to researchers in ARIs and NARS, and the Programme has over the past few years diversified its national collaborators (including NGOs), in particular in the policy arena. Significant changes in collaboration and partnerships occurred as a consequence of the above-mentioned evolution of Programme 1 and its activities. The Programme collaborates with a very wide range of IARCs through its work within the ASB and the AHI Systemwide programmes. In addition to linkages within the Systemwide programmes, links with other IARCs are concentrated on work with IFPRI and CIFOR (a variety of informal linkages among scientists).

² Linkages among programs are covered elsewhere, and particularly in Section 3.5

Future: Programme 1 intends to become more involved in impact assessment work and in the development of linkages with policy makers in partner countries. In addition, case studies will become part of the output of the Programme. When the new Programme Leader joins ICRAF, he will develop a new strategic plan for the programme, to update the current one developed in 1996. Work will include analysis of appropriate methods for characterization and diagnosis at multiple scales. The Programme will develop new methods and build new partnerships, especially with IARCs and ARIs that have relevant skills in modeling regional, watershed biophysical and economic dynamics, as well as economy-wide policy issues.

ICRAF formerly had few links with national policy makers outside forestry and agriculture. Since policies outside these sectors have powerful influences on agroforestry, ICRAF will continue to expand its working relationships with this new set of clients. If funds permit, Programme 1 intends to place a senior scientist in Latin America.

Within ICRAF, the work undertaken by Programme 1 has led to a number of changes: a) widespread realization that agroforestry research is a specific case of natural resources management research; b) realization of the need to work at a number of different spatial scales; and c) realization of the need to adopt a systems approach to agroforestry. These changes will be further pursued in the future.

PROGRAMME 2 - DOMESTICATION OF AGROFORESTRY TREES

Context: The programme on domestication of agroforestry trees has evolved since 1993 from the previous Programme 2 “Improvement of Multipurpose trees”. Tree domestication is a relatively new concept and involves accelerating the process of tree selection/improvement by making it more of a farmer-driven and market-led process. This innovative approach is being explained through developing strategies for priority tree species and using these as case studies to carry out the process.

The focus on tree domestication is a more direct approach compared to the previous MPT improvement programme that largely involved screening trials for exotic agroforestry species such as *Leucaena leucocephala*, *Gliricidia sepium* and conventional plus tree evaluation for *Markhamia lutea*. Although there has been a demand by farmers for indigenous tree species with well known uses such as food, fodder, and medicine, they have been largely overlooked in the previous programme. Agroforestry practices that integrate trees into landuse systems are expected to make the system more stable ecologically, while maintaining wide biological diversity. The expectation is that by this enhanced development process the traditionally important “Cinderella” trees will simultaneously provide sufficient environmental services and economically valuable non-timber forest products (NTFPs) to the farmers. Therefore, the domestication of agroforestry trees has been identified as one of the key pillars of ICRAF’s research agenda.

The aim of the Programme is to develop a framework for the identification, production, management and adoption of improved agroforestry trees, and subsequently to promote the use of quality tree germplasm. Specifically, the objectives are:

- To further develop methods for identifying and improving agroforestry trees

- To initiate and transfer tree improvement research for selected agroforestry trees to NARS;
- to explore, collect, characterize, document and conserve germplasm of priority species and facilitate the supply and exchange of research quantities of germplasm to collaborating institutions;
- to collect, document and disseminate information on agroforestry tree species through the development and regular publication of databases on agroforestry trees and the supply of germplasm;
- to promote timely and sufficient multiplication of superior germplasm of agroforestry trees;
- To investigate the most appropriate propagation systems for agroforestry trees;
- To optimise the propagation techniques (sexual and vegetative) for priority species;
- To investigate the physiological processes and morphological variation immature tissues to enhance the rooting potential of high-value trees;
- To evaluate in the field a wide range of priority agroforestry tree species and provenances;
- To assess species, provenance and clonal interactions with tree management practices for priority species;

The Programme is organized under four research projects:

- 2.1 - Genetic improvement strategies for agroforestry trees
- 2.2 - Genetic resources of agroforestry trees
- 2.3 - Propagation systems for agroforestry trees
- 2.4 - Field testing of agroforestry trees.

The Programme has activities in Africa, Latin America and the Southeast Asian region, although they are at different degrees of development. The tree domestication process is more advanced in Africa and Latin America than in Southeast Asia, where priority setting and selection of partner institutions are presently taking place.

The staff include three internationally-recruited personnel posted at headquarters (and two seconded junior scientists), with one scientist each at Malawi, Cameroon and Peru. In the absence of any permanent staff in Southeast Asia, a Winrock scientist gives approximately 30% of his time. National professional staff consists of one scientist in Peru and three in Kenya. In addition, support staff attached to this programme are highly committed and show commendable professionalism.

Planning: The activities under this Programme have direct relevance to ICRAF, as it deals exclusively with trees for the development of sustainable agroforestry systems. Farmers in different ecoregions have much interest in selecting high value trees for agroforestry systems, and the cooperation of international institutions has been forthcoming for this Programme.

The staff at headquarters and in the regions and NARS are involved in planning, priority setting, identifying, collecting, propagating and field evaluation of high value tree species for filling specific niches in the land use systems to benefit the farmers to increase and stabilize their incomes. The criteria for selection include emphasis on known indigenous

species wanted by the farmers, over-exploited or nearly extinct and promising high value trees for integration into the landscape ecosystem.

The staff of the Programme work in close collaboration with Programmes 1 and 4 in the African and Programme 3 in the Latin American regions, as well as at headquarters. In Southeast Asia, which is in its initial stages of development, inter-programme linkages are envisaged.

Links: Tree domestication covers a wide range of geographical areas, and collaborative linkages have been developed with several partners. Many of the partnerships have been facilitated by the presence of ICRAF staff in the regional programmes. The major collaborators are NARS in Burkina Faso, Cameroon, Kenya, Mali, Nigeria, Malawi, Niger, Tanzania, Uganda, Zambia, Zimbabwe, Peru, Brazil, Indonesia, Thailand and the Philippines. Some universities in the above countries also collaborate in tree domestication activities through staff and postgraduate research students. The Programme collaborates closely with two CGIAR Centres, CIFOR and IPGRI, and also with CABI, 14 advanced research institutes and several universities around the world.

Management: The Programme is managed by the Programme Leader based at the headquarters. Planning and management are well executed at all operational levels. Programmes 3 and 5 also collaborate with the activities of this programme, although at a modest level.

Outputs: Achievements and impacts are listed under Section 2.4 and include selections of promising tree species, collection of germplasm, development of seed documentation databases, identification of germplasm demand and supply and delivery pathways, production of nursery manuals and a seed suppliers directory and 74 research publications. The integration of high value trees is crucial for increasing farmer incomes and thus poverty alleviation. Hence this activity could have considerable global impact.

Future: The proposed cross-programme and global/regional (ASB, AHI) activities will broaden the scope and effectiveness of the Programme. The establishment and maintenance of living gene banks-cum-multiplication blocks of high-value, but over exploited, species, and clonal propagation will accelerate the distribution of high-value germplasm. Additional advantages will include trees that are early-bearing, small in size to fit into specific niches in the agroforestry system and production of uniform products for enhanced marketability.

The safe movement of germplasm of high value trees (quarantine and biosafety) among countries is an important issue, as stated in ICRAF's Policy Guideline Series No. 10. Recognition of the need for equitable access and benefit sharing of valuable tree genetic resources guides the philosophy of interaction with farmers, NARS and national governments. An international advisory committee comprising expert representation from developed and developing countries helps guide the genetic resource work.

The availability of sufficient and timely quantities of germplasm of high value trees has a direct bearing on the impact of tree domestication. The development of easy and simple sexual and vegetative propagation methods, nursery management and training in nursery techniques are being planned.

The commercialization of high value species, such as *Bactris gasipaes* (Peach palm) or *Prunus africana* for its medicinal value, into large-scale plantations by private entrepreneurs may override ICRAF's basic efforts to alleviate poverty among the inhabitants of rural communities. ICRAF has anticipated this eventuality and seeks to minimise its effect by preferentially providing small-scale farmers with germplasm and information. Risks to individual farmers are being addressed by promoting diversification of trees species under cultivation.

