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Forestry Research within the Consultative Group on International Agricultural Research

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The CGIAR System

The Consultative Group on International Agricultural Research (CGIAR) is an informal association of 41 public and private sector donors that supports a network of sixteen international agricultural research centers, CIFOR being the newest of these centers. The Group was established in 1971. The CGIAR centers are part of a global agricultural research system which endeavor to apply international scientific capacity to solution of the problems of the world's disadvantaged people.

CIFOR

CIFOR was established under the CGIAR system in response to global concerns about the social, environmental and economic consequences of loss and degradation of forests. It operates through a series of highly decentralized partnerships with key institutions and/or individuals throughout the developing and industrialized worlds. The nature and duration of these partnerships are determined by the specific research problems being addressed. This research agenda is under constant review and is subject to change as the partners recognize new opportunities and problems.

Forestry research within the Consultative Group on International Agricultural Research

J.A. Sayer

The mandate of the Consultative Group on International Agricultural Research has been expanded to encompass forestry and agroforestry research.

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The Consultative Group on International Agricultural Research (CGIAR) is an informal consortium of more than 40 donor agencies, together with representatives of developing, countries, elected through the FAO regional agricultural commissions. CGIAR was established in 1971 to support a system of agricultural research around the world.

The early work (up to 1988) of the International Agricultural Research Centres (IARCs) associated with CGIAR was largely focused on increasing the productivity of food crops. Given the rapid growth of urban populations in developing countries, two or three times faster than the rate of increase of rural populations, and the associated shift in diet towards grains that can be cooked quickly and stored easily, the IARCs' concentration on productivity was both logical and appealing to governments. The earlier CGIAR centres are best known for their development and promotion of the "green revolution" crops of rice and wheat, which included varieties designed to be especially responsive to fertilizer and irrigation. CGIAR-developed varieties of staple food crops and their derivatives made it possible for developing countries to produce three to four times as much food as they did in the 1950s.

However, by the mid-1980s, CGIAR recognized that its main focus needed to be supplemented by a greater attention to natural resource conservation and management as well as the sustainability of agricultural production. The benefits of CGIAR-sponsored research were not reaching a sufficiently large proportion of the intended clients either because the technologies were too expensive or too risky or because they were unsuitable for the marginal conditions under which many millions of farmers have to operate. Moreover, a CGIAR Committee on Sustainable Agriculture (established during the preparatory period for the World Commission on Environment and Development, the so-called Brundtland Commission) which reported in 1987 that it was not enough to resolve problems occurring in the farmers' own fields and herds. Farmers also depend on reliable supplies of water for farm and domestic use, as well as on security against soil erosion, siltation and flooding, market gluts and unstable prices. Many farmers, especially the poor, need trees in mixed farming systems to improve and stabilize their agricultural production. In many regions, they also require woodlands and forests as a source of products for domestic and farm use, as a source of germplasm of important agricultural and forest crops and as a foundation for off-farm employment and income generation. Therefore there was a move towards a greater emphasis on research in the areas of sustainability, resource management and environment. The Committee's work contributed to the preparations for the expansion of CGIAR from 13 to its current 18 centres.

International discussions held before, during and after the 1992 United Nations Conference on Environment and Development (UNCED) further highlighted the interrelationships between poverty alleviation and the use and conservation of forests in the tropics. These discussions focused the needs of forestry research clearly into the heartland of the CGIAR system. The prime stakeholders for forests were the same poor people whose food needs the CGIAR system had been established to meet. The integration of forestry into production systems and the question of sustainability became central to the debate.

INCORPORATION OF FORESTRY INTO THE CGIARSYSTEM

In July 1987 in Bellagio, Italy, an international strategy meeting on tropical forests was convened under the auspices of the

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Rockefeller Foundation, FAO, the World Bank, the UNDP and the World Resources Institute (WRI) to discuss global action to address tropical deforestation in the ambit of the Tropical Forests Action Programme (TFAP). The purpose of the meeting was to debate the constraints to effective implementation of the TFAP (particularly at the national level) and recommend steps to overcome them. One key point to emerge from "Bellagio I" was that the weakness of existing tropical forest related research was a major hindrance to TFAP implementation and, therefore, to the achievement of sustainable use of tropical forest resources.

In line with this point, in early 1988 the Rockefeller Foundation, the World Bank, the UNDP and FAO jointly sponsored an International Task Force on Forestry Research (ITFFR) to review research priorities and consider options for strengthening institutional support. The priorities identified by ITFFR were:

- forestry's role in agroforestry, watershed and arid zone land-use management;
- natural resource conservation and management;
- tree breeding and tree improvement;
- utilization and market research;
- policy and socio-economic research.

