CIFOR ANNUAL REPORT 1998

CENTER FOR INTERNATIONAL FORESTRY RESEARCH

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Director General's

Message

Professor Jeffrey A. Sayer

IN 1998, WE CELEBRATED CIFOR's fifth anniversary. Much has happened since Mr. Ali Alatas, Indonesia's Minister of Foreign Affairs, signed CIFOR's host country agreement on 15 May 1993 during the Center's first Board meeting. We have built and moved into our international headquarters near Bogor; we have recruited 135 staff members, including 60 scientists from 25 countries; and we have grown to an annual budget of more than US$ 11 million, with research activities in 38 tropical developing countries. The international research community concerned with forests has provided outstanding support in these first years. The Government of Indonesia has made contributions that exceeded our expectations, including the provision of CIFOR's excellent headquarters complex, which reached the final stages of construction in 1998.

1998 was an eventful year for CIFOR in several respects. The period saw a dramatic evolution in the political situation of our host country. Despite the disturbances that led to the resignation of President Suharto in May, and the frequent demonstrations later in the year, CIFOR continued functioning throughout this period. There were changes also in the leadership of the Indonesian Ministry of Forestry, with Minister Djamaludin and many of his team who supported CIFOR in its establishment and growth ending their mandates.

The change in government initiated a period of political and economic reform that is still continuing. The economic crisis has had major impacts on natural resources, and CIFOR scientists offered analysis and advice to the Indonesian government in developing new legislation and institutional arrangements for managing the country's forests. The fundamental issue is the tradeoff between the need for radical reform and the difficulty of moving smoothly toward institutional arrangements that will meet everybody's hopes and expectations.

In 1998, CIFOR completed it first External and Management Review, whose conclusions were very favourable. The review team stated that "CIFOR 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." The recommendations from the review will certainly have an impact on our future growth and direction. An important step in this direction has been the consolidation of CIFOR's major research thrusts from ten to six: policies and forests, sustainable forest management, biodiversity conservation, plantation forestry, forest products and people, and adaptive co-management of forests.

Several of our founding Board and staff members left us during the year, and we have been fortunate in attracting other excellent scientists and forest practitioners to join us both at Board and senior management levels. Our teams are revived and strengthened, and have added diversity.

In 1998, CIFOR also consolidated its regional offices within partner organisations in Zimbabwe and Brazil. In 1999, more scientists will be posted at these locations in fulfillment of CIFOR's intention to work most effectively with our scientific partners, and where they can experience the problems of forest-dependent people first hand.

1998 also saw a major review of the CGIAR by an independent panel led by Maurice Strong. The panel recommended that the CGIAR focus more attention on environmental and natural resources issues and that other centres should emulate CIFOR's collaborative, decentralised "centre without walls" way of operating.

The Intergovernmental Forum on Forests (IFF) continues to focus on science-based approaches to forest problems and has provided an excellent showcase for CIFOR's products. CIFOR has been a major contributor to a number of studies that are supporting the IFF process.

So we embark upon our second five years, and approach the new millenium, with confidence and enthusiasm. We have superb facilities, a strong and diverse team of scientists, and an efficient pan-tropical network of partners. But, most important, in many tropical developing countries a political and social environment exists that is receptive to the new approaches to forest management that CIFOR's research shows to be necessary. ■

CIFOR 1998

Highlights

CIFOR celebrated the fifth anniversary of its founding in May 1993. Today, the centre is well established in its headquarters complex in Bogor, which was donated by the Indonesian government and houses about 40 internationally recruited scientists and more than 70 national staff.

CIFOR helped set **the global agenda for forestry research** at an international consultative meeting in Austria, where a panel of experts proposed initiatives to improve coordination of forestry science and information. The meeting, known as ICRIS, was an intersessional event of the Intergovernmental Forum on Forests (IFF) and was co-sponsored by the governments Austria and Indonesia.

Indonesia's new Minister of Forestry and Estate Crops, Dr. Muslimin Nasution, joined CIFOR's Board of Trustees as the government's representative. He visited CIFOR for a briefing on key research issues in tropical forestry, and also addressed an international meeting at CIFOR on "Forests and People," which emphasised the importance of local participation in forest management.

CIFOR published **A Review of Dipterocarps: Taxonomy, Ecology and Silviculture**, a definitive book on one of the best known and commercially important groups of tropical trees. The book, which contains contributions by 13 internationally recognised specialists, spans research results produced over the past 150 years.

The groundwork was laid for a wide range of research activities at **Bulungan Research Forest in East Kalimantan**, which the government of Indonesia has designated as a site at which to test practices that support sustainable forest management. A new director arrived to head the project, and by the year's end as many as 30 scientists and research assistants were working in Bulungan at one time. CIFOR and several research partners issued guidelines for reduced-impact logging experiments that were set to get underway at the site.

A public forum on **"Forests for the Next Generation"** was held in April at the United Nations University in Tokyo in conjunction with a meeting of CIFOR's Board of Trustees. More than 200 people attended the forum, organized to convey to key audiences in Japan the global value of Japan's overseas development assistance to agricultural research. The Government of Japan is CIFOR's largest donor.

CIFOR achieved considerable media attention as **a source of independent scientific information** when staff scientists were featured in dozens of press, radio and television interviews around the world in relation to the economic crisis in Indonesia and the forest fires in Southeast Asia that occurred in 1997 and 1998. CIFOR continues to post regularly updated material about these situations on its Web site.

Forestry and biodiversity experts from 20 countries met in North Sumatra, Indonesia, in December at the invitation of CIFOR and UNESCO to discuss ways of expanding the **World Heritage Convention** as an instrument for conserving the biodiversity of tropical forests. The group issued detailed recommendations and a proposed list of additional sites to be considered for World Heritage designation.

CIFOR's pioneering project to develop **"criteria and indicators" (C&I)** for guiding sustainable management of forests ended its first four-year phase. A major achievement was completion of a series of social science-based resource tools–including a generic template, a CD-ROM and step-by-step manuals—that others can use to develop customised C&I appropriate for various forest settings.

All publications produced by CIFOR since its inception were compiled for the first time in complete text form on CD-ROM, which is available free of charge. This important new resource includes a reference list of papers and articles by CIFOR staff and their collaborators published in external journals and books.

A provocative new book, **Economic Models of Tropical Deforestation: A Review**, attracted widespread interest for its conclusions that call into question many of the results and methodologies of more than 150 economic models of deforestation. The authors caution that the findings should be viewed with scepticism

ALL PUBLICATIONS PRODUCED BY CIFOR SINCE ITS INCEPTION WERE COMPILED FOR THE FIRST TIME IN COMPLETE TEXT FORM ON CD-ROM, WHICH IS AVAILABLE FREE OF CHARGE. THIS IMPORTANT NEW RESOURCE INCLUDES A REFERENCE LIST OF PAPERS AND ARTICLES BY CIFOR STAFF AND THEIR COLLABORATORS PUBLISHED IN EXTERNAL JOURNALS AND BOOKS.

because of poor data quality and methodological weaknesses, and they urge new approaches in future research of this kind.

CIFOR underwent its **first external programme and management review**, as mandated by the CGIAR. The eight-member review panel commended CIFOR for strong progress in all aspects of its work, and noted that the centre has already achieved an enviable reputation as an authoritative source of scientific information.

A CIFOR–supported **study on the dynamics of China's bamboo sector** was considered for the CGIAR Chairman's Award for Collaborative Research. The study, a collaboration with major research institutions in China, contradicts the conventional view of bamboo as a poor man's timber, revealing instead its promise as a tool for rural development, income generation and rehabilitation of degraded lands.

Building in part on a research project in Madagascar, CIFOR formulated the concept for **a new programme initiative to be known as Adaptive Co-Management**. It was endorsed by the Board of Trustees at the year's end and will combine existing CIFOR projects to develop criteria and indicators and to improve the livelihoods of forest-dwelling people. The work in Madagascar, which is related to broader research efforts to strengthen community-based control of forests, offers a framework for developing more flexible plans for managing natural resources by incorporating innovative tools such as participatory mapping.

A monograph published by CIFOR, **Incomes from the Forest**, offers important lessons for conservationists, NGOs, development experts and others who view non-timber forest products as a major instrument for improving the livelihood of rural people. Citing case studies, the contributors describe relative strengths and weaknesses of various methods that have been employed to promote NTFP development. The book shows that, despite common assumptions, NTFP development does not necessarily guarantee conservation and economic benefits.

In collaboration with researchers in East, Central and Southern Africa, CIFOR began a four-year project, sponsored by the European Commission, aimed at helping to preserve vast **miombo woodlands** in the southern region of the continent. Nearly 40 million people rely on them for food, fuel wood and other daily needs, and concerted efforts are underway to develop a sustainable management plan for the woodlands.

New findings from CIFOR research in several Latin America countries are forcing **a revision of basic ideas about secondary forests**, which regenerate on native forests that have been cleared. Studies showed that secondary forests can provide many of the products that small-farmer households have traditionally acquired from primary forests, while also providing environmental benefits. This suggests the need for incentives to increase the value of secondary forests to farmers, thereby helping to counter the loss of primary forest for agriculture and other uses.

As part of its strategy to become a **"centre without walls,"** CIFOR established regional offices in Belém, Brazil, and Harare, Zimbabwe. These and major CIFOR field operations in Costa Rica, Cameroon, Gabon and other places strengthen CIFOR's collaboration with institutional partners around the world.

As part of an international response to the **devastating forest fires that occur periodically in Southeast Asia**, CIFOR launched a project with the U.S. State Department and the European Space Agency to acquire the kind of information needed to better understand the causes of the fires and devise effective remedies. CIFOR scientists also contributed their expertise to numerous discussions about the fires and to the development of initiatives to address the problem.

CIFOR collaborated with the International Academy of the Environment in Geneva in a policy dialogue to address some of the difficult issues associated with **applying the "Kyoto Principles" to forests**. In related matters, CIFOR presented a paper at a meeting of the Intergovernmental Panel on Climate Change later in the year, and CIFOR staff worked to develop a new research initiative that will look at trade in carbon sequestration services and how it might work to benefit sustainable forestry.

CIFOR UNDERWENT ITS FIRST EXTERNAL PROGRAMME AND MANAGEMENT REVIEW, AS MANDATED BY THE CGIAR.
THE EIGHT-MEMBER REVIEW PANEL COMMENDED CIFOR FOR STRONG PROGRESS IN ALL ASPECTS OF ITS WORK, AND NOTED THAT THE CENTRE HAS ALREADY ACHIEVED AN ENVIABLE REPUTATION AS AN AUTHORITATIVE SOURCE OF SCIENTIFIC INFORMATION.

History and Mission of

CIFOR

Established in 1993, the Center for International Forestry Research (CIFOR) has a mission to bring scientific knowledge to bear on major decisions affecting the world's tropical forests and the people who depend on them.

TODAY, CIFOR CAN POINT with pride to its highly respected staff of international scientists, a vast array of collaborative research projects around the world, important findings that are being reported in an impressive record of publications and a powerful voice in global discussions about how to manage and conserve the world's tropical forests for the benefit of future as well as current generations.

CIFOR arose out of growing concern that emerged from the Rio "Earth Summit" and other international dialogues about rapid deforestation and its associated costs to society in social, economic and environmental terms. In 1993, CIFOR was established as the 16th research centre of the Consultative Group on International Agricultural Research (CGIAR). The CGIAR is made up of public and private-sector organisations devoted to improving agriculture and natural resource use in ways that reduce hunger and poverty among people in developing countries without causing lasting environmental damage. CIFOR's role in this quest is important because millions of people around the world depend heavily on forest resources for their income and basic needs, and the conversion of forest land for agriculture is a primary cause of forest loss.

CIFOR's mandate stems in part from a sea change in philosophy that has occurred in the field of forestry over the past two decades. There is now widespread agreement that forests should no longer be managed mainly for timber production, but for balanced, multiple use that reflects a broader array of social values and demands by different sectors of society.

Reconciling these competing economic, social and environmental demands is a challenge for government officials, policy makers and resource managers who must make day-to-day management decisions and long-term policies governing forest use. They have an urgent need for practical scientific knowledge and analysis that

can guide their responses. To help address this need, CIFOR research is designed to emphasise strategic applications and produce findings that are generalisable to a variety of situations. Where possible, the centre also works closely with other institutions to strengthen local research capacity in developing countries, thereby providing the means for ongoing attention to regional and national forest-related problems.

The goal of CIFOR's wide-ranging research programme is to acquire more complete knowledge about forest ecology and forest use, and to better understand the relationships between these. Current research projects are investigating underlying causes of deforestation; improvements in productivity and silvicultural practices; methods for assessing biodiversity and other forest conditions, and for measuring progress toward sustainable management; innovative approaches to local management of forests; options for environmentally benign rural development; new modelling and analytic tools for forest systems; and the valuation of various forest goods and services.