PROGRAMME 3 – ECOSYSTEMS REHABILITATION

Context: Programme 3 began as Component Interactions in 1992, building on the largely theoretical analyses of the tree crop interface at the individual plant level developed by the Council. The research agenda has evolved from an initial emphasis on understanding how the components of agroforestry systems interact in various mixed cropping scenarios from a crop physiology perspective to be now mainly concerned with natural resource management. Particular emphasis is being given to agroforestry interventions that improve the nutrient supply to crops and reduce erosion and its off-site effects. It has four IRS and one seconded ORSTOM scientist based at Headquarters, one in the ECA region, one in Latin America, one in Southern Africa, and one plus an ORSTOM seconded scientist in SE Asia. Regional staff, appropriately, undertake a broader agenda. ICRAF headquarters has initiated investigations of the dynamic interaction of soil biology, soil organic matter, nutrient availability and soil structural stability and the effect of agroforestry interventions on these soil quality parameters with the joining of the ORSTOM seconded senior scientist.

Declining soil fertility has been identified as a major limitation to crop production in agroforestry systems in much of semi-arid and sub-humid Africa, brought about by continuous cropping without nutrient replenishment. Soils in the highlands of east and central Africa have good physical structure and were originally very fertile. In southern Africa and the Sahel, the reduction in the length of the "bush fallow" has led to declining yields (a long time ago; the more important issue is continuous cultivation without nutrient returns). Structural adjustment programmes have made fertilizer too expensive for use by most small farmers. Hence the program's change in emphasis to ecosystem rehabilitation through nutrient replenishment and management, as well as the management of water use from both the plant and now the watershed perspective. In the forest margins, the research is concentrating on ways to rehabilitate imperata grasslands in Southeast Asia and understand the component interactions and global environmental benefits of multistrata systems. In Latin America the emphasis now is on C sequestration and greenhouse gas emissions in best-bet AF systems.

The Programme manages its work in three projects as follows:

- 3.1 – Water use management
- 3.2 – Nutrition replenishment and management
- 3.3 – Productivity and environmental benefits of complex agroforests

Outputs: The programme review of the alley-cropping trials conducted at the AFRENA sites and detailed research at the Machakos Research Station indicated that the competition for water use by fast growing legume shrubs often was the major yield determinant for the associated crop, overriding any immediate benefit from the soil fertility enhancement of the

shrub prunings. This has important implications for this agroforestry practice where rainfall or soil water availability is limited. It has led ICRAF to re-examine its strategy for handling crop mixtures for soil fertility improvement and to vigorously explore in east, central and southern Africa, and in Latin America. ICRAF called attention in the world literature to the limited situations where alley cropping could be beneficial. Sequential rather than simultaneous systems were recognized as better options including planted legume fallow for subsequent maize crops and of biomass transfers derived from intercropped shrubs, hedgerows or field borders. The Programme is documenting the ways in which the soil fertility is enhanced in these systems, particularly through the nitrogen supply from fixation, deep nutrient capture, nutrient cycling and organic matter transformation. It is also looking at the water use in these more intensively managed rainfed systems.

There are major losses in the semi-arid tropics from run-off and deep drainage on sloping lands, and the Programme showed that contour plantings of trees could reduce this considerably. Prunings from these trees could be managed similarly to alley or companion cropping systems and lead to less erosion as well as enhanced water use but is more profitable to feed them to cattle if this is an option available. In much of the Kenyan highlands, *Grevillea robusta* is common in cropped fields. ICRAF research showed that the tree obtains most of its water below the rooting depth of the crops and hence was minimally competitive with the crop. Selection of tree germplasm with different root architecture for use in agroforestry systems is a promising new area of research.

The water management research has made good use of collaborations with research institutes in the UK and Australia and with the University of Nairobi. Models have been used to analyze water use in a range of soil types and environments. The challenge is to use this basic information on the functioning of trees and crops to design better agroforestry systems. A major ICRAF publication on “Tree-Crop Interactions: A Physiological Approach” collated current knowledge

Research on soil fertility constraints to production in agroforestry systems has focused on the role of trees on organic matter quality and quantity, and nutrient recycling, and on the efficiency of use of nutrient inputs, especially of different forms of P. By early 1997, the research at Machakos in the semi-arid tropics was phased out and research efforts transferred to the sub-humid highlands of western Kenya at Maseno where new station buildings and an analytical laboratory were being established with KEFRI. Trials conducted on farmers' fields helped to ensure relevance and the transfer of knowledge gained to farmer groups during field days. The research showed that nitrate had accumulated in the subsoil at a depth below the crop rooting zone, that young trees rapidly developed deep roots capable of extracting the nitrate and that P deficiency was severe. Research on organic matter inputs showed that some plants such as the wild sunflower, *Tithonia diversifolia* contained a large concentration of N, P and K and that crop responses could be obtained when cuttings were applied at the rate of 1 tonne dry matter per ha. Use on small areas of high value crops would be more rewarding than on cereal crops, and several farmers have made this shift with tithonia biomass transfers.

Collaborative research started at the Ministry of Agriculture, Food and Fisheries Research Station at Msekera near Chipata in Zambia in 1994, measuring the substantial beneficial effect of tree fallows, particularly of *Sesbania sesban*, on subsequent maize crop yields and the dynamics of soil nitrogen and organic matter fractions in long-term experiments. From

1995, soil properties were also monitored in experiments on mixed intercropping, improved fallows and relay cropping of shrub legumes at the Makoka Research Station, Zambia.

A small effort in weed and pest management strategies for use in agroforestry systems has been developed in collaboration with ICIPE and CABI-IIBC based in Kenya. *Sesbania* in fallows often becomes infected with root-knot nematodes in sandy soils, and this can affect both fallow performance and growth of subsequent sensitive crops such as tobacco. Tests of *sesbania* germplasm and other species have identified lines that are tolerant of nematodes. *Sesbania* can also become infested with *Mesoplatys* beetles, and IPM methods are being investigated. Some *Leucaena spp* and their hybrids were found to be tolerant of psyllid attack. *Sesbania* fallows can dramatically reduce *Striga* infestation of subsequent maize, and the reasons for this are under study. Shading from agroforestry trees can control weeds such as *Imperata cylindrica* in Southeast Asia, but the effect on the weed seed bank under improved fallows in Africa is yet to be explored.

Since 1993 the Programme has been very active in publishing its results in more than 70 papers in refereed journals, 28 conference papers, and 13 book chapters, and has edited five books or proceedings. It has also trained 28 MSc and 13 PhD students from 21 universities in seven countries. In 1997 Programme 3 edited the book “Replenishing soil fertility in Africa”, co-published with the Soil Science Society of America

Planning: There has been an increasing emphasis on soil fertility and soil-plant water relations research that has given an understanding of the biophysical aspects of the agroforestry systems being promoted under the AFRENAs. Sustainability and site specificity issues are likely to become more important as the concept of improved fallows is extended to new regions. Programme 3 will be involved in developing methods to model the responses to agroforestry technologies in these new environments to aid in the selection of appropriate technologies.

The Programme is also playing a role in generating understanding of the role of agroforestry in carbon sequestration and greenhouse gas emissions that has global IPG significance

ICRAF commissioned an external review of Programme 3 in March 1998. Comments on this CCER are made in Chapter 3.3.

Links: Links to the NARS research and to other CGIAR Centres operate through AFRENA, AHI and ASB Programmes. These are a crucial part of ICRAF’s capacity building role. As a major contribution to capacity building, Programme 3 has been involved since 1993 in training more than 26 post-graduate students, mostly from the NARS.

TSBF is on the steering committee of both the AHI and ASB which ICRAF coordinates and also collaborates closely on the Maseno pilot project and in ASB sites throughout the humid tropics. TSBF provides research support in the areas of soil organic matter and soil biology that is complementary to ICRAF’s expertise base, and this will be further strengthened by undertaking laboratory work in this area at ICRAF headquarters.