In terms of institutional options, the ITFFR report set out several options, including: creating an independent world centre for the direction, execution and coordination of tropical forestry research; expanding the mandate of the CGIAR to include forestry research; and establishing a new consultative group or similar body with a specific mandate for forestry research.

The report was discussed at a second international forestry meeting (Bellagio II), held at Wiston House in the United Kingdom in late November 1988. The participants at Bellagio II endorsed the ITFFR recommendations on research priorities and, after much discussion, recommended that forestry research be incorporated into an expanded CGIAR system.

Two panels, on forestry and on agrofarestry, were established by CGIAR's Technical Advisory Committee (TAC) in early 1989 to conceptualize the research agendas and examine possible institutional arrangements for the incorporation of forestry into the system. After intensive consultation with national institutes and leading forestry scientists throughout the world, a decision was taken to invite the International Council for Research in Agroforestry (ICRAF) to join CGIAR with an expanded mandate as a global institution for strategic agroforestry research. ICRAF was admitted to the system in 1991 and changed its name to the International Center for Research in Agroforestry.

Also in 1991 the decision was taken to create a new CGIAR centre, the Centre for International Forestry Research (CIFOR), with a global mandate for strategic and applied research on forestry and forest systems, and lead responsibility for coordination of forestry research within the CGIAR system.

CIFOR

The Australian Center for International Agricultural Research (ACIAR) was commissioned by CGIAR in May 1991 to do the preparatory work for the establishment of the forestry centre, a task accomplished in just under two years. In March and April 1993, the Governments of Australia, Sweden, Switzerland and the United States signed an agreement sponsoring the legal establishment of CIFOR while 17 international donors agreed to provide financial support. A Host Country Agreement was negotiated with the Government of Indonesia, which is providing temporary headquarters in its Forest Research Institute at Bogor until a new permanent headquarters for CIFOR's international activities can be constructed, also in Bogor.

As defined by its constitution, CIFOR's mission is to "promote the sustained well-being of people in developing countries, particularly in the tropics, through collaborative strategic and applied research in forest systems and forestry, and by promoting the adoption of improved technologies and management practices". A key element of the centre's mandate relates to increasing the forestry research capacity of developing countries.

CIFOR has gone through an intensive process of consultation with forestry researchers throughout the world in order to prepare a strategy and a medium-term plan for research from 1994 to 1998. Twenty-five national and regional seminars were held and more than 150 individual scientists around the world contributed to preparation of the plan. CIFOR will concentrate its research and related activities in five programmes (see Box, p. 34) and, in addition, there will be a strategic research planning component located in the office of the director-general.

The consensus to emerge from these consultations was that the greatest payoff and impact would be likely to come through policy analysis and development. CIFOR would conduct surveys and experiments to provide the biophysical data to underpin policy development while the needs of policy research would provide the demand pull for the centre's biological and technological research programmes.

Throughout the period of CIFOR's establishment, there has been a genera1 recognition that it must operate in a highly decentralized manner. The centre's research will need to produce results that can be generalized to apply to a wide range of tree species, biophysically defined sites, management objectives and socio-economic conditions. It would clearly be impossible to carry out the wide

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CIFOR research and related activities

PROGRAMME 1: POLICY DEVELOPMENT

- Policies and incentives to ensure the sustainable management of natural forests and encourage reforestation of degraded lands
- Systems for equitable distribution of the benefits and costs of forest goods and services
- Adoption of policy change
- Employment and income from forests
- Location and types of global and national forest resources to satisfy future demands for goods and services

PROGRAMME 2: MANAGEMENT AND CONSERVATION OF NATURAL FORESTS

- Low-impact harvesting and management
- Management for biodiversity and diverse products
- Growth and yield prediction systems
- Sustainable management of dry zone woodlands
- Reproductive biology and genetics

PROGRAMME 3: REFORESTATION OF DEGRADED LANDS

- Non-industrial techniques for reforestation of degraded lands
- Matching tree species genotype to biophysical site conditions and management systems
- Techniques for characterizing genetic variation and relating it to physiological and morphological adaptations
- Physiology and biochemistry of plant material for improved vegetative propagation
- Plantations of mixed tree species for multiple products
- Yield in second and subsequent rotations of tree plantations

PROGRAMME 4: PRODUCTS AND MARKETS

- Management for non-wood forest products by local communities
- Market requirements and possibilities for underused non-wood forest products
- Expansion and harmonization of databases on properties and uses of tropical timbers and non-wood forest products
- Social and economic impacts of new technology for adding higher values to products in or near the forest

PROGRAMME 5: RESEARCH SUPPORT AND INFORMATION

- Development of human and institutional resources
- Publication and information services
- Database harmonization, integration and dissemination

range of research implicit in CIFOR's mandate from a single headquarters location.