An endorsement of these and other directions came in 1998, when an independent panel completed the first external review of CIFOR's research programme. The reviewers commended the centre for its vision and achievements in its initial five years, and for making very good progress in all aspects of its work. The final report concluded that CIFOR had achieved an enviable reputation in a short time and had already acquired status as a key participant in major international dialogues concerned about the fate of the world's forests.

CIFOR's research programme is grouped under several major project categories, but the multidisciplinary nature of the centre's approach means there is considerable overlap and integration. Although the research described herein is only a selection, it is intended to convey the breadth and impact of the centre's work overall.

With the continued support and expertise of its many institutional partners in the years to come, CIFOR will continue to make tangible contributions toward efforts to maintain the well-being of the world's tropical forests while ensuring the livelihood of the people who depend on them. ■

A HOME IN THE TROPICS

THE CENTRE OF CIFOR'S OPERATIONS is in Bogor, a noted centre of agricultural and horticultural research in Indonesia. In February 1997, CIFOR moved into a new headquarters complex donated by the Government of Indonesia and situated on 10 hectares of forest land.

Indonesia, with a significant portion of the world's remaining rainforests, is an ideal home for CIFOR. The Indonesian Ministry of Forests and Estate Crops has been highly supportive of CIFOR's work and collaborates in research at many sites throughout Indonesia. In 1995 the Indonesian Government allocated 300,000 hectares of primary forest in the Bulungan District of East Kalimantan to serve as a long-term research site for studying model management practices designed to promote sustainable use of tropical forests.

CIFOR's talented team of internationally recruited scientists are based in Bogor but carry out research activities throughout the world in conjunction with a host of institutional partners — constituting a "centre without walls." CIFOR also welcomes many guest scientists to its headquarters complex, and hosts numerous conferences and workshops to disseminate important research techniques and results.

Today, CIFOR's staff numbers about 130 people, including 60 internationally recruited scientists; reflecting the centre's multidisciplinary approach to scientific research and forest management, they include economists, anthropologists, sociologists and geneticists as well as forest ecologists, silviculture experts and data specialists. The centre's annual budget has grown to more than US$ 11 million, and CIFOR is now involved in major research activities in three dozen countries. ■

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1. A *Curealionidae* weavil iin Peru's Manu National Park.
2. Wild orchids found in the rainforest of West Java, Indonesia.
3. A bamboo plantation in China.
4. Bird's-eye view of the Green Land in Manaus, Brazil.
5. Bark harvested from girdled teak in Central Java, Indonesia.

toward sustainability of forests

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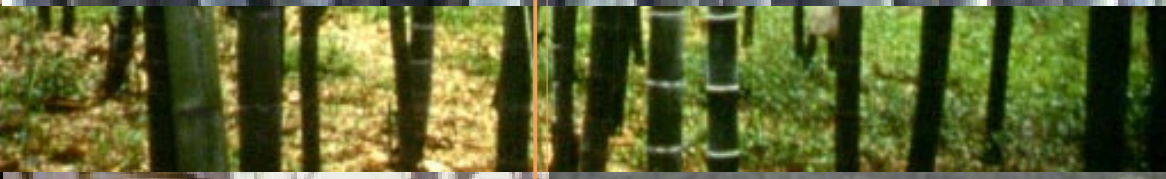

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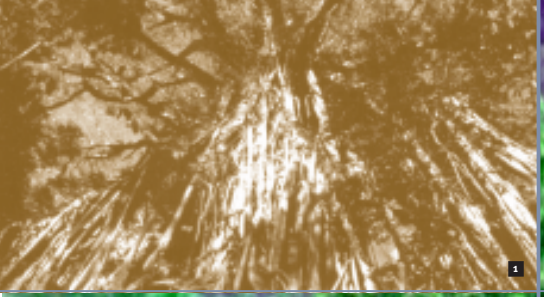
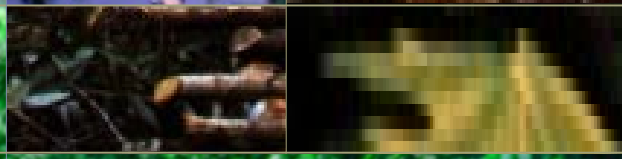
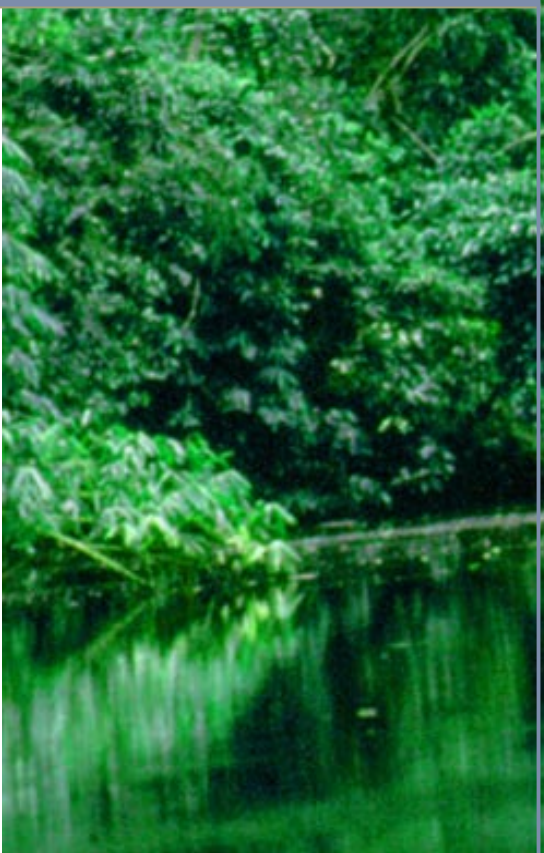


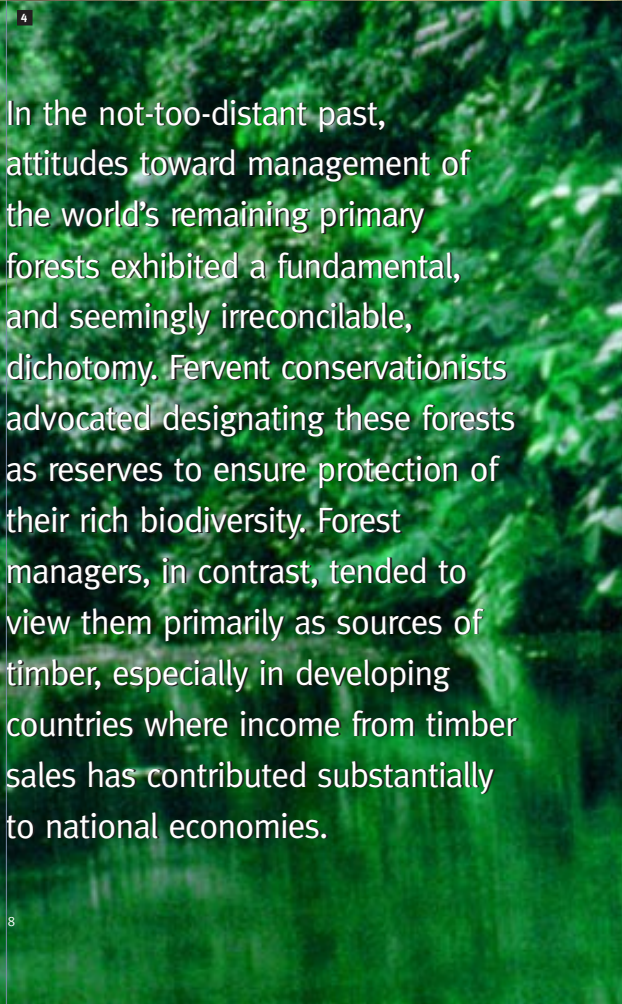
1. The strangler fig can be found in Central Sumatra, Indonesia.
2. Conventional log extraction in swamp forest of Sibu, Sarawak, East Malaysia.
3. The exotic and highly endangered bird of paradise in Indonesia.
4. River channel in a lower montane rainforest of Peru's Manu Biosphere Reserve.
5. Portrait of deforestation.

> "Employing RIL techniques is not equivalent to sustainable forest management, but in many forests, it would constitute a substantial step in the right direction."
>
> ***Dr. Jack Putz,*** *CIFOR forest ecologist*



Toward Sustainability of Forests





In the not-too-distant past, attitudes toward management of the world's remaining primary forests exhibited a fundamental, and seemingly irreconcilable, dichotomy. Fervent conservationists advocated designating these forests as reserves to ensure protection of their rich biodiversity. Forest managers, in contrast, tended to view them primarily as sources of timber, especially in developing countries where income from timber sales has contributed substantially to national economies.

LATELY, HOWEVER, A MAJOR shift in thinking has occurred. It views forests as complex ecosystems that must be managed wisely as part of the landscape to provide a balance of goods and services while minimising long-term environmental damage. Thus, forests should benefit humankind for years to come.

This concept of "sustainability" is now a guiding principle for natural resource management in many countries. Yet management for sustainability is complex, and much remains to be learned about how to achieve it. CIFOR is a leading provider of authoritative information needed to make sustainability of the world's tropical forests a reality.

REDUCED-IMPACT LOGGING

CONVENTIONAL LOGGING PRACTICES are often highly destructive to forest ecosystems. Heavy machinery can compact the soil and destroy vegetation while high-volume harvesting can contribute to erosion, and reduce species diversity and regenerative capacity. Excess organic debris can make forests more vulnerable to destruction in the event of fire.

Since its inception, CIFOR has given priority to research to quantify environmental effects of reduced-impact logging (RIL). As part of a broad programme on Sustainable Forest Management, CIFOR has been engaged in RIL studies in Malaysia, Brazil, Indonesia, Cameroon, Bolivia, Tanzania and Zambia. The results are aiding the development of guidelines and tools (such as software) for managing timber production so as to minimise damaging ecological side effects. Because acceptance of RIL methods entails the support of the logging industry and government, CIFOR is committed to collaboration with state and private logging enterprises in carrying out this work.

Previous research by CIFOR and others has demonstrated that environmental damage can be minimised through the use of site-sensitive harvesting techniques. Among the findings, it has been shown that RIL methods can reduce impacts to the soil from heavy logging machinery by 25 percent, and lead to a gain of as much as 50 percent in the "carbon storehouse" benefits from the remaining vegetation. In some RIL experiments in lowland tropical forests, the amount of damage to the soil and to advanced regeneration was reduced by about 50 percent relative to conventional logging.

Encouraging findings such as these led the International Tropical Timber Organization (ITTO) to adopt the goal of widespread implementation of reduced-impact logging by the year 2000. The Food and Agriculture Organization of the United Nations recently published a Model Code of Forest Harvesting Practices, and other institutions have issued similar guidelines. While guidelines such as these offer a general basis for reduced-impact logging practices, they must be interpreted at a site-specific level.

RIL studies are a central focus of CIFOR research in Bulungan Research Forest in East Kalimantan, Indonesia. A primary goal of this work is to aid the development of policy incentives that promote the adoption of reduced-impact logging by timber concessionaires.

In many industrialised countries, reduced-impact techniques for timber extraction in natural forests have been in use for many decades. Yet similar practices have not been widely adopted for timber harvesting in tropical forests. In a paper titled "Why Poor Logging Practices Persist in the Tropics," Drs. Jack Putz and Dennis Dykstra of CIFOR looked at excuses commonly given by commercial loggers when asked why they did not use improved timber harvesting practices. The authors challenge these perceptions in arguing the merits of reduced-impact logging.

The economics of reduced-impact logging is the focus of CIFOR-supported studies underway since 1996 at two sites in Brazil: Tapajós National Forest, near Santarem, and Curua-Una, an experimental forest downstream from Santarem. In a new research thrust in Brazil, CIFOR scientists in Belém co-sponsored a workshop in December with EMBRAPA to discuss guidelines for RIL field experiments in production forests of Eastern Amazon. The work is part of a joint project to develop a sustainable management plan for the region.

Meanwhile, in Tanzania and Zambia, CIFOR is participating in two coordinated field studies of reduced-impact logging under a long-term programme, funded by the European Union, to achieve sustainable management of the important and ecologically threatened miombo woodlands of East, Central and Southern Africa.

BIODIVERSITY CONSERVATION

TODAY, MUCH OF THE WIDESPREAD concern about the loss of tropical forests stems from increased public awareness about their importance as a major repository of biodiversity. Yet reliable

scientific knowledge about the nature and extent of biodiversity loss from forest disturbance is still quite limited.

CIFOR research in this area includes studies to determine the impacts of disturbances such as logging, non-timber forest product extraction and forest fragmentation on *in situ* conservation of biodiversity. A goal is to acquire generalisable data from representative ecoregional research sites that can be used to generate and test spatial and process models.

In a wide-ranging project, researchers from India, Thailand, Indonesia and Malaysia have been working under the auspices of CIFOR and the International Plant Genetic Resources Institute (IPGRI) to investigate how human activities affect the genetic resources of forests. The work is multidisciplinary, involving research components on genetic resources, reproduction ecology of the species studied and socioeconomic aspects of communities in and around the forest sites.