Work in Eastern and Southern Africa on soil nutrient management through TSBF, CIMMYT, universities and the NARS also complements ICRAF’s capacity building activity.

As part of the Systemwide Initiative on Water Management, ICRAF is leading the project on Improved Water Utilization in a Watershed Perspective and proposes to undertake this research in three key watersheds in Mindanao, northern Thailand and Sumatra, analyzing the effect of on-farm tree distribution on soil loss and the quality and quantity of water leaving the watershed. Support with the hydrological aspects of this project will come from collaborating institutions. The biophysical research will support policy research from Programme 1 on watershed management. Watershed-scale research demands a great deal of resources if the results are to be useful with inputs from several disciplines, careful planning and coordination and a long-term commitment. Programme 3 is positioning itself to play a leading role in coordinating such studies.

Future: There is much interest from the World Bank in the concept of nutrient replenishment through an improvement in soil fertility following a major addition of large amounts of P fertilizer, probably as rock phosphate. The process is being thought of in terms of a large scale capitalization of the land. Such a programme relies on an appropriate farming system using nitrogen fixing legumes, probably agroforestry trees or shrubs, to build up the available nitrogen status of the soils and to recycle nutrients including the fertilizer P. As well as biophysical research on the processes and farming systems, there is a need for policy research on the ways in which this “capitalization” fertilizer is to be distributed (which areas, which farms and by which means) and how the communities and individual farmers’ responsibilities in the process are to be defined and their commitments and involvement maintained. ICRAF is poised to play a lead role in the research necessary to take this concept into practice with funding from KARI for such an initiative in the pilot project at Maseno. Such a collaboration with NARS in research as an aspect of development projects is likely to play an important role in the future funding of Programme 3’s work.

If the funding base for AHI and ASB becomes more assured, this will be another major source of funds for Programme 3, reducing its present reliance on unrestricted core funds.

Much of the research in Programme 3 has been conducted by post-graduate scholars, and this is an important aspect of ICRAF’s institutional strengthening role. Co-supervision of such students especially in collaboration with local universities or NARS, will continue to add value to Programme 3’s staff output. The mix of graduate students and well-designed and managed, representative field sites has resulted in a very productive outcome. National programme scientists want to undertake their postgraduate training in some way linked to ICRAF. This activity provides ICRAF with an excellent means to extend the network of scientists skilled in agroforestry research and at the same time strengthen the NARS capacity.

PROGRAMME 4 - SYSTEMS EVALUATION AND DISSEMINATION

Context: In 1993, the principal aim of the Systems Evaluation and Dissemination Programme was *“to undertake monitoring and evaluation of the long-term biophysical, ecological and economic impact of agroforestry technologies to be used as alternatives to current systems.”* The output of this work was stated as *“the production of recommendations for technologies to be tested on-farm in collaboration with scientists in ICRAF’s Project 1.2, Technology Testing”*.

The five years since the last EPMR have seen major and deliberate changes in the Programme's goals, project structure and expected outputs. There have been three main reasons for these changes:

- the need for far greater farmer and extension and NGO personnel involvement in the processes of priority setting, design, evaluation, adaptation and experimentation with innovative agroforestry systems;
- the need to play a facilitating role in the wider dissemination of agroforestry solutions;
- the need to involve a greater spectrum of partners in the development, evaluation and dissemination of improved agroforestry systems.

The required change in emphasis was greatly facilitated by the addition of a principal agricultural economist to the Programme in November 1995 (as recommended by the last EPMR).

The Programme has identified seven new principal aims, namely to: a) undertake both *researcher-controlled trials and participatory evaluation with farmers* of promising agroforestry systems; b) to find *optimal system component combinations* and define their biophysical and socioeconomic limits; c) to assess the *adoption potential of different system management options*, that is their *feasibility, profitability and acceptability* under different biophysical and socioeconomic conditions; d) to promote the *wider dissemination of proven agroforestry systems* through pilot development projects by working in close collaboration with teams comprised of members from governments, extension services, NGOs, farmer groups and development projects; e) to monitor and *document farmer adaptation, adoption and subsequent impact* at the field, farm and community level, and assess how these vary by gender, wealth status and other key socioeconomic variables; f) to provide *feedback to ICRAF's Research and Development Divisions* and to collaborators on lessons learned and issues requiring further research; g) to *make available to a wide range of audiences guidelines, approaches and methods* for effective systems development, evaluation and dissemination research.

The activities designed to meet these aims are now structured within three new projects that reflect key activities in systems evaluation and dissemination. The projects are:

- 4.1- Developing choices with farmers
- 4.2 - Assessing farmers responses
- 4.3 - Facilitating adoption and impact.

The context for this Programme in ICRAF's new Development Division is still evolving, and finalization of its strategy and mode of operation await the arrival in Nairobi of the new Division Director. However, the Programme already is well on its way to establishing a productive set of activities, strategies and development hypotheses, which are intended to become the central focus of the Programme's work.

The main mode of operation will be research and dissemination combined through an iterative process involving: a) development of methods and techniques for development research related to agroforestry; and b) three types of applied field trials that attempt to incorporate the more upstream, strategic research of ICRAF and others into practice in the farmers fields and provide feedback to those programmes. The three types of on-farm

research are: Type I - Researcher designed/researcher implemented trials; Type II - Researcher designed/farmer implemented trials; and Type III -Farmer designed/farmer implemented trials.

Outputs: Programme 4 has made solid progress in moving its focus towards a more farmer participatory approach in the development and improvement of agroforestry systems. This has been achieved both by the development of guidelines and approaches for participatory on-farm research and through the activities of regionally based Programme 4 staff working with adaptive research and dissemination teams in ICRAF's six ecoregions. Guidelines have been produced for a variety of tasks related to on-farm research and trials within the three types used by ICRAF.

On the ground, in the six ecoregions where ICRAF works, the Programme's collaborative research teams have greatly expanded their participatory on-farm research. Specific details of the achievements and impact of this work are given in the regional programme annexes and in Section 2.4.

There has been a dramatic increase in the number of on-farm trials and farmers involved in the technology development process. The majority of farm trials and farmers involved are in the Southern and Eastern Africa regions. This increase in farmer involvement has occurred largely in farmer designed and managed trials.

Programme 4, together with other Programmes and Collaborators, has completed 37 participatory assessments of the adoption potential of agroforestry techniques, including improved fallows, boundary planting, fodder trees, hedgerow intercropping, woodlots, biomass transfer, live fences, mixed intercropping, relay cropping and alternative tree establishment methods. Twenty-eight of these assessments examine the feasibility of a technique at a particular site from the farmers' perspective. Twenty-three also include an assessment of profitability, and 24 include an assessment of their acceptability and uptake by farmers. Nineteen of the assessments are from six sites in eastern Africa, eleven are from six sites in southern Africa, two are from HULWA and five from the Sahel.

In almost all the benchmark locations and pilot areas, ICRAF has acted as a facilitator in the development and coordination of formal and informal adaptive research and dissemination teams of researchers, extension personnel, NGOs and farmer groups. These teams conduct participatory on-farm research and facilitate the wider dissemination of successful agroforestry solutions.

In S. Africa, the Programme has hired international and national professional dissemination scientists to facilitate the wider dissemination of proven agroforestry innovations and plans to increase its capacity in this field in other regions.

In 1995 the Programme co-organized an international symposium on "Agroforestry alternatives in imperata grass lands", in Banjarmasin, Indonesia which was published as a special issues of Agroforestry Systems. The follow-up on the findings led the Indonesian Ministry of Forestry to request ICRAF's help in developing tenure rights for agroforesters in government land. In 1997, the Programme played the lead role in organizing an international symposium entitled "The science and practice of short-term improved fallows," held in Malawi and attended by over 100 participants from the research and development arena. Participants came from 23 countries of the humid and sub-humid

tropics. A book emerging from the symposium (currently in preparation) will provide an up-to-date synthesis of this most promising suite of technologies.