From the outset, CIFOR has been conceived as a "centre without walls". It will operate in close collaboration with national forestry research systems in the developing countries and with relevant specialized institutes in the industrialized world. Very little research will actually be carried out at CIFOR's international headquarters in Indonesia; it is anticipated that 70 percent of its resources will be deployed away from the Indonesian office. CIFOR's headquarters staff will travel frequently to work with their partners in the rest of the tropical world and these partners will also have the opportunity to spend time at CIFOR's headquarters to work with the multicultural team of scientists located there. It is expected that most of the research programmes will include partners in both the developed and developing countries, thus the basic operational model will be a tripartite series of activities. Several such programmes are already under way; for example:

- work on forest policy in India, particularly focusing on joint forest management, is being developed in collaboration with the University of Florida in Gainesville, the Indian Forest Service and the Tata Energy Research Institute in New Delhi;
- case-studies on the long-term sustainability of forestry-related rural development projects in the Amazon basin are being developed by the WRI in Washington, DC, supported by the United States Forest Service and BMZ (Germany) and in collaboration with Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA) as well as a variety of non-governmental organizations in the region;
- ACIAR is collaborating with forest research institutes in Malaysia, Indonesia, the Philippines and Thailand in a CIFOR project aimed at examining the problems inherent in the reforestation of *Imperata* grasslands in these four countries;
- CIFOR is working with FINNIDA, the World Bank and forest research institutes in Zimbabwe, Malawi and other Southern AFrican Develoepement Community (SADC) countries to examine the problems of community management of dry woodlands in southern and East Africa.

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CIFOR's success or failure will be largely a function of the impact on its developing country partners. One of its first major research activities will involve the International Service for National Agricultural Research (ISNAR) in the Netherlands for carrying out a baseline study of forestry research capacity and effectiveness in the tropics. Methodologies for evaluating both CIFOR's impact on research capacity and the impact of research on the welfare of the ultimate beneficiaries (people and the forests on which they depend) will be developed at ISNAR's headquarters in The Hague.

ICRAF's ROLE AND FUTURE RESEARCH AGENDA

Agroforestry is probably the most complicated biological challenge for CGIAR, i.e. how to grow annual crops with trees in such a way that the inevitable competition for light, water and nutrients results in sustainable food production without degrading the environment.

Agroforestry farming systems are among the more attractive sustainable alternatives to shifting cultivation. They are also critical for the reclamation of secondary forest fallows and derived grasslands which often follow in the wake of short-rotation shifting cultivation. At the farm level, on-farm tree planting and improved on-farm tree management can play a major role in increasing farm productivity, raising farm incomes, improving food security and conserving farm, soil and water resources.

There is a limited understanding of how such interactions occur at the process level and how they can best be manipulated by adapted germplasm and agronomic and silvicultural management techniques. Furthermore, agroforestry systems need time to get established and to exercise key functions such as nutrient cycling and soil conservation.

Much of ICRAF's work at priority locations in humid, semi-humid and semi-arid ecosystems is aimed at developing a predictive understanding of the major interactive processes between people, trees, crops and/or animals that will be available to or of value to each agro-ecosystem. ICRAF has given special emphasis to socio-economic methods for studying local peoples' perception of agroforestry systems. It has developed a strong agroforestry network system with national research institutes in Africa – the Agroforestry Research Networks for Africa (AFRENAs) – and has plans to develop similar networks in Asia and Latin America.

Major gaps exist between traditional agroforestry practices and improved agroforestry technologies. ICRAF's overall strategy is aimed at overcoming these gaps through four research and three dissemination programmes (see Box on this page). Research programmes will be implemented using three operational modalities: activities at headquarters, collaborative networks (thematic and agro-ecological) and ecoregional mechanisms. In Africa, the AFRENAs will be consolidated; in Latin America and Asia, ICRAF will link into existing institutional structures dealing with agroforestry and, at least initially, will focus on the humid tropics (four countries in Latin America and three or four countries in Asia). Appropriate laboratory, greenhouse and field research facilities will be established in Nairobi (including a multipurpose tree germplasm centre and a training centre) to enable ICRAF to fulfil its global strategic research and dissemination mandate.