IN A WIDE-RANGING PROJECT, RESEARCHERS FROM INDIA, THAILAND, INDONESIA AND MALAYSIA HAVE BEEN WORKING UNDER THE AUSPICES OF CIFOR AND THE INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE (IPGRI) TO INVESTIGATE HOW HUMAN ACTIVITIES AFFECT THE GENETIC RESOURCES OF FORESTS.

In Malaysia, for example, it was found that although the impacts of logging were evident in all species sampled, the loss of genetic diversity did not exceed 24 percent. Similarly, the impact of harvesting wood for timber and fuel in Thailand was significant only at very high harvesting intensities. A study in Central Kalimantan demonstrated a significant increase in species inbreeding after logging – results that will be investigated further in a dipterocarp species.

In 1998, with the recruitment of Danish International Development Agency associate expert Dr. John Poulsen, CIFOR launched a new initiative under this project in India's Western Ghats. The study, which entails extensive interviewing of local tribal and non-tribal people, will assess landscape-scale impacts of non-timber forest product extraction on the region's flora and fauna, including birds, butterflies, small mammals, trees and herbs.

Other work in India done as part of this project revealed that poorer households are most heavily dependent on the collection of NTFPs, and with many NTFPS entering the market there is a tendency toward unsustainable harvesting, even among indigenous communities that traditionally have relied on these products for their livelihoods. Consequently, the regeneration of some important plant species has been almost completely absent in some areas, thereby eroding the genetic diversity of these species.

In Central Kalimantan, CIFOR scientists are studying the impacts of logging on the diversity of birds and small mammals, as well as on vegetation structure. Initial results from the comparison of biodiversity in logged versus unlogged sites have indicated that selective logging has less significant impacts on species richness and diversity. Patterns of bird community structure, species composition and relative abundance were adversely affected by both logging activity and landscape factors (as gauged by topographic position and wetness).

Meanwhile, biodiversity baseline data from integrated surveys in Indonesia, Thailand, the Western Amazon basin and Cameroon are providing insights into the response of biodiversity and carbon sequestration along gradients of land-use intensity. New, generic indicators of these response patterns have been identified through the use of Plant Functional Types (PFTs), which reflect plant adaptation to changing physical environments. A multidisciplinary study conducted in lowland Sumatra, Indonesia, has established potentially useful linkages between vegetation structure, key groups of plant and animal species, PFTs and soil nutrient availability.

Finally, in Costa Rica, CIFOR researchers and their collaborators are studying impacts of fragmentation on genetic diversity. The studies are being done in an area of 22 riverine fragments of landscape that was cleared, mainly for cattle ranching. The research is designed to determine whether the fragmentation adversely affects the work of insect pollinators and possible consequences on the genetic diversity of four important tree species.

NON-TIMBER FOREST PRODUCTS

NON-TIMBER FOREST PRODUCTS have long been an important component in the livelihood strategies of forest-dwelling people. Today, efforts to promote more environmentally benign use of

BULUNGAN RESEARCH FOREST: AN "R&D" SITE FOR MODEL PRACTICES

WITH THE ARRIVAL OF Dr. Kuswata Kartawinata as director in March 1998, CIFOR's work in Bulungan Research Forest gathered momentum. The site, which consists of 321,000 hectares of prime forest land in the Bulungan District of East Kalimantan (Borneo), was designated by the Indonesian Ministry of Forestry in 1995 to serve as a place for testing practices of sustainable forest management. The International Tropical Timber Organization (ITTO) and France's CIRAD-Forêt are major partners in the project.

In the latter half of the year, as many as 30 scientists were working at one time in the area, and the project received a grant from the MacArthur Foundation to support the work of Indonesian graduate students working at Bulungan. Plans to build a semi-permanent CIFOR field station in the forest also got underway.

The Bulungan research site is covered almost entirely by primary forest and is considered particularly rich in biodiversity. Some of the forest is under protection, but a state-owned logging company, INHUTANI II, has been doing selective logging since 1997. The forest is also under growing pressure from other commercial enterprises, including coal mining and oil palm plantations. Local people inhabiting the area, mainly Punan and Kenyah rice farmers, practice extensive agroforestry and harvest a variety of non-timber forest products.

Multidisciplinary research by CIFOR and its many institutional partners is exploring the impacts of these activities on the ecology of the forest and the well-being of the local people.

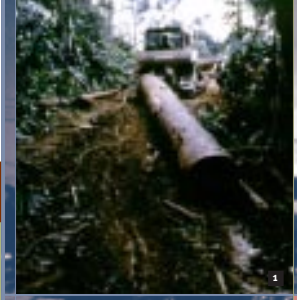
In 1998, CIFOR issued "Reduced-Impact Logging Guidelines for Lowland and Dipterocarp Forests in Indonesia," which will form the basis of RIL experiments at Bulungan. The guidelines are not final, but a set of working hypotheses to be tested and revised as necessary according to the research results. CIFOR researchers hypothesise that adoption of the techniques should reduce disturbance to soil and vegetation by as much as 50 percent over conventional logging practices, while reducing logging costs by at least 15 percent.

Workshops were held to train INHUTANI II managers in forest inventory and topographic assessment techniques, while workers learned RIL-compatible directional felling methods and skid trail construction. Inventories were done in areas where initial experiments will be carried out, topographic maps were produced and a logging plan was developed.

Research at Bulungan will include an array of biodiversity studies. Activities in 1998 included GIS imaging done as the basis for developing a comprehensive database and a digital elevation model of the entire Bulungan research area to facilitate ongoing research. The Wildlife Conservation Society did a pre-logging biodiversity assessment of the area. The information was used to compile the *Bulungan Ethnobotany Handbook*, a field guide to important plants and animals in the region. Meanwhile, a biologist from the Indonesian Institute of Sciences began a plant inventory and identification project at Bulungan in preparation for establishing a herbarium.

CIFOR's social science research at Bulungan builds on a considerable body of anthropological data on East Kalimantan collected over several decades by a host of international and regional institutions that include the World Wide Fund for Nature-Indonesia; Mulawarman University in Samarinda, Indonesia; and the Indonesian Forestry Research and Development Agency (FORDA). Much of this work is being done in the vicinity of Long Loreh, a Dayak village near the site of the reduced-impact logging experiments. Surveys done in 1998, as part of a multi-pronged CIFOR effort to develop social science methods effective in assessing human well-being, added significantly to baseline information about residents of Long Loreh and their relationship to the forest. In October, CIFOR co-sponsored a workshop that looked at possible ways of formalising local people's rights to the forest land they inhabit.

Additional areas of research focus include shifting patterns of land use and the role that non-timber forest products (NTFPs) play in meeting the needs of local people. A socioeconomic history of the Bulungan area that is now being written, based in part on archival records in the Netherlands, will help determine the direction of these and other studies. ■



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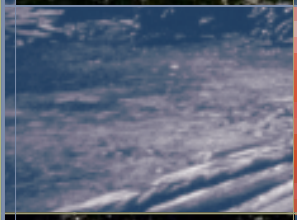

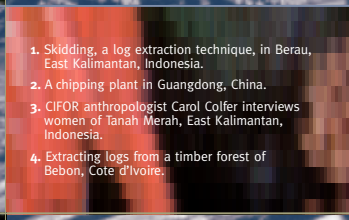

1. Skidding, a log extraction technique, in Berau, East Kalimantan, Indonesia.
2. A chipping plant in Guangdong, China.
3. CIFOR anthropologist Carol Colfer interviews women of Tanah Merah, East Kalimantan, Indonesia.
4. Extracting logs from a timber forest of Bebon, Cote d'Ivoire.

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forests has led to increased interest in NTFP collection and marketing as an instrument for sustainable development. Despite this emphasis, however, there is no guarantee of a positive outcome. A large body of NTFP research by CIFOR and its many collaborators has been influential in providing useful lessons about what works, and what doesn't.

As CIFOR scientists and others have noted, considerable research has already been done on NTFPs. But much of the resulting knowledge has been narrowly focused and specific to certain locations, products and user groups, thereby limiting its usefulness. In contrast, CIFOR focuses on the broader dynamics of NTFP collection, use and trade, especially in the context of social, economic and environmental changes. Thus, the findings should lead to better


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understanding of the actual role or potential opportunities of NTFPs as a tool for development and conservation in a variety of settings and strategies.

A highlight of 1998 was the publication of *Incomes From the Forest: Methods for the Development and Conservation of Forest Products for Local Communities*. Based on case studies from a number of organisations, it offers useful lessons about various methods that have been used to assess the conservation and development of forest products in different contexts. The book includes a conceptual framework that illustrates the complex nature of NTFP development and conservation, with issues that must be addressed at various levels: in households, markets, local institutions and the surrounding forest.

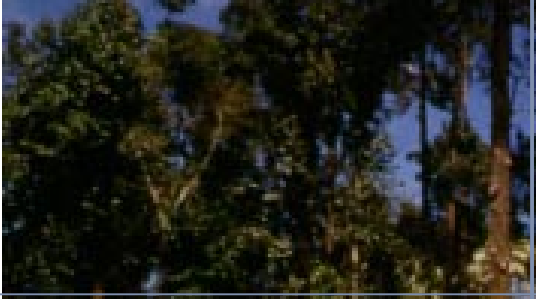
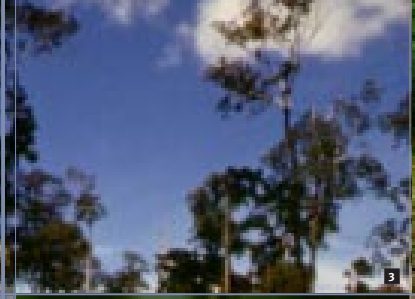
Also in 1998, CIFOR began a major global research study designed to provide insight into NTFPs and their relation to land use and local livelihood strategies. In the initial phase, CIFOR is studying a number of forest products in Indonesia as case studies to analyse the process of NTFP use and development. Eventually, similar studies will be done in the three main tropical regions, leading to international comparisons and broad-based conclusions. This global comparison will constitute CIFOR's main research thrust on NTFPs in the next couple of years.

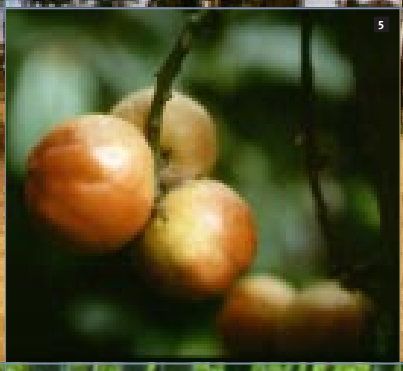
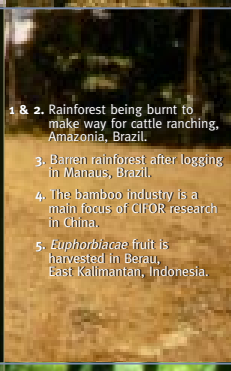
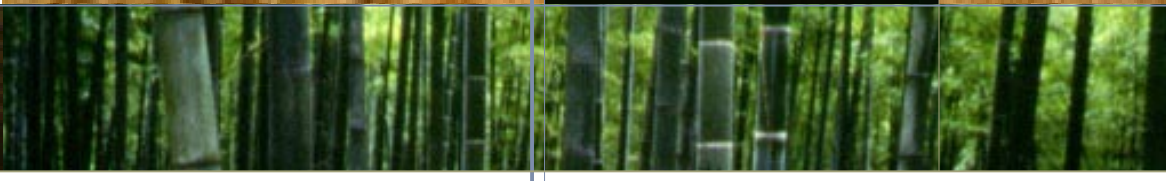
Among the research in Indonesia, researchers are investigating the potential for renewed viability of small-scale cultivation of rattan and fruit gardens in an area of East Kalimantan in the face of changing government regulations. Rattan was once a key product of the area, but local production essentially collapsed since the late 1980s following a ban on the export of raw rattan to safeguard domestic supply.

The multi-faceted research initiative is modelled in part on a pioneering study of the dynamics of the bamboo sector in China, which involved close collaboration by Drs. Manuel Ruiz Pérez and Brian Belcher of CIFOR and scientists from the Research Institute of Subtropical Forestry and China's National Economics and Development Research Center. The findings of this research are now being used by the Chinese Ministry of Forestry to guide new policies and support for the bamboo sector in China.

In a comparative study of damar agroforests in Krui, Sumatra, and the collection of gaharu (a resin-impregnated fragrant wood) in East Kalimantan completed in 1998, researchers found that the level of income earned from a forest product is not enough to predict whether people are likely to sustain that income source or exploit it. Instead, it is necessary to understand the future expected importance of the income source in the household livelihood. Hence, steady but low income from damar was seen to be valued more than the high returns from perennial crops such as coffee because of the damar income's contribution to household food security.