Planning: ICRAF's intention is that Programme 4 will be a major link between research and application of the results of that research in development. ICRAF's designated "Pillar" for the programme is "accelerating impact." Programme 4 draws on the thinking and outputs of the three research Programmes as well as the ideas of collaborators and the farmers with whom they work. These become key elements in Programme 4's participatory research. In turn, during the process of trying new and adapted technologies, there is a clear and deliberate set of feedback loops, where results from Programme 4 trials are fed back to Programmes 1, 2, and 3 for consideration in the iterative process of improving the focus of the strategic research. Figure 4.1 indicates the planned and intended links. Elsewhere the Panel comments on the relative effectiveness of these linkages in ICRAF.

Moving up towards the development end of the spectrum, a filtering process takes place where information learned from observation of biophysical responses and farmer responses is used to assess the applicability, feasibility and profitability of technologies being introduced. Towards the development end of the spectrum, a set of options that have proven applicable, feasible and profitable under the conditions being investigated are extended, mainly through NARS and other local development partners, to large numbers of farmers for the final test of acceptability. (See Figure 4.2).

During the process of filtering technologies and feedback on biophysical and farmer response, the development hypotheses of the Programme 4 and other Programmes will be tested for more general dissemination and use across field sites and conditions encountered. Also methods and approaches are being developed and disseminated across regions and to other research groups. These activities constitute the main IPG contributions of the research and a key justification for ICRAF (international) involvement in the field-level activities undertaken at specific sites.

It appears that leaders of Programme 4 in headquarters are fully aware of the IPG aspects and importance of the research programme. However, field staff need to become more aware of the needs and potentials of the IPG concept in moving ICRAF research beyond the local level.

Links: This Programme links widely to NARS, NGOs and other IARCs through, for example, the Adaptive Research and Dissemination Teams that, with farmers, establish development choices, provide the guidance and input for the activities related to assessment of farmers' responses and facilitate adoption and impact.

Future: This Programme, in particular, is a key one in terms of the increased focus of ICRAF on expanding actual impacts in farmers' fields. Its main strategy for the future is basically to continue as in the past, following the basic process of moving from research to application in farmers' fields and on to the synthesis work that results in as IPG contribution, as in the steps laid out in Section 3.3 of this Report.

PROGRAMME 5 - CAPACITY AND INSTITUTIONAL STRENGTHENING

Context: Capacity and Institutional Strengthening (CIS) has been a major activity of ICRAF during the last two decades, identified as a responsibility of the former Training and Information Division. In 1998, Programme 5 evolved with the merger of Training and Agroforestry Education on the recommendation of the First EMPR. ICRAF has recognized the importance of capacity building by incorporating most of the recent advances of agroforestry research and development into its training and education activities. The objectives of the Programme are:

- to enhance the skills of researchers, educators/trainers, technicians, policy makers, development workers and NGOs through group and individual training and the development of teaching materials;
- to incorporate a multidisciplinary systems approach to land management in curricula in tertiary education institutions, at the postgraduate, undergraduate and certificate levels;
- to develop the capacity of national programmes to access and manage relevant up-to-date information; and
- to continue the development of a global information base on the science and practice of agroforestry through several mechanisms.

The Programme comprises five projects:

- 5.1 - Group training in agroforestry
- 5.2 - Individual training in agroforestry
- 5.3 - Agroforestry training materials
- 5.4 - Strengthening agroforestry tertiary education
- 5.5 - Information for agroforestry research and development.

The staff include two international and one national scientist at headquarters, one consultant and a volunteer in Southeast Asia and one post-doctoral fellow in the Sahel region.

Planning: CIS is a major component of ICRAF's activities and is crucial to the development of agroforestry through strengthening of the national capacities at all levels, from universities to the development workers. Both headquarters staff and those in the regional programmes are involved in the planning and execution of various training and education activities and collaborate closely with other ICRAF's Programmes. ICRAF's planning process is part of ICRAF's strategy, aimed at achieving its main goals through a participatory process involving headquarters staff, Regional Coordinators, NARS scientists, university academics and NGOs. The priority areas of training are identified at the regional meetings, finalized at the headquarters level and implemented based on the availability of funds. The relevance of this Programme is closely reflected in the increasing demand by diverse client groups. However, a mechanism for follow-up has not yet been developed.

Management: The Programme is under the Development Division and managed from the headquarters. The training and educational activities are specifically selected and focused to meet the needs of client groups or individuals. In the case of individual training, the decisions are often made by the sponsors, and the Programme assists only in the placement of trainees according to the projects selected, as long as their work plans fit comfortably

into our Medium-term plans. A procedure for selection of trainees by the NARS has not yet been elaborated. From 1998, a policy for the devolution of various training courses has been planned. This will enable ICRAF to conduct more training courses that will be managed by the countries in the regions. The strategy is to mobilize the capacity already built in the collaborating NARS and universities, which will be highly cost effective.

Links: Due to the nature of the activities undertaken by CIS, a multitude of partners in various countries involved in agroforestry participate in training and education programmes. ICRAF collaborates with NARS, universities and NGOs in Southeast Asia and different regional groupings in Latin America. In Africa, collaboration is best developed through AFRENAs and universities in the four ecoregions on the continent. Training covers participants not only of the ICRAF mandated countries, but many from other parts of the world. Several universities have collaborated with CIS in the development of curricula and course materials. The trainees of NARS are also invited to conduct courses at ICRAF.

Outputs: The Programme has conducted training for both groups and individuals and has assisted universities to develop agroforestry curricula. Training materials, manuals and databases have been developed and distributed to collaborating institutions. (For details see Section 2.4)

Future: Five years from now, ICRAF plans that the majority of its partners will have established a sizeable capacity to develop and manage agroforestry research and training. To achieve this vision, CIS will develop and impart start-of-the-art courses in agroforestry and apply modern information technology to their delivery. ICRAF also plans:

- to increase the presence of agroforestry capacity building activity in Latin America and Southeast Asia;
- to catalyze the emergence of agroforestry training in the regional agenda;
- to inject more policy and socioeconomic aspects into agroforestry courses;
- to catalyze the development of teaching materials by national institutions; and
- to provide a global analysis of agroforestry training and education and monitor services.

SYSTEMWIDE ECOREGIONAL PROGRAMMES

ALTERNATIVES TO SLASH AND BURN (ASB) SYSTEMWIDE PROGRAMME

Context: The ASB programme had its origins in 1990 with an inquiry by the UNDP whether it would be possible to develop an approach to finding alternatives to slash and burn agriculture. The interest was both in halting the rapid rate of deforestation and in making better lives for the farmers and settlers living at the forest margins. The programme focuses on the global environmental effects of slash and burn agriculture and on technological and policy options to alleviate those effects.

The original Centres that responded to the UNDP challenge were ICRAF, IITA, CIAT and IRRI, together with TSBF and IFDC. ICRAF was chosen as the convening Centre for this global cross-ecoregional initiative (within the context of the CGIAR Systemwide ecoregional activities) in 1991 due to the close links between sustainable agroforestry options and alternatives to unsustainable slash and burn practices.

The objectives of the ASB programme are to:

- identify and refine promising land use options (“best-bets”) to slash and burn practices;
- remove policy distortions that encourage forest conversion or discourage adoption of improved practices; and
- strengthen local institutional capacity to ensure that ASB issues can be addressed by stakeholders in the region.

Planning: The ASB programme was planned in three Phases:

- I: selection of benchmark sites and establishment of multidisciplinary teams that characterized the sites;
- II: identification of farmer derived “best-bet” practices; quantification of biophysical processes, household and institutional factors;
- III: consolidation of research at the landscape scale, development and implementation of national action plans and policies; scaling up.

Phase I is now completed, and the programme is well into phase II. The eight benchmark sites currently in the programme are in Brazil, Indonesia, Cameroon (the original three) and Peru, Thailand, the Philippines, Mexico and Vietnam.

The work has great relevance both in terms of helping to reduce or prevent poverty for many millions of forest fringe farmers and in terms of ameliorating negative global change (including climate change and biodiversity loss) associated with slash and burn agricultural practices and deforestation in general.