FORESTRY AND AGROFORESTRY RESEARCH BY OTHER CGIAR CENTRES

Partly in response to the increasing concern about sustainable agriculture and partly in response to the perceived need to take a more ecoregional approach to re-

ICRAF programmes

RESEARCH

- **Characterization and impact – dealing with environmental and economic characterization of land-use systems, the validation of technologies and the assessment of policy and impact issues related to their adoption**
- **Multipurpose tree improvement – identifying, collecting, evaluating, conserving and improving multipurpose-tree germplasm**
- **Component interactions – focusing on process-oriented research designed to test hypotheses and obtain scientific data on nutrient cycling, soil conservation, how trees and crops compete for light, water and nutrients and how pests affect such processes**
- **Systems improvement – dealing with the development and improvement of management systems and strategies**

DISSEMINATION

- **Training – to enhance the skills and knowledge of agroforestry scientists and others so that they can diagnose land-use constraints and design and implement agroforestry research projects leading to the development of systems and technologies suited to local conditions and adoptable by farmers**
- **Education – to strengthen the capacity of universities and technical colleges to teach agroforestry at the postgraduate, undergraduate, diploma and certificate levels**
- **Information – to support agroforestry research, training and development through dissemination of information on agroforestry**

search several IARCs have forestry and/or agroforestry rcsearch programmes in progress Some of the rcscarch is specific to individual IARCs but there is an increasing tendency for research on renewable natural resources to be undertaken by several IARCs working together with national agricultural and forestry research organizations. A notable example is the global project "Alternatives to Slash-and-Burn Agriculture" (ASB), coordinated by ICRAF and involving the International Centre for Tropical Agriculture (CIAT), CIFOR, the International Food Policy Research Institute (IFPRI) and the International Institute of Tropical Agriculture (IITA), together with national institutes in Africa, Asia and Latin America.

Throughout the dialogue on how the CGIAR system can most usefully contribute to global forestry research needs, a conscious effort has been made to maintain or to introduce forestry and agroforestry research components into the agendas of the centres.

Agenda 21, one of the outputs of UNCED, has also stimulated the IARCs to take a broader view of their potential roles, and the current medium term plans (1994-1998) usually indicate which specific areas of Agenda 21 might be assisted by an individual IARC. Brief summaries of the forestry- and agroforestry-related research of the other CGIAR centres follow.

CIAT

The International Center for Tropical Agriculture in Colombia was the first IARC to move strongly towards an ecoregional approach in its research planning. Its Forest Margins programme will undertake research on both sides of the forest agriculture boundary but anticipates close collaboration with CIFOR on the forest side. ICRAF and IFPRI are likewise partners with CIAT at ASB project sites in the western Amazon.

CIP

The International Potato Centre (CIP) in Peru is about to launch an ecoregional programme in the high Andes and may become involved with agroforestry, if not with forestry. CIP is in contact with the FAO-supported regional forestry research project, INFORANDES, in Ecuador.

IBPGR*

The International Board on Plant Genetic Resources (IBPGR) in Italy has undertaken germplasm collections and characterizations of fruit trees for several years. Recently, the IBPGR has sought to capitalize on its experience in ex situ conservation and seed management by incorporating forest trees into its ambit. Meetings to clarify the respective roles of CIFOR, the IBPGR, ICRAF and FAO were held in Rome in 1991, Nairobi in 1992 and, most recently, Rome again in July 1993. The IBPGR has appointed a forestry germplasm specialist to its staff and has been involved in four major consultancy studies intended to clarify the issues and suggest future directions for research.

ICRISAT

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in India has undertaken some notable ecophysiological work on alley cropping at its headquarters in Hyderabad. At its sahelian centre in Niamey, the Niger, work has been undertaken on *Faidherbia albida* agroforestry systems, and on shelterbelts in the Sahelian countries.

IFPRI

Located in Washington, DC, IFPRI has sponsored work on the labour requirements of fuelwood collection and is now involved in many aspects of policy research on renewable natural resources and environmental matters at both micro and macro levels. It has cosponsored and been a principal organizer of four workshops on research agendas for tropical land-use and forestry policies (Washington, DC, 1991; Bangkok and Nairobi, 1992; San Jose, 1993) and is collaborating on policy research with ICRAF on the ASB, especially in the western Amazon basin. IFPRI's new Environment and Production Technology Division is undertaking research on arresting deforestation and resource degradation in forest margins of the humid tropics and is examining both technology and policy options.