A particular focus of interest in the research on gaharu collection was the more general question of how high prices are likely to affect incentives for sustainable management of an NTFP. The study examined the economic importance of gaharu to Kenyah swidden farmers in three villages. Today, this wood still ranks

1 & 2. Rainforest being burnt to make way for cattle ranching, Amazonia, Brazil.

3. Barren rainforest after logging in Manaus, Brazil.

4. The bamboo industry is a main focus of CIFOR research in China.

5. *Euphorbiacae* fruit is harvested in Berau, East Kalimantan, Indonesia.

among the most highly valuable traded forest products worldwide. Findings reported in 1998 showed that since 1993, prices paid to collectors in East Kalimantan for high-quality specimens have soared to unprecedented heights, stimulating the most intensive period of gaharu collection in living memory.

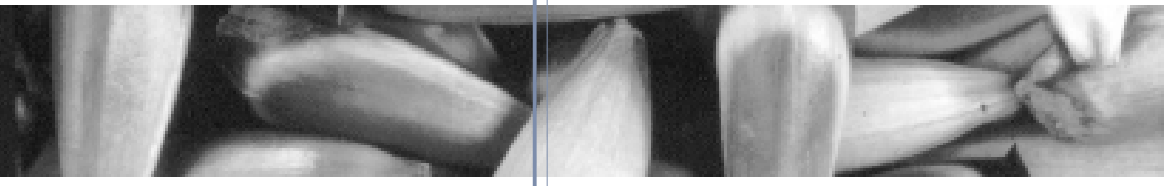
Another study in Indonesia is examining widespread collection and marketing of benzoin (a tree resin used chiefly for incense, perfume and medicine) in North Sumatra. Among the findings to date, benzoin was found to be particularly important to middle-income villagers; in both absolute and relative terms, this group has a much higher income from benzoin than the poorest group. The results correspond well with similar findings for bamboo in China.

Key partners in CIFOR's research in Indonesia are the Center for Social Forestry at Mulawarman University in Samarinda and Project FORRESASIA, a European Union-supported programme concerned with alternative strategies for the development of forest resources. The research in Kalimantan builds on a strong foundation of related work in the region by other local and international collaborators, including the World Wild Fund for Nature-Indonesia, Indonesia's Forestry Research and Development Agency (FORDA) and the Consortium for Community Forestry.

Much CIFOR research on the role of forest products in development is also being done in Bolivia and Zimbabwe. Follow-up work will focus on legal, institutional and marketing factors that affect NTFP trade in these two countries, such as new forestry laws, land tenure practices, village structure and competition between institutions.

Research in northern Bolivia has analysed a dramatic shift in the distribution of benefits from NTFP collection following the collapse of the Brazilian rubber market in the 1980s. Previously, rubber barons exerted control of trade through peonage systems that left rubber tappers heavily indebted and locked out of the benefits from forest product sales. Today, Brazil nut collection and processing has become the single most important source of income for many rural households. Factories in neighbouring cities control processing, and forest residents reap financial benefits from both collecting the nuts and working seasonally in the shelling plants.

In Zimbabwe, CIFOR is participating in analysis of economic and ecological impacts of a booming wood-carving industry that offers much needed income to thousands of rural residents. The project is under the auspices of CAMPFIRE, a programme of the U.S. Agency for International Development that promotes the protection of biologically threatened areas by enlisting the support of local people who can benefit from eco-tourism based on wildlife and from commercialisation of natural resources. The wood-carving industry in Zimbabwe has been controversial because of concerns that some indigenous species of trees are being seriously depleted as a source of wood. Studies by CIFOR and other research partners are exploring issues related to sustainable management of local wood supplies, including legislative reforms, economic incentives for change and local participation in planning constructive solutions.



Also in 1998, new NTFP field work was conducted in the Western Brazilian Amazon, and spatial analysis of data for the Alto Juruá Extractive Reserve began. Preliminary results show a changing pattern of settlement in the reserve, with rubber tappers moving from the hinterland and headwaters to the more accessible river banks. Changes in the economic base of the area have also been seen. Rubber was shown to play a decreasing role, while some crops, livestock and income from the tertiary sector (such as pensions and health and school salaries) have increased their contribution to the reserve's production.

In Cameroon's Humid Forest Zone, a programme of NTFP research by CIFOR brought to light an unexpected situation, showing that women in the region play a surprisingly strong role in NTFP production and trade in sharp contrast to their restricted role in decision-making. Although NTFP trade in Cameroon is officially governed by local regulations, women were found to exert considerable control over the markets, as well as related savings schemes that operate to finance NTFP trading ventures. The findings have implications for socioeconomic policy change and sustainable management of forests in Cameroon – and potentially other tropical regions – because NTFP trade appears to be an important income strategy for women, who constitute the majority of poor forest dwellers in rural Cameroon but are generally denied ownership of land and assured access to forest resources.

The research has also demonstrated the potential role of NTFP markets in degradation of forest resources, and underlines the difficulty in achieving a balance between improving the livelihood of forest-dependent people and forest conservation. It revealed an increased dependency of rural dwellers on medicinal plants as a result of a national economic crisis and the devaluation of the CFA franc.

UNDERLYING CAUSES OF DEFORESTATION

MANY PHYSICAL CAUSES OF deforestation have been identified and are the focus of considerable research aimed at minimising ecological damage. But not all causes of forest degradation and loss are direct and obvious; social processes and economic policies also play a major role. Sorting out the various factors and interrelationships of these processes and how they affect the condition of forests and forest-dwellers is a challenge for researchers.

CIFOR studies are providing important insight into the impacts of extra-sectoral influences such as economic policies (especially structural adjustment programmes) and technological advances in agriculture and decentralisation. Much of this work is centered around a comparative study of macroeconomic changes in Bolivia, Cameroon and Indonesia. Other significant research is being done in Southern and Eastern Africa and in Central America.

In 1998, Drs. David Kaimowitz and Arild Angelsen published *Economic Models of Tropical Deforestation: A Review*, which has generated widespread interest among researchers and policy makers because of its provocative conclusions. Summarised in a major research journal of the World Bank, it calls into question many of the conventional hypotheses about causes of deforestation.

PLANTATIONS AND REHABILITATION OF DEGRADED LAND

PLANTATION FORESTRY, ESPECIALLY ON degraded or low-potential sites, is a major focus of research by CIFOR because of the need to meet the world's huge appetite for lumber, pulp and other wood products. Much of this work includes efforts to optimise the productivity of plantation forests.

The challenge for foresters, scientists and industry is to develop planted forests that are economically viable as well as biologically sustainable. This is already being achieved in many industrialised countries. Yet plantation forestry is still relatively new in many tropical countries, and little is known about local conditions and problems that may limit yields – poor water and nutrient levels in the soil, erosion, genetic stock variation and improper site preparation, for example.

Under the direction of Dr. Christian Cossalter, an expert on reforestation of marginal lands, CIFOR is engaged in a number of research studies around the world designed to yield information that will improve soil fertility and boost productivity of tree plantations over successive generations.

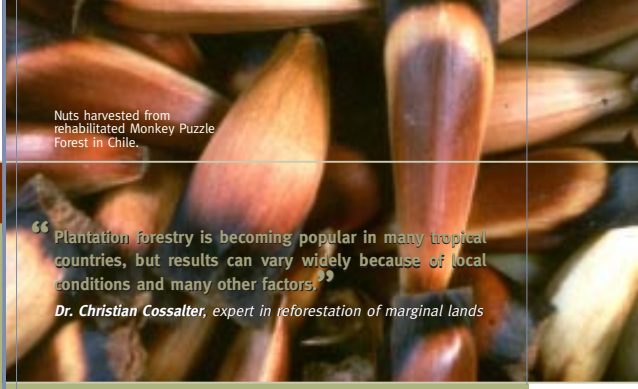
In 1998, field experiments continued at 16 plots in seven countries – Australia, Brazil, China, Congo, India, Indonesia and South Africa – in a project to determine the best methods for plantation harvesting in tropical countries under a wide range of ecological conditions. The results will help site managers select the best management strategies to correct productivity problems at the individual sites, and should be relevant as well to plantation forestry in general.

Among the sites under study are low-performing eucalyptus plantations in China and India. Planted eucalyptus forests are one of the major sources of wood and pulp for both domestic and international demand. But yields at the experimental sites in China and India are well below average for the species. Researchers are testing a variety of treatments they hope will remedy the problem.

Meanwhile, similar experiments launched in 1998 provide the basis for research to develop "criteria and indicators" suitable for guiding management of plantations to maintain or increase productivity. Another tool being developed to aid plantation management is a promising approach that combines geographical information systems (GIS) and multi-agent systems (MAS). Eventually it should enable forest managers to build spatial models of plantations to examine interactions of plantations with other natural resources and with local inhabitants, thereby facilitating decisions related to landscape management.

Although forest plantations are well-delineated areas, they are nonetheless part of larger landscapes. This raises important questions about what impacts plantations may have on broader ecosystems. How, for example, does plantation agroforestry affect biodiversity? Do plantations near protected areas pose a threat to the native flora and fauna by facilitating the introduction of generalist or exotic species? CIFOR is expanding its work on plantations to address questions such as these.

Rehabilitation of forest land that has been degraded offers potential commercial value as well as important environmental benefits. Regeneration requires addressing problems such as loss of soil fertility, the effects of erosion and disturbance to hydrological balance and other ecological functions. Solutions include a variety of practices such as accelerating natural regeneration, enrichment planting, altering rotation cycles, cultivating fast-growing species, using improved genetic stock, reducing the impacts of logging and establishing mixed plantations with fast growing and shade tolerant species.



Nuts harvested from rehabilitated Monkey Puzzle Forest in Chile.

> "Plantation forestry is becoming popular in many tropical countries, but results can vary widely because of local conditions and many other factors."
>
> ***Dr. Christian Cossalter**, expert in reforestation of marginal lands*

CIFOR research on degraded lands spans the globe, encompassing a range of forest types. Japan has been a major funder of this programme, which is coordinated by Dr. Shigeo Kobayashi.

One focus of research is silvicultural techniques for improving degraded forest lands. A joint study with Kasetsart University in Thailand, for example, is evaluating the ecological impacts of teak plantation thinning at various patterns and intensities, and the effects on intercropping with plants such as coffee. In another plantation study, experiments got underway in 1998 at two 7-year-old eucalyptus plantations in Sao Paulo State, Brazil, that are owned by paper mills. Planned in conjunction with Brazil's EMBRAPA/CNPF, the study will evaluate how the impacts of soil compaction from harvesting and tilling methods affects site productivity. The findings will have broad implications, because eucalyptus forests make up nearly 40 percent of all tree plantations in Brazil, with about 1 million acres in Sao Paulo State alone.

In a major partnership with China, CIFOR scientists are studying socioeconomic approaches that could help support widespread efforts to reclaim degraded lands. Degraded lands in mountainous and hilly areas account for more than 60 percent of China's total land area, and there is a dire need to encourage productive use of this land, especially by small-scale farmers. Tree planting is a highly favored solution, but there is concern about the sustainability of tree planting on such lands. The Chinese Academy of Forestry has produced a number of technological solutions, but a major problem is how to apply these technologies at a wide scale and in ways that are appropriate for selected areas.

Unfortunately, forestry research in China and other countries is often hampered by poor data. Available information about forest resources may be inconsistent and uneven in quality, and methods commonly used to compile such material can lead to inexact interpretations. In 1998, CIFOR scientists continued their collaboration with several institutions in China and Indonesia to improve systems of collecting forest data, thereby facilitating more authoritative analysis. Following a review of statistical data from forestry agencies in the two countries, they began synthesising and analysing the results and formulating recommendations in preparation for a related workshop that will be held in Bejing in May 1999. ■

"While potentially very useful, quantitative models also have their limitations. The usefulness and validity of many of these to explain deforestation should be questioned because of poor data and doubtful assumptions."

***Dr. Arild Angelsen,** CIFOR economist*

Rattan and damar collection among Dayaks is a focus of CIFOR research in West Kalimantan, Indonesia.

The authors reviewed the methodologies and results of more than 140 economic studies of tropical deforestation. They caution that many of the findings should be viewed with skepticism because of poor data quality and weaknesses in study design. Quantitative economic modelling of deforestation has become very popular in recent years. While some of these studies have offered useful insights, the authors argue that commonly used approaches such as national and multi-country regression models are of limited value. They recommend a shift toward household and regional-level studies, which should shed greater light on factors that influence decisions by agents who are directly involved in forest use and clearing.

Other path-breaking work by this research programme is challenging prevalent ideas about agriculture intensification and its impact on forests. The conventional paradigm has been that improved agricultural productivity resulting from technological advances lessens the pressure on forest resources, thereby supporting forest conservation aims. But CIFOR researchers have found many instances in which innovations in the agriculture sector have created new opportunities for farmers, who have thereby cleared land more rapidly than they might otherwise have done. In particular, the research suggests, capital-intensive technologies suited for agricultural frontier conditions, and production for export, are likely to increase conversion of forest land.