Planning and implementation of the programme have been hampered by uneven funding. Partly this is due to the fact that initially it was funded by one donor only and that funding has been provided on a rather short-term basis. For example, in 1995-96, there was a serious funding gap, and research activities were interrupted during that time. The programme is now back on track, however, and has a good donor support group and a funding strategy to the year 2000.

Management and Links: ICRAF convened and coordinates the ASB programme. However, decisions concerning the direction and content of the programme involve an elaborate but logical set of steps and interactions to ensure participation of all the partners in the ASB consortium. The consortium consists of the following:

- CGIAR Centres: ICRAF (convenor and coordinator), CIAT, CIFOR, IFPRI, IITA.
- National agencies from Indonesia, Brazil, Peru, Mexico, Cameroon, Thailand, Vietnam and the Philippines.
- National universities and NGOs.
- CIRAD, ORSTOM, Cornell University, TSBF and IFDC

Governance of the ASB programme is provided by the global steering group, which comprises AARD (Indonesia), CIFOR, Cornell University (USA), EMBRAPA (Brazil), ICRAF, IFPRI, IITA, INIA (Peru), IRAD (Cameroon), the Ministry of Agriculture and

Cooperatives of Thailand and TSBF. The Global Steering Group is responsible for executive decisions such as annual budget allocations, consortium membership, workplans for consortium members and appointment of regional and global coordinators. The DG of ICRAF serves as Chair of the Global Steering Group.

To give a perspective on the relative distribution of funds among the various partners, in 1996, 14% went to the coordination office, 34% to ICRAF research and 52% to other consortium members. By 1998, 18% went to the coordination office, only 23 % to ICRAF research and some 59% to other consortium members.

Outputs: The output of the ASB programme involves a wealth of data from the benchmark sites, some of it unique, time series data on the global impacts of land use change. The results also include identification of a number of “best-bet” alternatives in complex agroforests, simple agroforests, improved pastures, improved fallows and community managed forests. Currently, results are forthcoming from the evaluation of these “best-bets” under a variety of environmental and human welfare criteria and conditions.

So far, the concrete impacts in terms of changed land uses and improved wellbeing of local forest fringe communities are minimal, as would be expected, given the short time during which the programme has been operating and the fact that the initial years were spent in characterization, establishment of baseline profiles and development of alternatives to evaluate for implementation. However, concrete impact has been achieved through the policy work in Indonesia (mentioned above under Programme 1 and Southeast Asia), and there are indications that the impacts in terms of the research development of consortium member countries have been positive. For example, the Governments of Indonesia, Thailand, Vietnam, Peru and Brazil have identified research and development activities on ASB as a national priority.

Future: The ASB will be entering Phase III of the programme over the next five years. (Phase III will involve a consolidation of the research from Phase II with development of national action plans based on the selection of alternatives identified in Phase II and on an integrated landscape management approach, and it will involve the design and implementation of appropriate policies to underpin the action plans).

AFRICAN HIGHLANDS INITIATIVE (AHI)

Context: The AHI programme is a CGIAR initiative to develop an ecoregional, collaborative research programme with the goal of improving natural resource management (NRM), and thereby the sustainability of land productivity, in the highlands of east and central Africa under the umbrella of the ASARECA. It forms one of the three components of the CGIAR Global Mountain Development Programme. ICRAF was given the role of coordinating the development of the AHI in 1992, which effectively started in 1995. ASARECA comprises ten countries, five of whose NARIs (Kenya, Ethiopia, Uganda, Tanzania and Madagascar) are in AHI. The AHI concept was to coordinate the NRM activities of the CGIAR Centres in the region, and partners also include ICRAF, ILRI, CIAT, CIMMYT, IITA, CIP, IFPRI and IPGRI, as well as TSBF, regional universities and ARIs and NGOs. There are also links to the regional commodity networks: ECABREN (beans), PRAPACE (potatoes) and BARNESA (bananas) and to AFRENA, an agroforestry network coordinated by ICRAF. The highlands occupy 23% of the land area of the region

but contain more than 50% of the population with large projected increases. The area has been subject to extensive land subdivision, a decline in soil fertility and crop production, deforestation, loss of biodiversity, the inability to maintain livestock and an increase in crop pests associated with soil fertility decline. Phase I (1995-1997) was involved in developing a framework for ecoregional research and in initiating some research activity through small grants, research fellowships and consultancies that reviewed the status of knowledge in key aspects of NRM. Five themes were addressed by scientists in technical advisory panels:

- maintenance and improvement of soil productivity;
- integrated pest management for four pest and disease complexes linked to low soil fertility;
- characterization and diagnosis;
- information and documentation; and
- training.

The objectives were to develop the ecoregional research network, institutionalize NRM concerns into agricultural research and production systems and build the capacity of NARS and their partners to conduct NRM research. Soil fertility and land use are at the nub of issues addressed. The project is concerned with cultivating a collaborative research culture based on problem focussed activity at benchmark sites and maintaining an applied focus through on-farm experiments with farmer participation. Team building was an important part of the process in Phase 1. This involved identifying scientists with specific expertise and institutes with particular capacity to bring to bear on the collectively identified problems in a systems framework. This aimed to optimize use of the human resource capability in the region and reduce duplication of activity. This cross-organizational approach to researching problems would also reduce the need for each NARS or other research organization to establish a comprehensive discipline base. It also aimed to facilitate cooperation between the CGIAR Centres in the region in NRM.

Planning: AHI has operated in two phases – an initial planning phase (1995-1997) in which institutes and scientists were brought together to identify problems and approaches to solving them, identify the eight benchmark sites and develop ways to work in teams and fund multi institutional and multidisciplinary work. A start was made on identifying the methods that would be used. Ongoing research at the benchmark sites at Embu, Maseno and Kakamega in Kenya and at Kabale in Uganda was incorporated into the AHI framework. This led to a very comprehensive Work Plan and Budget for Phase II, 1998-2000. The present funding level is about half of the amount detailed in the Phase II Work Plan and Budget.

National coordinators have been appointed along with benchmark site coordinators from the host NARIs. Technical Advisory Panels were established in Phase I with representatives from the NARIs and CGIAR Centres, but this has evolved in Phase II to Technical Support Groups in the areas of soils, livestock, socioeconomics, integrated pest management and policy whose membership is based on the expertise available in the region. They establish methodologies to be used and develop detailed plans for the experiments to be conducted and mechanisms for coordination. A database of the projects being conducted on NRM in the region is being developed.

Management: ICRAF coordinates the AHI programme as one of the 15 ASARECA networks. AHI NRM agenda cuts across several of the other networks. The AHI has a

comprehensive Management Steering Committee (MSC) that includes the national coordinators representing the host NARS, representatives from the CGIAR Centres involved and other regional projects. Originally chaired by ICRAF's DDG, the governing body is now chaired by a senior KARI manager. A Coordinator is employed by ICRAF but works closely with the ASARECA secretariat in Entebbe, Uganda. ICRAF and ASARECA jointly seek funding. ASARECA provides regional policy and management advice, and its Executive Secretary is an ex-officio member of the MSC. The AHI has set up a system to plan, initiate and fund research activities. Mechanisms are still evolving for coordinating activities at the benchmark sites through site steering committees.

ASARECA commissioned a comprehensive review of AHI's activities in 1996. Recommendations have been responded to, but the issue raised of the limited time available by some partners to devote to AHI is being resolved as existing commitments to non-AHI activities are phased out.

ICRAF provides technical support for the projects and contributes through its existing project inputs to the three AHI benchmark sites that are currently operational. It will work with the NARIs to develop spatial decision support using GIS to help diagnose NRM problems and to extrapolate from the existing knowledge base.

Outputs: The setting up of the structure and mechanism by which AHI will operate has been a major achievement from Phase I, as it has involved the integration of institutes with very different cultures into new partnership arrangements at both the regional and benchmark site level. This process is ongoing. Six comprehensive, technical reports on the current status of NRM issues in the AHI region have been completed. Regional research fellows were employed to conduct specific research and diagnostic studies. Research needs for the region have been identified and research plans formulated. Characterization of some of the benchmark sites has been undertaken. Small grants were provided for 73 activities in the areas of the maintenance and improvement of soil fertility and integrated pest management. A major achievement has been the provision of a database on NRM as well as email to AHI partners with telephone communications. Training needs have been assessed, and some training has been started on characterization and diagnosis, participatory rural appraisal and IPM.