IITA

The IITA in Nigeria is well known for its long-term studies of alley cropping. It is a principal collaborator with ICRAF on the ASB project in West Africa, using its humid tropics substation at M'balmayo in Cameroon, particularly to investigate the components and interactions within agroforestry systems.

ILCA

The International Livestock Centre for Africa (ILCA), headquartered in Ethiopia, has made collections and tests of forage shrubs and trees for many years. ILCA collaborated with the IITA in Nigeria to develop and run a research network on the incorporation of the nitrogen-fixing *Gliricidia sepium* into agroforestry systems, both cropping and forage. The network had success especially as a result of its good leadership, the timely delivery of resources to collaborators and the application of lessons from other agricultural and forestry research networks. It may well provide a model for future forestry networks within the CGIAR system.

IRRI

The International Rice Research Institute (IRRI) in the Philippines has provided

**Ed. note*: As from January 1994, the IBPGR has become the International Plant Genetic Resources Institute (IPGRI).

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assistance to other institutions in the Philippines for research on mixed cropping systems, especially in the development and adaptation of Sloping Agricultural Land Technology (SALT).

ISNAR

The mandate of the International Service for National Agricultural Research (ISNAR), located in the Netherlands, encompasses national forestry research systems alongside those in agriculture, drainage and irrigation and fisheries. ISNAR has included national forestry research systems in its regional programme in SADC countries to reorganize the institutional basis for research. ISNAR's compilation of agricultural research indicators, its development of a project-based system for planning, control and accounting of research as well as its work on evaluation and assessment of impact are all highly relevant to forestry research organizations. Organizations seeking to strengthen national forestry research services can learn much from ISNAR's experiences in almost 50 developing countries.

WARDA

The West Africa Rice Development Association (WARDA) in Cote d'Ivoire has expressed interest in working with CIFOR on the hydrological aspects of managing upland watersheds that feed the rivers supporting inland swamp rice culture.

IMPROVING COLLABORATION WITH NATIONAL FORESTRY AND AGROFORESTRY RESEARCH SYSTEMS

Because of the high degree of interdependence between CGIAR strategic work in forestry and agroforestry and adaptive research at the national level, much thought has been given to the development of improved mechanisms for supporting effective networks with national forestry and agroforestry research institutions. An initiative of FAO, the Asian Development Bank and the UNDP, the regionally funded and managed Forest Research Support Programme for Asia and the Pacific (FORSPA), offers promise for replication elsewhere. FORSPA provides a formal mechanism for linking up and sharing research interests of national forestry research organizations. In so doing it could also become an effective research communication and consultation network, with which CGIAR and its centres could collaborate at a relatively low cost compared with the effort of setting up one-to-one linkages with every national forestry research system [Ed. note: see article by Y.S. Rao, p. 27].

Ways and means of strengthening similar collaborative linkages with national forestry and agroforestry institutions in other regions are currently being explored. The possibility of initiating a FORSPA-type project in West Africa, building on the experience of the regional tree improvement and seed distribution network, is under examination.

CGIAR RESPONSE TO AGENDA 21

The basis of CGIAR's response to the challenge of UNCED's Agenda 21 is the effort to balance productivity and natural resource management in all CGIAR-supported research. A key element of this response is an ecoregional approach that aims at performing research in and for regionally defined agro-ecological zones.

To deal more effectively with natural resource conservation and management issues as part of agricultural, forestry and fisheries development, CGIAR has brought in new centres and is making significant changes to its structure and mode of operation. These changes are mainly based on:

- the need to strengthen CGIAR's scientific capability in the area of soil, water, forestry and fisheries resource management;
- the recognition that natural resource management issues are often agro-ecologically site-specific and require more intensive multidisciplinary research that focuses on high-priority regions and has a special emphasis on alleviating rural poverty, all undertaken as part of ecoregional research;
- the importance of interacting with local people and, particularly in marginal ecosystems, building research on traditional knowledge, requires that the CGIAR centres further strengthen their capability of tackling socio-economic and macroeconomic policy research;
- the recognition of the role that women play in decision-making at the farm and household level has urged CGIAR to focus more on gender issues;
- the need to help national research institutes strengthen scientific expertise in natural resource management.

Above all, CGIAR has launched a process that will determine how a substantive environmental capacity can be integrated into the programmes of all its centres. These major efforts can enhance CGIAR's participation in the post-UNCED process. Their success, however, depends not only on CGIAR but on the continuing commitment of the international community to attaining UNCED's goals.