Because structural adjustment programmes have a major impact on forests and forest-dependent people, CIFOR is investigating the impacts of such programmes and analysing the feasibility of alternative strategies. Only a few years ago, poor people and their shifting agriculture practices were seen as the main driving force behind deforestation. But recent evidence is indicating that commercial factors and macroeconomic changes can have a far greater impact.

Comparative studies in Indonesia, Cameroon and Bolivia are demonstrating how national economic crises and subsequent government macroeconomic policies affect local patterns of livelihood and forest use. By combining social science methods and remote-sensing data in many cases, the researchers are acquiring answers to central questions such as what affects farming decisions at the household level and how this relates to forest clearing.

SECONDARY FORESTS

SECONDARY FORESTS, WHICH regenerate on native forest that has been cleared for ranching or agriculture, are an important focus of CIFOR research because of growing evidence that they help counter the loss of primary forest. Studies have demonstrated that secondary forests can be managed to provide many of the products that small-farmer households traditionally obtained from primary forests, while providing some of the environmental benefits of primary forests. The findings are leading to an interest in efforts to use policy and technological interventions to augment the value of secondary forests to farmers, thereby inducing them to maintain the amount of area devoted to secondary forests and delay its re-conversion to other uses.

Most of the research in this area has been done in several South American countries, under the direction of Drs. Joyotee Smith and César Sabogal. Secondary forests cover an estimated 165 million hectares of land in Latin America. The work is supported by funding from the Inter American Development Bank and the Spanish Agency for International Cooperation and includes major involvement by the Tropical Agricultural Center for Research and Higher Education (CATIE).

In 1998, the programme reported encouraging findings from a study in Amazonian Peru that contrasts with generally bleak scenarios about tropical deforestation. Results showed that substantial amounts of secondary forest existed in the area studied even several decades after colonist settlement began. The implications are important because they suggest that deforestation related to slash-and-burn agriculture may be considerably less than commonly believed.

The researchers found that regeneration of secondary forests on previously cleared land appeared to mitigate the impacts of residual primary forest loss. As a result of secondary forest growth, more than a third of the farms in the area studied remained under forest cover after three or four decades of frontier development.

This and related research in Brazil and Nicaragua is part of a broader effort to better understand the dynamics of secondary forests – that is, how their role changes as colonist frontiers develop. The study sites in the three countries were selected to represent different stages of frontier development, with biophysical and socioeconomic research now ongoing. One objective of the project is to develop bio-economic models for analysing how changes in various factors affect the profitability of forest-based small farmers and related decisions about land use.

Other initiatives in this research programme include studies to evaluate the use of silvicultural interventions to enhance the productivity of timber species on young secondary forests. Following a pilot study in Costa Rica, experiments are being carried out in Peru and Nicaragua. CIFOR also is working to compile a book that will provide a comparative review of logged-over and second-growth forests in three regions of the world and aspects related to sustainable management of them. ■

1. The rapid clearing of land has placed the Javan gibbon on the endangered species list.
2. Commercial factors contribute to deforestation in Indonesia and elsewhere.

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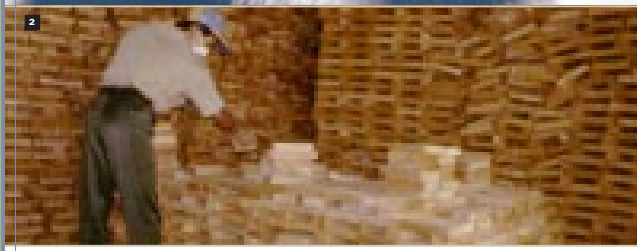

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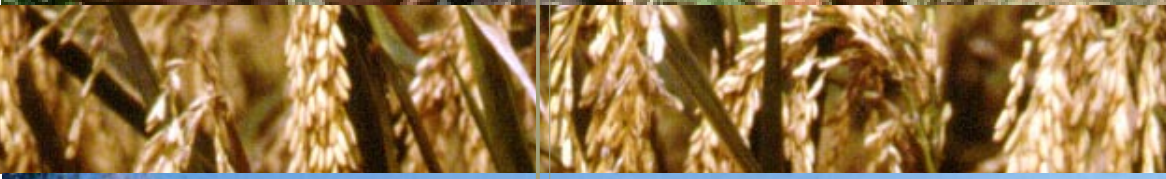
In 1998, CIFOR researchers analysed the results of surveys in Cameroon to determine how changes in market prices and a massive currency devaluation that followed a national economic crisis in the 1980s influenced what crops people planted and the amount of land they used. One important finding was that, as global market prices fell, small-scale farmers shifted from production of export crops such as cocoa to subsistence crops, and they did so by clearing more forest land rather than using land previously cleared for agriculture. (They retained their export crop plots in the hope that prices would eventually revive.) This project, being done in conjunction with the U.K.'s Department of Overseas Development, is also investigating other aspects of macroeconomic policy effects as well as the influence of new forestry laws in Cameroon.

The trend of decentralisation that is occurring in many tropical countries is another extra-sectoral factor that is affecting how forest resources are managed and by whom. CIFOR and research partners that include the Center for Research on Labor and Agrarian Development (CEDLA) and the Bolivian Sustainable Forest Management Project (BOLFOR) have been working to determine whether decentralisation will ultimately benefit forests by reversing historic patterns of control by powerful forces that tended to increase forest clearing and degradation in the Bolivian lowlands.

Initial findings have shown that decentralisation in Bolivia has brought benefits to many poor rural people in heavily forested areas, including greater access to forest resources, restricted encroachment by large timber companies and ranchers, and a greater voice in policy making. Nevertheless, there are major obstacles that could undermine sustainable management and use, including weak local technical capacity, limited national support and organisational problems among small-scale loggers. ■



managing forests for multiple use

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1. Saplings are planted in Tanzania's Udzunqwa Mountains.
2. Preparing charcoal in Pakistan.
3. Tebulo's butterfly, a native of the rainforest of East Kalimantan, Indonesia.
4. A rubber tapper smoking fresh latex collected from the Alto Juruá Extractive Reserve in Brazil.

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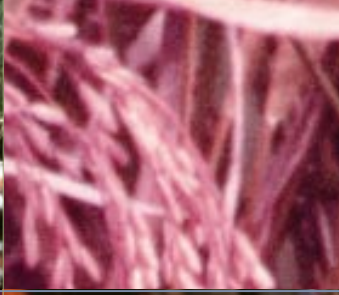
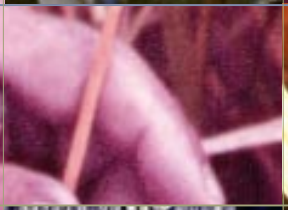


1. Logs of *Acacia mangium* at a sawmill in Malaysia.
2. Forest dwellers in Amazonia, Brazil, have been partners in CIFOR's work to develope C+I for forest sustainability.
3. Rare golden lion tamarins of Brazil's lowland Atlantic Forest.
4. Raw latex sheets drying in Brazil.
5. Winnowing rice in Indonesia.



Managing
Forests for
Multiple Use

During the last two decades, there has been a worldwide trend toward the devolution of forest management to local communities. At the same time, there is growing agreement that forests must be managed in ways that accommodate a variety of uses by various stakeholders. CIFOR has an extensive programme of research that seeks to develop effective new models of community-based management of forests based on these changing attitudes and priorities.

A WIDE RANGE OF ACTIVITIES IS underway to explore methods and approaches that could give local communities – especially groups who traditionally have been disenfranchised – a stronger role in policy making and management of forests, and to improve negotiation and collaboration among multiple stakeholders. This work is closely linked with a number of other important CIFOR research programmes, including studies of non-timber forest product use and other strategies to improve local livelihoods, and the development of criteria and indicators (C&I) for sustainability of tropical forests.

EXPANDING LOCAL PARTICIPATION

TROPICAL FORESTS ARE DIVERSE, and so is the range of people who look to forests to meet a variety of subsistence and income needs. These multiple interests entail overlapping management systems – traditional management for local people's access to cultural sites, forest land, products and jobs; industrial management for timber and plantation crops; and governmental efforts to manage for conservation and other goals.

There is a need for ways of managing forests in a manner that preserves ecological integrity and human well-being while addressing these diverse demands. Historically, however, most forest management approaches have been conventional, "top-down" systems that tend to give greater voice and control to more powerful interests while minimising the concerns and needs of local people. As a result, forest-dwelling people often have declining access to resources that are vital to their families' welfare and lack fair representation in forest-related decisions that affect their daily lives.

CIFOR's programme of research on devolution and community management includes the development of ways to identify all the relevant stakeholders of a forest area and to strengthen their participation and collaboration in decision-making processes. Because local people are the ultimate beneficiaries of this research, CIFOR adopts a "participatory" approach that emphasizes their involvement in community-based research. Focus groups, individual interviews, "community mapping" (illustrating institutional and social networks) and other techniques may be employed in fieldwork to make the research more relevant and less intimidating to local people.

In 1998, CIFOR completed a body of research that explored ways of involving local people as active partners in the development of criteria and indicators. The work was done in several villages in Brazil, Indonesia and Cameroon over several periods since March 1997. A report on the research describes a number of methods that could be employed to engage local forest dwellers in collaborative design of C&I, and discusses relative strengths and weaknesses of the various methods. It also suggests ways of explaining underlying theoretical concepts to community inhabitants.

Other research in this area includes field studies in China. In 1998, collaborators from academic and forestry institutions in Yunnan, Hunan and Guizhou provinces attended training sessions organised to discuss what devolution means in China, how to evaluate its impacts and how policies related to devolution might be improved.

GENDER AND DIVERSITY

AS FORESTRY RESEARCHERS AND MANAGERS recognise the importance of addressing the interests of multiple stakeholders in forest use, so is it important to adequately reflect the diversity within and among stakeholder groups, especially local forest dwellers. Power imbalances and access restrictions based on gender, ethnicity, status of wealth and other differences may block participation by many people who interact intimately with forests and have much to contribute to effective management of them.

Tapping this often undervalued knowledge and expertise can bring critical insights to research, ensuring that it leads to maximum benefits and equitable impact. Recognising that barriers in language, culture and other factors often hinder participation by women and other less dominant groups, CIFOR has initiated a Gender and Diversity Programme to help ensure that research activities incorporate diverse perspectives and are as accessible as possible to all groups. Women are a major focus of this initiative because of their traditionally unequal access to forest land and resources and their restricted role in local decision making, which tends to undermine their social and economic security.

Gender issues are well represented in social criteria and indicators being developed by CIFOR to measure progress toward sustainable management of forests. Among the measures that CIFOR researchers are now testing, for their usefulness as indicators of social well-being among forest dwellers, are the

CIFOR has initiated a Gender and Diversity Programme to help ensure all interests are represented in forest issues.

GENDER ISSUES ARE WELL REPRESENTED IN SOCIAL CRITERIA AND INDICATORS BEING DEVELOPED BY CIFOR TO MEASURE PROGRESS TOWARD SUSTAINABLE MANAGEMENT OF FORESTS.

AMONG THE MEASURES THAT CIFOR RESEARCHERS ARE NOW TESTING, FOR THEIR USEFULNESS AS INDICATORS OF SOCIAL WELL-BEING AMONG FOREST DWELLERS, ARE THE NATURE AND EXTENT OF WOMEN'S PARTICIPATION IN LOCAL CO-MANAGEMENT, AS WELL AS CONFIDENCE ABOUT ACCESS TO FOREST LAND AND THE BENEFITS THAT ACCRUE FROM IT.

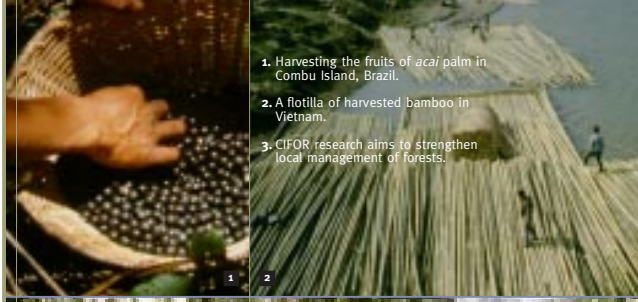
nature and extent of women's participation in local co-management, as well as confidence about access to forest land and the benefits that accrue from it.

What significance does such research have for sustainable management of forests? From studies in Cameroon, for example, CIFOR researchers found that inheritance patterns that forbid ownership of land by women may influence how local forest land is used – to the possible detriment of forest cover. The tenuous land tenure in the study area appeared to encourage many women in tropical Cameroon to plant mainly subsistence crops that involved shifting cultivation and the use of greater areas of land for crop rotation, while men, as landowners, had the option of cultivating perennial and commercially important plantation crops such as coffee, cocoa and oil palm.