Future: AHI will incorporate into the network other ongoing activities in NRM in the region, particularly those involving the CGIAR Centres. It will undertake more detailed characterization of the newly identified benchmark sites. Participatory on-farm research based on farmer community groups will be the focus of much of the research, which will be undertaken in a systems framework.

SUPPORT UNITS

RESEARCH SUPPORT UNIT

The research support unit functions under the Research Division. This unit provides support to the ICRAF staff at headquarters and in the regions, other NARS collaborators and students attached to the various programmes.. The unit is organized under three specialized units: Biometrics, Plant and Soil Laboratories and Electronics and

Instrumentation. The major objective of these service units is to provide specialized support services to the scientists to enhance the quality and standard of research.

Biometrics Unit

Context: This unit is involved with the design of field and laboratory experiments, field surveys and sampling procedures, assistance in data collection, and management, use of software, data interpretation and presentation, protocol, report and manuscript reviews and training in statistical procedures. The staffing is one international and a junior scientist, one temporary associate and two national scientists.

Links: The unit has direct links with NARS in Africa and to a lesser extent in Southeast Asia and Latin America. It also collaborate with African and British universities and CGIAR Centres such as CIP, ILRI, IITA, ICRISAT, and IRRI.

Outputs: The unit works closely with all programmes of ICRAF attending to routine, specific and generic problems to increase the awareness and use of appropriate research methods. It has conducted training programmes for capacity building in the African and South American NARS. The training course on Design of Agroforestry Experiments has been conducted 5 times from 1993 –97 in three languages, and that on Data Management and Analysis twice. The quality of the services provided by this unit appears satisfactory.

Future: The unit will continue to service the researchers of ICRAF and other collaborators. It will also review the biometrical information already available in publications for practical application in agroforestry research. The present staff should be strengthened by recruiting a lower grade staff to assist the Biometrician.

Plant and Soil Laboratories

Context: These laboratories provide analytical services and advice to researchers, support laboratories funded by ICRAF in the region and training of staff, post-graduate students, technicians and NARS scientists. It is also involved in development of analytical methods.. The unit has one international staff (50%) in the soil analytical laboratory, and two international, one national and seven support staff attached to Programme 3.

Links: The unit works closely with scientists of KEFRI, KARI and TSBF, universities in Africa, Canada, Sweden, United Kingdom, Netherlands and GCIAR Centres: CIP, ICRISAT, ILRI, CYMMIT, and CIAT. Several student attachments to Programme 3 have been realized through these collaborative arrangements.

Outputs: A major output of the unit has been the quantification of soil P deficiencies in Kenya, developing rapid and reliable methods for testing soil P deficiency in low-external input systems, contribution of trees to soil P and the role of trees in influencing N availability and soil organic matter pools. The unit also assists postgraduate research, individual training of laboratory technicians both at laboratory and field level to upgrade their skills.

Future: This unit will continue to provide services to the ICRAF scientists and collaborators. However, ICRAF should reconsider the present charges for analytical services provided, and make them affordable to NARS collaboration. It has also proposed regional soil and plant laboratories in East, Southern and West Africa to focus on issues of soil and natural resource management of regional importance which are not handled adequately by the national laboratories.

Electronics and Instrumentation Unit

Context: This unit provide technical support on field and laboratory instruments and equipment, design low cost instruments for studying crop-tree interaction processes, repair and maintain laboratory and field equipment and training of researchers and other collaborators in the proper use of these instruments. The staff is one international scientist and 1.5 technicians.

Links: The unit works closely with Programme 3 scientists at headquarters, regional centres and the African NARS; Universities in UK, Australia and Japan are the other partners of this unit.

Outputs: The unit has made substantial achievements in developing instruments for the better understanding of the tree–crop interactions in complex agroforestry systems. Method for studying root turn over by using a mini rhizotron and other root measuring devices, tipping bucket method for measuring surface water flow and soil erosion, heat balance instruments, and sap flow gauges, are the major contributions of this unit.

Future: The unit will continue assisting Programme 3 scientists and other collaborators, in the development of new instruments (e.g automatic infiltration meter and rainfall simulator for soil biophysical studies), repair and maintain instruments at both headquarters and regional level and engage in training activities.

INFORMATION SUPPORT UNIT

Context: The Information Support Unit is under the Development Division. The basic objective of the Information Support Unit is to assist agroforestry research and development by providing up-to-date and timely information to ICRAF researchers and various other clients including networks and the Systemwide programmes coordinated by ICRAF.

The Unit undertakes three activities: publishing; library and documentation; and public awareness. The staff of the Unit also contribute directly to the activities of Programme 5 by providing information-related capacity building to NARS through information provision, training in information management and scientific writing. The Unit has three international, nine national professional and seven support staff.

Planning: The staff attend regional planning meetings, when possible, and also receive feed back from all ICRAF's Programmes to identify information and library documentation requirements. Advance planning is also made to publish upcoming proceedings of conferences and workshops. The unit undertakes regular reader and user surveys to determine the relevance of publications, library and other information services.

Management: The Unit holds regular weekly meetings to prioritize and monitor status of publications. The Library Committee screens the books and journals requested by scientists while the Publications Committee develops policies on publications and other service provided by the Unit. The management of the activities of this Unit appears to be satisfactory.

Links: The Unit targets ICRAF's scientists, NARS and IARC partners, university academics, students, development workers, policy makers and the general public through its publications, public awareness and library services. It has close links to Programme 5 in the preparation of training materials and organizing of information-related courses. Its CGIAR collaborators are ILRI, ISNAR, CIAT, IPGRI, CIFOR and WARDA. It also collaborates with CAB International, CATIE, CTA and others.

Outputs: The Information Support Unit is presently responsible for producing several publications, including ICRAF's magazine *Agroforestry Today*. Nowadays it publishes 4 issues per year and reaches over 4,000 subscribers. A reader survey conducted by ICRAF two years ago showed that the magazine is read by up to 25,000 people. *Agroforestry Systems* is also widely distributed, although it is only available through paid subscription from a commercial publisher. (Kluwer in Europe). Due to the high demand and associated high cost of publishing *Agroforestry Today*, a rationalization of subscription has been implemented by charging US\$ 40 per year for those subscribers in the developed countries while those in the developing countries receive it free of charge.

The Information Support Unit also publishes the ICRAF Annual Report, Conference Proceedings, Training Manuals, Directories, Brochures, Posters, ICRAF updates and many other miscellaneous publications. Co-publishing with other CGIAR Centres such as IPGRI and WARDA, and with FAO and CABI, Soil Science Society of America, advanced research institutes and NARS partners has strengthened the links, and by these publications ICRAF has been in the forefront taking leadership.

In-house translations have presently given way to working with other institutions and ICRAF co-publishes *Agroforestry en las Americas* in Spanish with CATIE.

ICRAF has also taken initiative in developing databases. Although in 1993 the Information Support Unit operated three databases, presently it operates only one, the bibliographic database on agroforestry (AFBIB) which has 40,000 records, mostly with abstracts. The MPTS database on multi-purpose trees and shrubs is presently expanded by Programme 2. These databases are used widely for database searches, Agroforestry updates, selected bibliographies and question and answers and photocopy services for ICRAF staff and others. ICRAF has been supporting with information services to NARS partners in those mandated countries and outside the region. ICRAF also has access to external database such as the Tree CD, which is made available to researchers on request.

ICRAF has taken the initiative to reach their wide clientele through E-mail and Internet. During the past 5 years, electronic mail access has been made available to more than 200 NARS researchers and institutions in the Eastern and Central Africa through the AfricaLink Project.

The IVDN has also helped in data sharing quickly with ICRAF researchers and even sharing articles from other international research centers. This will reduce duplication of

information among researchers, other CG centers and NARS scientists. Although there are limitations presently, especially with NARS partners of some countries, it is expected to change rapidly and they will soon be on the Internet. It is known that the majority of the NARS and universities are using the modern information technology and will have communication technology to access and utilize agroforestry information.

ICRAF has focused emphasis on publishing their work in referred journals in order to improve the quality of research output. This is a commendable decision which has paid dividends since the last EPMR. The number of refereed publications has increased from 22 in 1993 to 109 in 1997, scientific citations of ICRAF staff in *Science Citation Index* has increased from zero in 1993 to 95 in 1997, while journal articles by senior staff has increased from 0.2 to 1.1 per year per scientist over the same period. These as quality research indicators have been assisted by the Information Support Unit through efficient internal peer reviews and co-publishing of special issues of journals. This trend should be maintained in the future.

The Unit also assists in the preparation of training materials and the Training Manual on Scientific Writing for Agricultural Research Scientists is a major contribution to the researchers of ICRAF and NARS.

The agroforestry video, Fields of Trees, BBC, CNN, TV and other broadcasting, programmes, and press releases have focussed on public awareness of agroforestry and the Centre's activities.

The Information Support Unit has been the major contributor to the dissemination of research technology resulting in the improvement of the quality of research, of scientists involved in agroforestry research and development in the developing countries.

Information on mature agroforestry technologies, which is disseminated through this unit has been useful for agroforesters, particularly with the field level extension workers and the NGOs. These publications and audio-visual materials have created an interest to focus on agroforestry development for sustainable management of natural resources of many developing countries.

The opportunity to publish and disseminate the work of ICRAF scientists has lead to develop high quality research as expected by ICRAF. The output is clear evidence that the Unit has emerged as the leader of the publications related to agroforestry and a global-wide authority on the technological dissemination of information on agroforestry for the conservation and utilization of national resources.

Future: The future strategy of ICRAF is to increase emphasis on information delivery through electronic media such as the Internet and to facilitate this, a home page on the World wide web site has been established. Public awareness programmes are useful for partnership building with the public for creating awareness of ICRAF's activities on agroforestry for poverty alleviation and environmental resilience. These should be strengthened and targeted to specific groups including policy makers.

The major issue ICRAF has to face in the future is how it can meet the demand for agroforestry information as there is an ever increasing demand by the NARS partners and

students in agroforestry. The trend for new information demand has also shifted from researchers to extension workers.

ICRAF has also limited ability to publish in French and Spanish which needs attention, hence collaboration with institutions having competence on hiring of expertise has to be considered.

ICRAF's role in the production and dissemination of agroforestry information has to be continued even more effectively than before. However, the cost of publishing with limited core funds has to be noted and a balance will have to be achieved taking into consideration the priorities for ICRAF researchers, NARS partners and other clients.

ITINERARY OF THE EPMR PANEL

The whole Panel visited ICRAF headquarters from 16 to 24 April 1998 for the initial phase of the Review to familiarize itself with the Centre. The Panel members interacted with the Board, senior management and staff, and met with representatives from the Staff Associations and the External Auditors. During the initial phase, the Panel visited ICRAF's work at Embu. On 25 and 26 April, the Panel visited ICRAF's work at Maseno.

From 27 April to 5 May, three Panel members visited ICRAF's work in Southern Africa. From 9 to 17 June, two Panel members visited ICRAF's collaborative work in Latin America. From 18 to 22 June, two Panel members visited ICRAF's collaborative work in Southeast Asia. These visits provided further opportunities for Panel members to interact with ICRAF staff in the field and with their national and other partners.

The whole Panel returned to ICRAF headquarters on 23 June 1998 for the main phase of the Review. Panel members interacted with management, scientific support staff, individually and in small groups. Panel members also met with representatives from KARI, KEFRI, Nairobi University, ILRI, ICIPE, TSBF, UNEP, Rockefeller Foundation, GTZ and Officials from the Ministry of Science and Technology and the Ministry of Foreign Affairs.

Draft chapters of the Report were shared with the Director General. On 10 July 1998, the Panel Chair presented the Report of the Panel to Board members and senior management, and subsequently to staff.

LIST OF DOCUMENTS PROVIDED TO THE PANEL

1. ICRAF Annual Report 1996
2. ICRAF: The Way Ahead Strategic Plan
3. ICRAF Medium Term Plan 1998-2000
4. Financial Requirements 1999-2001 ICRAF's Submission to TAC and the CGIAR
5. Making the Matrix Work
6. Annual Accounts 1997
7. Host Country Agreement between the Government of the Republic of Kenya and the International Centre for Research in Agroforestry (ICRAF)
8. Personnel Policy – Policy Guideline 4
9. Center Commissioned and Internally Commissioned External Review Reports (21)
10. Charter of The International Council for Research in Agroforestry (ICRAF)
11. Policy Manual for the Board of Trustees
12. Staffing Statistics
13. Management Information Systems
14. List of Agreements for Cooperative Activities with other Centres and Institutions
15. List of Staff Publications 1993-1997
16. Ongoing and Completed Restricted Grants
17. List of Reports by Major Planning Conferences (1993 - 1997) and ICRAF Calendar of Events (1994 - 1997)
18. Response to the Recommendations to the First ICRAF External Programme and Management Review
19. Literature Generated by ICRAF Research: A preliminary impact assessment
20. Major Issues Facing the International Centre for Research in Agroforestry
21. Achievements, Constraints and Impacts (1993 - 1997)

22. Minutes of Board and Board Committee Meeting 1993 - 1997
23. Reports of the External Auditors (1993-1997)
24. Recent Internal Audit Reports
25. ICRAF Publications 1988-1997: Partner Involvement
26. Systemwide Initiatives – Analysis of Coordination Costs
27. Monitoring Data for Gender Staffing
28. Resource Mobilization Strategy for ICRAF
29. ICRAF Involvement in Systemwide Programmes
30. ICRAF Involvement in Soil Nutrient Replenishment Development Projects
31. ICRAF Staff Categories and Budget Allocation by Region and Programme
32. Top Outputs from ICRAF's Programmes and Regions
33. Key Programme Inputs into each of ICRAF's Regional Programmes
34. ICRAF's Development Division: Strengthening the Research and Development Continuum in Agroforestry
35. ICRAF's Partnerships: A Preliminary Examination of the Characteristics, Inputs and Benefits of its Collaborative Relationships
36. Report of the Internal and Interprogramme Review of the IRA/ICRAF. Research Project in the Humid Lowlands of Cameroon
37. Report of the Internal Review of the SADC/ICRAF Research. Project at Tumbi Research Station, Tabora, Tanzania
38. Record of the First MPT- GRU International Advisory Committee Meeting
39. Report of the Internal and Interprogramme Review of the SADC/ICRAF Research Project at Chalimbana Research Station, Lusaka, Zambia
40. External Evaluation of the Project Alternatives to Slash and Burn
41. External Evaluation of the Kenya National Agroforestry Project for the Coffee-Based Land Use Systems (Embu)

42. Report of the Internal Review of the Internal and Interprogramme Review of the Zambia/ICRAF Research Project in Chipata, Eastern Zambia
43. Record of the Second MPT- GRU International Advisory Committee Meeting
44. Evaluation of the African Highlands Initiative
45. AHI External Review Report and Response of the Task Force
46. External Review of the Finance and Administration Division
47. Recommendations of the Third Meeting of the Advisory Committee to the Germplasm Resource Unit, ICRAF, Nairobi
48. An evaluation of Regional Research Networks for Cassava, Beans, Agroforestry, Potatoes and Sweet Potatoes
49. External Review of the CGIAR Genebank Operations
50. External Review of the CGIAR Genebank Operations: Annex: Centres' Responses to the External Review
51. Evaluation Report of the Hifadhi Ardhi Shinyanga (HASHI)/ICRAF Agroforestry Research Project
52. A Field Survey on ICRAF's Research/MPT Nurseries, Their Present Status and Potential Regarding Improvement of Quality and Quantity
53. Progress Report on STAP Selective Reviews: Alternatives to Slash and Burn, Phase I
54. Domestication of Indigenous Fruit Trees of the Miombo Woodlands in Southern Africa – Improvement of propagation and plant production facilities
55. Internal Management Review of ICRAF Southeast Asia
56. Proceedings of the Fourth Meeting of the Advisory Committee to ICRAF on Genetic Resource Activities
57. Review of research and community nurseries in Mexico and Peru
58. Internally Commissioned External Review of Present Situation and Recommendations for the Future Related to the Preparation of 5-Year Workplan, 1998-2002 and Annual Workplan, 1998 for Programme 2 Activities at ICRAF Headquarters
59. Centre Commissioned External Review of Programme 3: Ecosystem Rehabilitation (including Response and Proposed Plan of Action to the Recommendations of the Review Team)