In 1998, under a grant from the CGIAR's Program on Participatory Research and Gender Analysis for Technology Development and Institutional Innovation, CIFOR laid the groundwork for conducting gender-related studies in Asia and Africa as part of broad-based efforts to develop criteria and indicators that can help guide community co-management of forests. The initial work will be integrated into studies already underway in the village of Long Loreh, East Kalimantan, to investigate methods leading to greater local empowerment and improved cooperation between relevant stakeholders.

Local organisations such as lending agencies often play a central role in ensuring the livelihood and financial security of forest-dwelling people. CIFOR research in Zimbabwe revealed dramatic differences in perceptions about a local lending agency among men and women based on household roles and experiences in dealing with the agency. In a survey, women ranked the agency very low, while men gave it very high marks. The different attitudes were found to be rooted in the corporation's practice of giving loans mainly to sectors of agriculture that were dominated by men, such as cotton, maize and sunflower production, whereas low priority was given to agricultural activities more typical of women, such as gardening and groundnut production.

In Tanzania, research by CIFOR shows that economic hardships have led to changes in gender roles in rural areas. Women are increasingly expanding their roles away from traditional domestic activities to



1. Harvesting the fruits of *acai* palm in Combu Island, Brazil.
2. A flotilla of harvested bamboo in Vietnam.
3. CIFOR research aims to strengthen local management of forests.

income-generating activities such as forest product exploitation and sale, casual labor and petty businesses. Men are gradually taking up activities that have traditionally been in the domain of women.

PUTTING POLICIES INTO PLACE

NONE OF CIFOR'S RESEARCH CAN have much impact unless policy makers and opinion leaders receive and use the results. Policies in many countries are slow to respond to changing circumstances and often interfere with the accomplishment of sustainable forest management and human well-being, in part because of weak institutional mechanisms and tools to enable such responsiveness.

In November, CIFOR co-sponsored a week-long workshop for policy analysts, researchers and forestry managers from several countries that explored problems hampering the implementation of community-oriented forestry policies and how they might be overcome. In discussions designed around a multi-country study of the International Institute for Environment and Development published as *Policy That Works for Forests and People*, the participants concluded that simpler and more consistent policies are needed, and that local institutions play a critical role in effective implementation. Also stressed was the importance of ongoing dialogue among multiple stakeholders so that opportunities for policy reform can be seized when they arise.

Other CIFOR work has found that local governments require substantial external assistance both to bolster their support for sustainable forest management and to strengthen their capacity to promote such management. Among the requirements are clear mechanisms for exercising their legal rights and carrying out their responsibilities, as well as an overall policy context favourable to local initiatives. With this in mind, CIFOR is examining what kinds of information and sources policy makers have used in the past to guide their decisions. Initial studies are looking at the role of policy research in the formulation of new forestry laws in Bolivia, Cameroon, Costa Rica and Indonesia.

PROTECTED AREAS: WHAT'S THE ANSWER?

TRADITIONALLY, SETTING ASIDE ecologically fragile sections of forest as protected areas has been part of forest management strategies worldwide. Despite acknowledgement of their importance for biodiversity preservation and other benefits, however, protected areas have been a contentious issue because of competing interests and resentment about restrictions on the utilisation of natural resources.

With growing recognition of the need to represent the interests of diverse stakeholders in forest management, decisions about protected areas have become even more complex because of complicated issues related to jurisdiction and control.

CIFOR is studying ways of reconciling the tensions surrounding protected areas so they can meet environmental objectives without jeopardising the well-being of local inhabitants. Much of this work is centered on the development of new strategies for cooperative planning and management of protected areas. Cornell University in Ithaca, New York, has been a key partner in this area, in line with the university's major programme of research to improve land use policy and practices in areas where traditional agriculture and conservation interests tend to clash.

In a workshop at Cornell in September, conservationists, development experts and researchers from CIFOR and many other institutions around the world discussed key issues that hinder support for protected areas as a conservation strategy and how this opposition might be overcome. The participants agreed on the need to treat protected areas as part of larger ecosystems, rather than as isolated and self-contained reserves, and to develop more comprehensive and "pluralistic" management plans that reflect this broader scope of impact. Strategies to improve decision making and governance of protected areas will be a central focus of CIFOR's new research programme on Adaptive Co-Management. ■

In 1998, significant methodological advances were made in Malawi, Tanzania and Zimbabwe using rapid rural appraisal techniques to conduct more participatory research on the effects of different policy changes at the household level. These were complemented by input from secondary sources and key informants as well as economic modelling to get a clearer view of the complex interactions that determine how different policies affect the livelihoods of local communities and their use of forest resources, as well as local institutions.

Economic hardships in Zimbabwe in recent years resulting from a currency devaluation and related policy reforms by the government were seen as the reason for a collapse of community endeavours and a move away from the extended family. The reform

Cultivation of manioc is part of multiple forest use in Brazil.

measures were also found to have a negative impact on state organisations operating in the rural areas, including those related to agriculture and natural resource management.

Although in many African countries traditional institutions have eroded, they still retain much potential for management of natural resources. In Tanzania, some macroeconomic policies created conditions that have led to a broadening of the cash income base of rural communities, and have put value on some otherwise non-tradable forest products. Nonetheless, these policies also appeared to adversely affect the traditional and government management of natural forest resources.

In Malawi, structural adjustment policies aimed at liberalising tobacco production and the marketing of maize and tobacco, as well as increasing accessibility to foreign currency, were shown to stimulate expansion of land area for these crops at the expense of natural forests. The research identified villagers living around the forest reserves as key agents of deforestation and environmental degradation, through careless cutting of trees, opening up of gardens, grazing livestock and charcoal burning.

TOWARD "ADAPTIVE CO-MANAGEMENT"

THE NEW INITIATIVE THAT CIFOR will pursue in 1999, Local People, Devolution and Adaptive Co-Management of Forests, or ACM, has emerged from growing recognition that "on-the-ground" change in community management of forests is not possible until multiple stakeholders agree on what resources need to be sustained and how that may be achieved. Reaching such agreement is invariably complex, and can occur only through iterative processes of collaboration and decision making.

Through the prolonged course of collaborative planning, circumstances may occur that can have a bearing on the outcome. Participants' attitudes about a situation may change, for example, or there may be a dramatic shift in environmental conditions. As such, there is a need for periodic monitoring and adaptation to ensure progress toward objectives.

The ultimate aim of research under this new programme is to guide the improvement of forest-related community action, local institutions and policy effectiveness. Areas of focus include mechanisms for local empowerment in stakeholder negotiations, including ways communities can influence policy (for instance, through alliances between local and national-level actors); methods for enabling adaptive forest management at the local level, including monitoring and information exchange involving the use of criteria and indicators; and how policies mediate the effectiveness of ACM, in both formal and informal communication links. An immediate focus of the research will be to establish the nature and influence of policy constraints.

Criteria and indicators for sustainable forest management are a key component of adaptive co-management strategies that CIFOR researchers will work to develop under this programme. Basically, C&I will serve as monitoring tools to guide changes along the road to adoption of sustainable use of forests and their resources – signalling the need for corrections in response to unplanned developments or side effects.

1. Women in forests of Ethiopia are major participants in land use and resource management.

2. Eco-tourism attractions may benefit both humans and the environment.

A framework for preparing adaptive management plans for natural resources using participatory mapping and other innovative research tools has been developed based on work in Madagascar by CIFOR and its partners. The project entails efforts to establish structures capable of carrying out devolved governance as provided for under government actions such as a 1996 Law on Community-Based Management of Renewable Natural Resources.

Another project with major implications for CIFOR's future work on adaptive co-management was tests conducted by CIFOR and its collaborators in 1998 to identify and evaluate a variety of social science methods capable of assessing human well-being quickly and reliably. The methods had already been tested fully or in part at sites in Indonesia, Cameroon, the United States, Trinidad and Gabon. The findings will be reported in a CIFOR book now under preparation, called *Local People in Logged Forests: Human Well-Being Under Scrutiny.*

CIFOR fieldwork in several countries being done as part of a broad project to analyse devolution of forest management and related policies is an important foundation for future research on adaptive co-management. Very early findings from devolution studies in China, for example, suggest that contradictions among tenure policies, taxes and harvesting regulations have limited the potential of collaboration among local forest managers and the state. In addition, frequent changes in policies related to tree tenure seem to have created a high degree of uncertainty among local people about their rights, thereby limiting their engagement in collaboration and their ability to test new management practices. ■

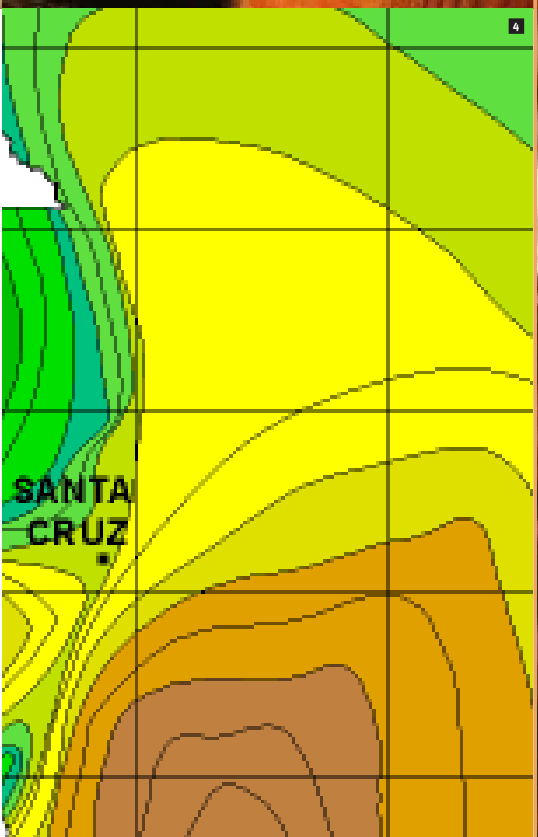
better tools for forest management

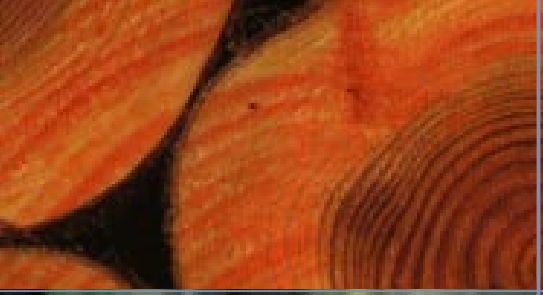
1. A host of "criteria and indicators" can be used to assess the long-term well-being of a tropical forest.

2. Tree growth information helps guide forest management decisions.

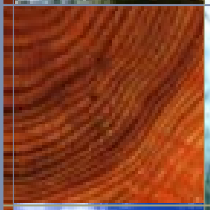
3. Selected animals and plants can serve as indicators of the health of forest.

4. GIS techniques can be used to support policy decisions.

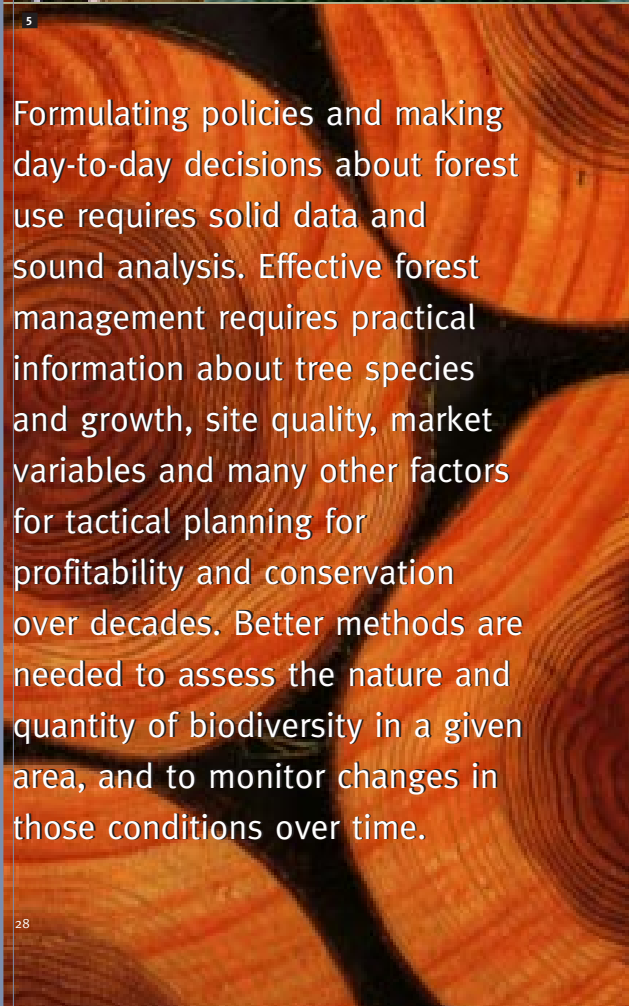




1. Kenyah women of Long Segar, East Kalimantan, Indonesia.
2. *Couroupita guianesises* found in the Botanical Gardens of Calcutta, India.
3 & 4. Log depot in Mahakam River of East Kalimantan, Indonesia.
5. Tree growth data is a central component of TROPIS.