GLOSSARY OF ACRONYMS

AARD	Agency for Agricultural Research and Development
ACIAR	Australian Centre for International Agricultural Research
AFBIB	Agroforestry Bibliography (ICRAF Database)
AFRENA	Agroforestry Research Networks for Africa
AHI	African Highlands Initiative, coordinated by ICRAF
ANAFE	African Network for Agroforestry Education
APAN	Asia-Pacific Agroforestry Network
ARDHI	Hifadhi Ardhi Shinyanga
APR	Annual Programme Review at ICRAF
ARDT	Adaptive Research and Dissemination Teams
ARI	Agricultural Research Institute
ASB	Alternatives to Slash and Burn Initiative, coordinated by ICRAF
ASEAN	Association of Southeast Asian Nations
ASERECA	Association for Strengthening Agricultural Research in East and Central Africa
BARNESA	Banana Research Network for Eastern and Southern Africa (Kampala, Uganda)
BMZ	Bundesministerium fuer Wirtschaftliche Zusammenarbeit (German Ministry for Economic Cooperation)
BOT	Board of Trustees
CABI	Commonwealth Agricultural Bureau International
CARE	Care International
CASER	Centre for Agro-Socioeconomic Research
CASAWAC	Committee for Agroforestry, Soil and Water Conservation (Zimbabwe)
CATIE	Centro Agronomico Tropical de Investigación y Enseñanza
CCER	Centre Commissioned External Review
CD-ROM	Compact disk - read only memory
CGIAR	Consultative Group on International Agricultural Research
CIAT	Centro Internacional de Agricultura Tropical
CIDA	Canadian International Development Agency
CIFOR	Centre for International Forestry Research
CILSS	Comité permanent inter-états de lutte contre la sécheresse dans le Sahel
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo
CIP	Centro Internacional de la Papa, Peru
CIRAD	Centre de coopération internationale de recherche agronomique pour le développement
CIS	Capacity and Institutional Strengthening
CODESU	Consortio para el Desarrollo Sostenible de Ucayali
CORAF	Conference de responsables recherche agronomique africaine

CSIRO	Commonwealth Scientific and Industrial Research Organization (Australia)
DANIDA	Danish International Development Agency
D&D	Diagnosis and Design
DDG	Deputy Director General
DFA	Director of Finance and Administration
DFID	Department for International Development, UK
DG	Director General
DGIS	Directorate General for International Cooperation, Ministry of Foreign Affairs, the Netherlands
DMP	Desert Margins Project
DR	Director of Research
DSO	Direct Support to Training Institutions in Developing Countries, The Netherlands
ECA	Sub-Humid Highlands of Eastern and Central Africa
ECABREN	East and Central Africa Bean Research Network (Kampala, Uganda)
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuaria (Brazil, Nari)
EPHTA	Ecoregional Programme for the Humid and Sub-Humid Tropics of Sub-Saharan Africa
EPMR	External Programme and Management Review
EU	European Union
FINAD	ICRAF's Division of Finance and Administration
FAO	Food and Agriculture Organization of the United Nations
F/FRED	Forestry/Fuelwood Research and Development
G7	Group of 7
GIS	Geographic Information System
GRC	Germplasm Resource Centre
GSSA	General Support Staff Association
GTZ	German Agency for Technical Cooperation
HQ	Headquarters
HRU	Human Resources Unit
HULWA	Humid Lowlands of West Africa (AFRENA)
IARC	International Agricultural Research Centre
IBPGR	International Board for Plant Genetic Resources
ICIPE	International Centre of Insect Physiology and Ecology, Kenya
ICRAF	International Centre for Research in Agroforestry
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ICWG-GR	Inter Centre Working Group on Genetic Resources
IDRC	International Development Research Centre
IFDC	International Fertilizer Development Centre
IFPRI	International Food Policy Research Institute
IIBC	International Institute for Biological Control
IITA	International Institute of Tropical Agriculture
ILCA	International Livestock Centre for Africa
ILRI	International Livestock Research Institute
IMMI	International Irrigation Management Institute

INIA	Instituto Nacional de Investigación Agraria (Peru Nari)
INIFAP	Instituto Nacional de Investigaciones Forestales y Agropecuarias (Mexico, Nari)
IPG	International Public Goods
IPGRI	International Plant Genetic Resources Institute
IPM	Integrated Pest Management
IRS	Internationally Recruited Scientists
IPSA	ICRAF Professional Staff Association
IRA	Institut de la recherche agronomique
IRAD	Institut de recherche agricole pour le développement
IRRI	International Rice Research Institute
ISBRAM	International Board for Soils Research and Management
ISC	Information Systems Committee
ISNAR	International Service for National Agricultural Research
ISSU	Information Systems Support Unit
ISU	ICRAF Information Services Unit
ITU	Information Technology Unit
IVDN	Integrated Voice Data Network
HRU	Human Resources Unit
JIRCAS	Japan International Research Centre for Agricultural Sciences
KARI	Kenya Agricultural Research Institute
KEFRI	Kenya Forestry Research Institute
LA	Humid Tropics of Latin America
LAN	Local Area Network
MC	Management Committee
MOU	Memorandum of Understanding
MPT	Multipurpose Tree
MPTS	Multipurpose Trees and Shrubs
MTP	Medium-Term Plan
NARI	National Agricultural Research Institute
NARS	National Agricultural Research System
NGO	Non-Governmental Organization
NRM R&D	Natural Resource Management, Research and Development
NSC	National Standing Committee
NTFP	Non-Timber Forest Products
OFI	Oxford Forestry Institute
OFR	On-Farm Research
ONADEF	Office national de développement des forêts (Cameroon)
ORSTOM	Institut français de recherche scientifique pour le développement en coopération
P	Programme
PC	Programme Coordinator
PHT	Post-harvest Technology
PRAPACE	Programme régional d'amélioration de la culture de la pomme de terre et de la patate douce en Afrique centrale et de l'est (Kampala, Uganda)
PRCA	Common Property Rights Initiative

PROCITROPICOS	Cooperative Programme on Technology Generation and Transfer for the South American Tropics
PWB	Programme of Work and Budget
R	Restricted funds
RAC	Research Advisory Committee
RC	Regional Coordinator
RSC	Regional Standing Committee
RSU	ICRAF Research Support Unit
SA	Sub Humid Plateau of Southern Africa
SADC	South African Development Corporation
SAFGRAD	Consultative Advisory Committee on Semi-Arid
SALWA	Semi-Arid Lowlands of West Africa (AFRENA)
SANREM	Sustainable Agriculture for Natural Resource and Environmental Management, USA
SEA	Southeast Asia
SEANAFE	Southeast Asia Network for Agroforestry Education
SGRP	System-wide Genetic Resources Programme
SIDA	Swedish International Development Authority
SINGER	System-wide Information Network for Genetic Resources (IPGRI)
SSY	Senior Staff Year
STAP	Scientific and Technical Advisory Panel of the Global Environment Facility
SWI	System-wide Initiative
SWIM	System-wide Initiative for Water Management
SWP	System-wide Programme
TAC	Technical Advisory Committee
TID	Training and Information Division
TSBF	Tropical Soils Biology and Fertility Programme (UNESCO)
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UR	Unrestricted funds
USAID	United States Agency for International Development
VVOB	Flemish Association for Development Cooperation and Technical Assistance
WARDA	West African Rice Development Association
WWF	World Wild Fund for Nature