Better Tools For Forest Management



Formulating policies and making day-to-day decisions about forest use requires solid data and sound analysis. Effective forest management requires practical information about tree species and growth, site quality, market variables and many other factors for tactical planning for profitability and conservation over decades. Better methods are needed to assess the nature and quantity of biodiversity in a given area, and to monitor changes in those conditions over time.

SOPHISTICATED MODELLING TOOLS can demonstrate the likely consequences that proposed actions will have on forests and the people who depend on them, thereby stimulating reconsideration and possible alternatives.

CIFOR is developing a variety of tools to aid these processes. One of the centre's most intensive efforts in this regard is research to develop "criteria and indicators" that can be used to assess the long-term health of tropical forests and whether they are being managed in ways that are likely to be sustainable.

FLORES

IN 1998, CIFOR MADE SIGNIFICANT advances in its efforts to develop the Forest Land Oriented Resource Envisioning System, or FLORES, a simulation model to aid decision making for forest management. Key partners in the project are the International Centre for Research in Agroforestry (ICRAF) and the University of Edinburgh.

Once fully developed, FLORES should operate much like the popular computer video game SimCity, in which users choose from numerous options in infrastructure, landscape features and other areas to "design" a complex urban city. But FLORES will go beyond the entertainment nature of that model. It will enable policy makers and forest managers to make "what if" decisions about real-life forests and land use, and aid quantitative analyses of policy options related to this.

The refinement of FLORES will take a number of years. But in 1998, CIFOR and its partners in the project demonstrated the technical feasibility of this exciting new tool by constructing a simple prototype with the Agroforestry Modelling Environment (AME) being developed in Edinburgh, Scotland. By the year's end, several dozen forestry specialists and computer experts were poised to develop the first version of FLORES early in 1999 at a workshop in Sumatra, Indonesia.

TROPIS

WORLDWIDE, THERE ARE MORE THAN half a million plots that have been used to monitor growth and change of individual trees in forests. Unfortunately, most of these plots are underutilised and data remain unavailable to researchers interested in forest dynamics. A project of CIFOR, the Tree Growth and Permanent Plot Information System, or TROPIS, helps foresters find growth data pertinent to their situation by tapping into a network of researchers and others who deal with permanent plots and have agreed to share their data with others.

In 1998, TROPIS gained increased interest and a steady flow of new contributions as well as search requests. Of the more than 90 search requests to date, most inquiries have led to useful information or new contacts.

A related system for organizing plot-related inventory data, known as MIRA, is hosted by the Tropical Agriculture Research and Higher Education Center (CATIE) in Costa Rica. Now bilingual (Spanish-English), it has been used widely in Latin America and is rapidly gaining interest elsewhere.

TOOLS FOR ASSESSING BIODIVERSITY

TODAY, RESEARCH ON FOREST biodiversity is shifting away from broad inventory surveys as scientists and forest managers acknowledge the costliness and impracticality of such an approach. Instead, there is much interest in acquiring techniques that can predict species occurrence, habitat type and genetic impacts from environmental data based on geographic information systems (GIS).

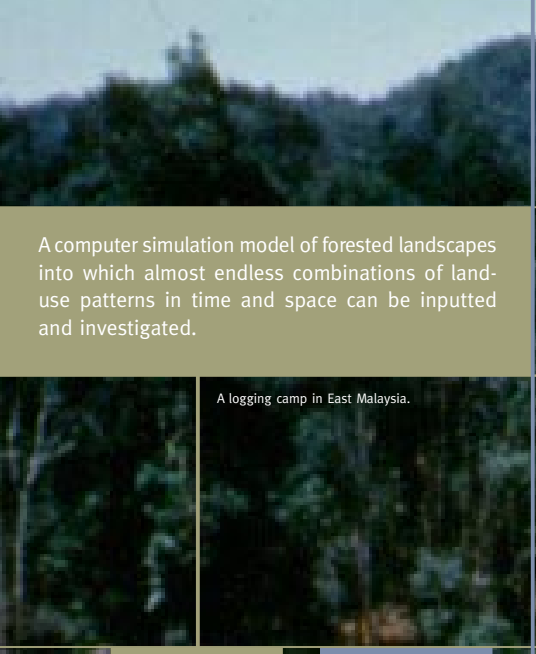
CIFOR is working to develop and refine a number of innovative tools to aid biodiversity research and analysis. These include rapid survey methods, molecular markers, computer software, new applications of GIS and remote sensing, and "criteria and indicators" to assess biodiversity.

An increasingly popular product of these efforts is DOMAIN, a Windows 95 software package for mapping the potential distribution of plants and animals. Users can model this biodiversity status through links to GIS data and other baseline information.

POPGENE, a genetic analysis computer program that was developed in part by CIFOR, is already being used widely around the world for analysis of data on trees, agricultural crops, fish and wildlife.

In another innovative system, CIFOR scientists are working to develop a more useful framework for measuring how plants respond to climatic and other environmental changes. This centers on a concept known as Plant Functional Attributes

A computer simulation model of forested landscapes into which almost endless combinations of land-use patterns in time and space can be inputted and investigated.



A logging camp in East Malaysia.

A computer-based technology which integrates common database operations such as query and statistical analysis with the unique visualisation and geographic analysis benefits offered by maps.

FLORES

FOREST LAND ORIENTED RESOURCE ENVISONING SYSTEM

TROPIS

TREE GROWTH AND PERMANENT PLOT INFORMATION SYSTEM

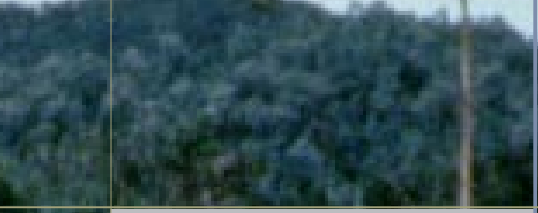
GIS

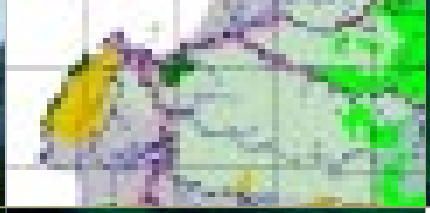
GEOGRAPHIC INFORMATION SYSTEMS

DOMAIN

A Windows 95 software package for mapping the potential distribution of plants and animals.

A database of permanent plots and tree growth in planted and natural forests maintained by a network of researchers and others around the world.

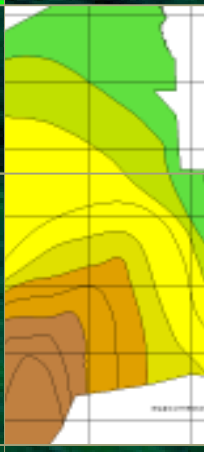




A genetic analysis computer programme developed in part by CIFOR, is being used widely around the world for analysis of data on trees, agricultural crops, fish and wildlife.

"The capacity to model the complexity between and within components of forest systems will be indispensable in carrying out ecosystem approaches to forestry."

***Dr. Jerry Vanclay**, systems modeller*

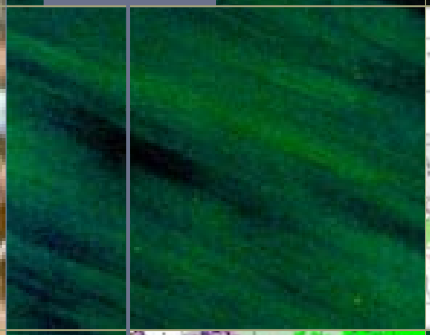


POPGENE

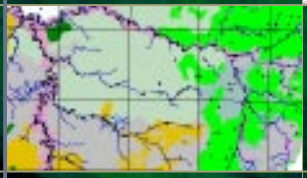
PFAPro

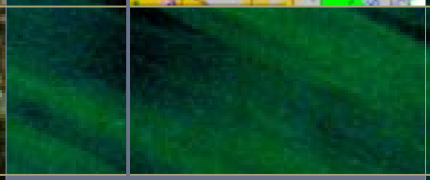
C & I

CRITERIA AND INDICATORS



A Windows 95 programme facilitates the collation, storage and analysis of field data from biodiversity surveys.





A ground-breaking programme of research to develop methods for assessing the condition of forests and judging whether they are being managed sustainably.

(PFAs) – basically sets of characteristics that interact to affect various aspects of plant performance, such as responsiveness to photosynthesis and vascular control of nutrient balance. Once refined, this system could facilitate manipulation of biodiversity-related data for mapping and global comparisons.

Currently, beta testing is underway for a related Windows 95 software programme called PFAPro, which is designed to aid the collation, storage and analysis of field data from biodiversity surveys. It has been used successfully in several training programmes worldwide coordinated by CIFOR and the International Centre for Research in Agroforestry (ICRAF) as part of the CGIAR's system-wide Alternatives to Slash and Burn programme. Multi-lingual packages are now being developed.


1


2

GIS AND REMOTE SENSING

GIS AND ENVIRONMENTAL INFORMATION management systems are now critical tools in forestry and other areas of natural resource management. Researchers face new challenges, however, related to scale, dynamic changes in landscape patterns, accuracy and integration of data, efficiency of analysis and alternative applications as in monitoring the status of biodiversity.

Workshops in 1998 addressed many of these issues. The International Conference on Data Management and Modelling for Tropical Forest Inventory, held in Jakarta, Indonesia, in October and co-sponsored by CIFOR. The conference explored a variety of ways to improve monitoring and assessment of forests and their resources, and to improve simulated modelling and data collection for land use decision making.

GIS and other technologies are central to much of CIFOR's research. In one new innovative application, researchers in the Humid Forest Zone of Cameroon used GIS techniques to better understand the characteristics of markets for non-timber forest products. Although NTFP market studies usually mention some spatial characteristics that influence the commercialisation of NTFPs, such as distance, transportation infrastructure, population size and forest distribution, few have used GIS as a tool for analysis. The use of this technique gave the CIFOR scientists and their colleagues a more complete understanding of the spatial structure of the markets and the dynamics of NTFP trade in the area – highly useful for more targeted policy interventions.

Similarly, a major new programme of NTFP research in East Kalimantan, Indonesia, by CIFOR and its partner institutions will benefit from a GIS and spatial analysis component launched in 1998. The GIS/spatial analysis work, funded by a grant from the Canadian International Development Agency, will measure and map land use and forest cover changes over the past decade,


3


4

as a framework to support studies of local inhabitants' reliance on NTFP trade at different stages of forest development.

CRITERIA AND INDICATORS

IN 1998, CIFOR COMPLETED the initial four-year phase of its pioneering project to develop objective methods for determining whether forests are being managed sustainably. Known broadly as "criteria and indicators" (C&I), this work has generated so much interest in the forestry and conservation sectors that dozens of institutions and individuals around the world have teamed up with CIFOR to field test C&I for possible use in a wide range of forest settings.

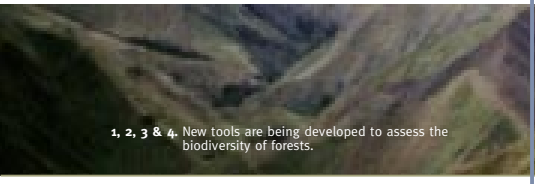
The results of this work are closely followed by many national and international agencies that are struggling to discover ways of defining and measuring sustainability, and of making timber and forest product certification programmes viable. Some of the impetus comes from a recent push by the World Bank and the World Wide Fund for Nature to have 100 million hectares of tropical forest certified as sustainable by the year 2005.

"Criteria" are not measurement instruments but standards by which to judge the situation under study. "Indicators"

are a means of measuring the realisation of the standards.

Indicators have long been an important instrument in the health, education and financial sectors, for monitoring potential problems and guiding the adoption of corrective measures and policy changes where needed. Similarly, criteria and indicators should make it possible to monitor the health and management of forests.

Biological vigour, as indicated by conditions such as levels of biodiversity, is one important gauge of sustainability. The development of C&I for biodiversity is one component of CIFOR's research programme. But additional measures are needed to assess social conditions and the relationship between forest-dwelling people and the area they inhabit.



1, 2, 3 & 4. New tools are being developed to assess the biodiversity of forests.

> "Our C&I work is based on the assumption that forests cannot be sustainably managed until appropriate attention is paid to the people who inhabit them. If the well-being of forest peoples is not assured, forests will always be in danger."
>
> ***Dr. Carol J. Pierce Colfer**, CIFOR social scientist*

Because tropical forests are complex and varied, no "universal set" of C&I is possible. Instead, researchers must devise locally tailored sets of C&I that are appropriate for various settings, such as forests where logging concessions operate.

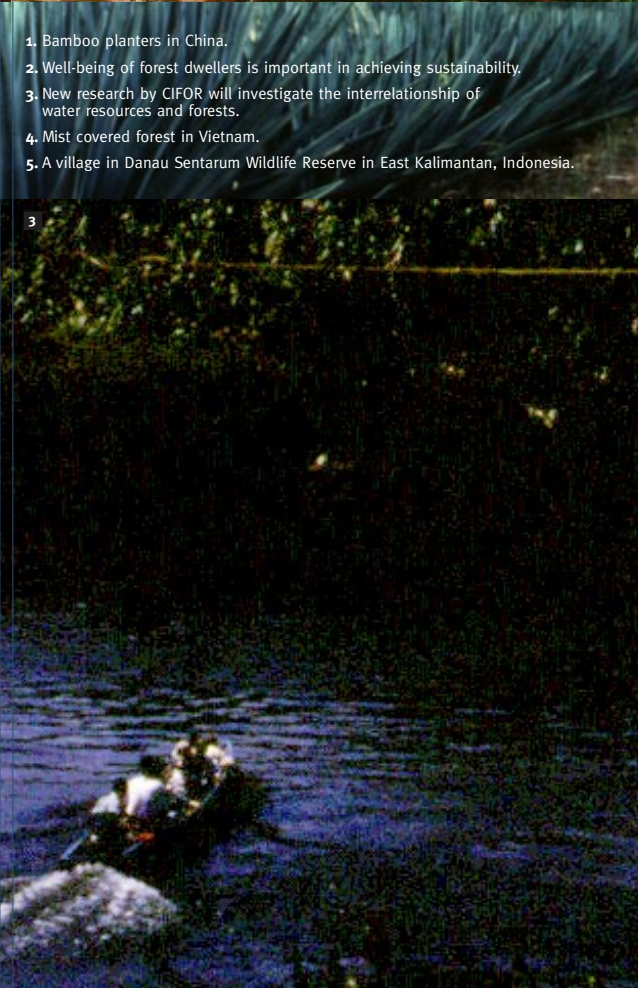
CIFOR's C&I research programme, led by Dr. Ravi Prabhu and now part of a newly restructured programme headed by Dr. Carol J. Pierce Colfer, has focused largely on the development of indicators for social sustainability in relation to forest management. A major achievement in 1998 was the completion of a series of tools to guide the development of C&I. These include a generic template for constructing a minimum set of criteria and indicators, and a set of manuals. One example from that set is *The BAG (The Basic Assessment Guide for Human Well-Being)*, which helps users draw on various social science methods for C&I development and assessment. The newest addition, CIMAT (Criteria and Indicators Modification and Adaptation Tool), is a computer-based model that integrates C&I related to production of goods and services, policy, social issues and ecology, and provides assistance to those wanting to incorporate community-based and other location-specific knowledge into C&I.

In 1998, CIFOR researchers described the results of ongoing work in several countries to devise appropriate and effective ways of assessing human well-being in a variety of forest settings. A key area of focus is the relative benefits accruing to various stakeholders at forest sites and related issues, such as the degree to which local people have "rights" in forest management and how those rights are allocated.

One study, for example, explored this issue at sites in Indonesia and Cameroon that were judged "forest rich" or "forest poor." The researchers found that while government and timber companies dominated access to cash-generating timber, local people chiefly had access to other forest resources. There were important variations in this distribution of benefits, and future work will analyse patterns that contribute to these differences.

Meanwhile, at a workshop in March sponsored by the U.N. Food and Agriculture Organization, a group of biodiversity experts, including geneticists and ecologists, discussed key issues in efforts to develop C&I for biodiversity assessment. In 1998 CIFOR's research in this area changed its emphasis to focus more on broader issues of biodiversity, in line with the centre's overall biodiversity research programme. Major undertakings in 1998 included the preparation of a literature review of critical thresholds of biodiversity C&I, as well as planning for field tests that were scheduled to begin in mid-1999. ■

1. Bamboo planters in China.
2. Well-being of forest dwellers is important in achieving sustainability.
3. New research by CIFOR will investigate the interrelationship of water resources and forests.
4. Mist covered forest in Vietnam.
5. A village in Danau Sentarum Wildlife Reserve in East Kalimantan, Indonesia.



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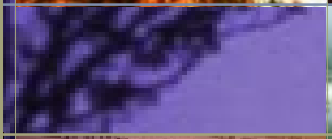
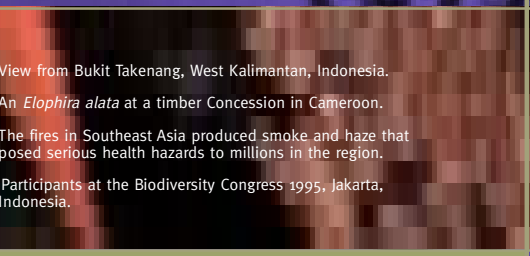




1 View from Bukit Takenang, West Kalimantan, Indonesia.

2 An *Elophira alata* at a timber Concession in Cameroon.

3 The fires in Southeast Asia produced smoke and haze that posed serious health hazards to millions in the region.

4 Participants at the Biodiversity Congress 1995, Jakarta, Indonesia.

5

Global Issues and International Impact

Apart from its mission to conduct critical forestry research that combines biological, physical, economic and social factors, CIFOR is committed to participation in a host of policy dialogues and global initiatives aimed at bringing about more sustainable use of the world's tropical forests. This work, part of a programme on Policies, Technologies and Global Changes, has given CIFOR a very high profile in intergovernmental circles and enhanced its stature as the pre-eminent institution for forest research.

SETTING AN AGENDA FOR FORESTRY RESEARCH (ICRIS)

IN SEPTEMBER, CIFOR Director General Jeffrey A. Sayer and Deputy Director General for Research Dennis Dykstra were among a group of 80 internationally recognized forestry experts and representatives from around the world who met in Ort-Gmunden, Austria, to identify the most pressing issues in forest management and suggest ways to promote greater research collaboration and better information sharing.

The meeting, the International Expert Consultation on Research and Information Systems for Forestry (ICRIS), arose from increased recognition of the importance of research in informing inter-governmental processes and conventions related to forests. The request for the consultation emerged during a session of the Intergovernmental Forum on Forests (IFF) in 1997. CIFOR organized the event in collaboration with the U.N. Food and Agriculture Organization, the International Union of Forestry Research Organizations, and the governments of Austria and Indonesia.

Among the panel's final recommendations was the creation of a global forum or other appropriate body that would bring together policy makers, funding agencies, forest research agencies, scientists and others to guide initiatives in forestry research, especially to better mobilise resources and achieve coherence in priorities. It was suggested that the IFF might look at the CGIAR – CIFOR's parent organisation, the Consultative Group on International Agricultural Research – as the model for such a body.

The ICRIS participants also emphasised the need for mechanisms to strengthen research collaboration and policy-science linkages, particularly in the context of global initiatives such as IFF. As envisioned, a proposed Global Forest Information Service would facilitate access to forest related information among policy makers, forest managers, nongovernmental organisations, community groups and the public at large.

In setting forth its recommendations, the ICRIS panel said growing evidence shows that development assistance applied to building national research capacity has proved to have more sustainable long term benefits to recipient countries than other forms of development assistance. In light of such findings, it urged a focus on initiatives that will help countries strengthen their capacity to solve their own forest-related problems rather than relying on "ready-made" solutions from advisory missions and aid projects.

WORLD HERITAGE CONVENTION AND BIODIVERSITY CONSERVATION

AT A MAJOR POLICY DIALOGUE in December, CIFOR scientists and forestry experts, conservationists and government officials from 20 countries met to discuss how the World Heritage Convention might be used as an instrument to help protect biodiversity-rich tropical forests. The meeting, held in Berastagi, North Sumatra, was co-sponsored by CIFOR, UNESCO and the Government of Indonesia.

Among their achievements, the participants drafted a list of tropical forests that were deemed worthy of consideration for nomination as World Heritage sites. They also urged the World Heritage Committee to consider a number of issues relevant to tropical forest protection, such as inherent conflicts between traditional conservation strategies that tend to exclude people from certain areas and newer attitudes that seek to accommodate human needs as well as environmental objectives.

The World Heritage list has been maintained by UNESCO since 1972 based on a conservation treaty, known as the World Heritage Convention, that has been ratified by 160 countries. It designates sites around the world that are outstanding for their cultural value or their unique natural beauty or ecological importance. Financial assistance and management support is provided to help host countries maintain the integrity of designated World Heritage sites.

So far, 33 tropical forest sites – covering more than 26 million hectares – have been included on the World Heritage List. Thus, the programme already plays a key role in conserving a large proportion of the world's biodiversity. But the participants at the "Berastagi Dialogue" noted that many forests with widely recognised outstanding biodiversity value are not under World Heritage protection, and urged that the network be expanded to include these important areas before their biological wealth is lost. A related analysis found, for example, that in all of Asia, which has some of the world's largest remaining areas of rainforest, only four forest sites have received World Heritage status.

The group pledged to make safeguarding the rich variety of species and ecosystems in World Heritage tropical forests a top priority for international conservation efforts. The participants also called for

CIFOR research includes studies of household strategies for forest subsistence and income, such as coffee harvesting.

G FORTH ITS RECOMMENDATIONS, THE ICRIS PANEL SAID GROWING EVIDENCE SHOWS THAT DEVELOPMENT ASSISTANCE APPLIED
NATIONAL RESEARCH CAPACITY HAS PROVED TO HAVE MORE SUSTAINABLE LONG TERM BENEFITS TO RECIPIENT COUNTRIES
AN OTHER FORMS OF DEVELOPMENT ASSISTANCE. IN LIGHT
SUCH FINDINGS, IT URGED A FOCUS ON INITIATIVES THAT
WILL HELP COUNTRIES STRENGTHEN THEIR CAPACITY TO SOLVE THEIR OWN FOREST-RELAT
PROBLEMS RATHER THAN RELYING ON "READY-MADE" SOLUTIONS FROM ADVISORY MISSI
AND AID PROJECTS.

governments and international agencies to provide more funding and other resources needed to support better management of existing tropical forest sites and to broaden the nomination of new candidate sites, especially in under represented regions of the world.

SEEKING SOLUTIONS TO FIRES IN SOUTHEAST ASIA

IN LATE 1997 AND early 1998, the world watched with horror and sadness as fires ravaged millions of acres of tropical forest in Indonesia. The destruction cut a swath across the islands of Sumatra and Kalimantan, producing a blanket of smoke that exposed millions of people to serious health hazards, jeopardised air travel safety and caused huge economic losses throughout the region.

Although fire-related projects were not part of the centre's official work plan, the disaster occurring in its own "backyard" prompted major concern by CIFOR, which has been active in efforts to address the problem. Ongoing research into the underlying causes of deforestation enabled CIFOR to comment authoritatively on the impacts of the fires on forests in Indonesia. Members of staff were invited to participate in numerous meetings and conferences concerning the fires, and were involved in efforts by Indonesia and other countries to develop strategies for dealing with the issue.

Regularly updated position statements and other background information were posted on CIFOR's Web site. As a result, CIFOR gained considerable media interest and public exposure as a source of independent scientific information on the situation. A documentary produced by the BBC included extensive comments by CIFOR researcher Dr. William Sunderlin.

With support from the International Centre for Research in Agroforestry (ICRAF), UNESCO and the European Commission Joint Research Centre, CIFOR in 1998 compiled an important background report, titled *A Review of Forest Fire Projects in Indonesia: 1982-98*. It summarises major fires that have occurred in Southeast Asia over the past two decades, prevalent ideas about their causes and effects, and a wide range of projects to address the problem.

As long ago as the 15th and 16th centuries, Portuguese and Dutch explorers recorded large fires in the forests and peat swamps of Borneo, accompanied by a choking haze that extended as far as the present location of Singapore. More recently, significant fires in

High-resolution satellite imaging was used to monitor fire outbreaks and map burnt areas.

> "In most of the fire crises we have experienced in the last 30 yea eventually learned that we made decisions based on the information. Will our present knowledge about fires prove to ha same deficiencies in 15 years' time?"
>
> **Dr. Reidar Persson,** *CIFOR Assistant Director General*

the region occurred periodically in the 1980s and '90s. But experts concurred that the fires of 1997-98 were particularly damaging, because severe drought associated with the recurrent El Niño-Southern Oscillation phenomenon coincided with an expansion of land clearing for plantations.

The fire report issued by CIFOR showed that before 1994, governments and agencies around the world provided assistance mainly in the form of short-term emergency aid, management support, and technical equipment and training. The more severe recent fires, however, have led to calls for concentrated efforts to understand and address the underlying causes.

In late 1997, an intensive multinational initiative began that entailed using high-resolution satellite imagery to monitor fire outbreaks and map burnt areas. As the fires raged, the Internet provided a means of rapid dissemination of up-to-date information about the environmental disaster to scientists, government officials, journalists, donors and the public at large.

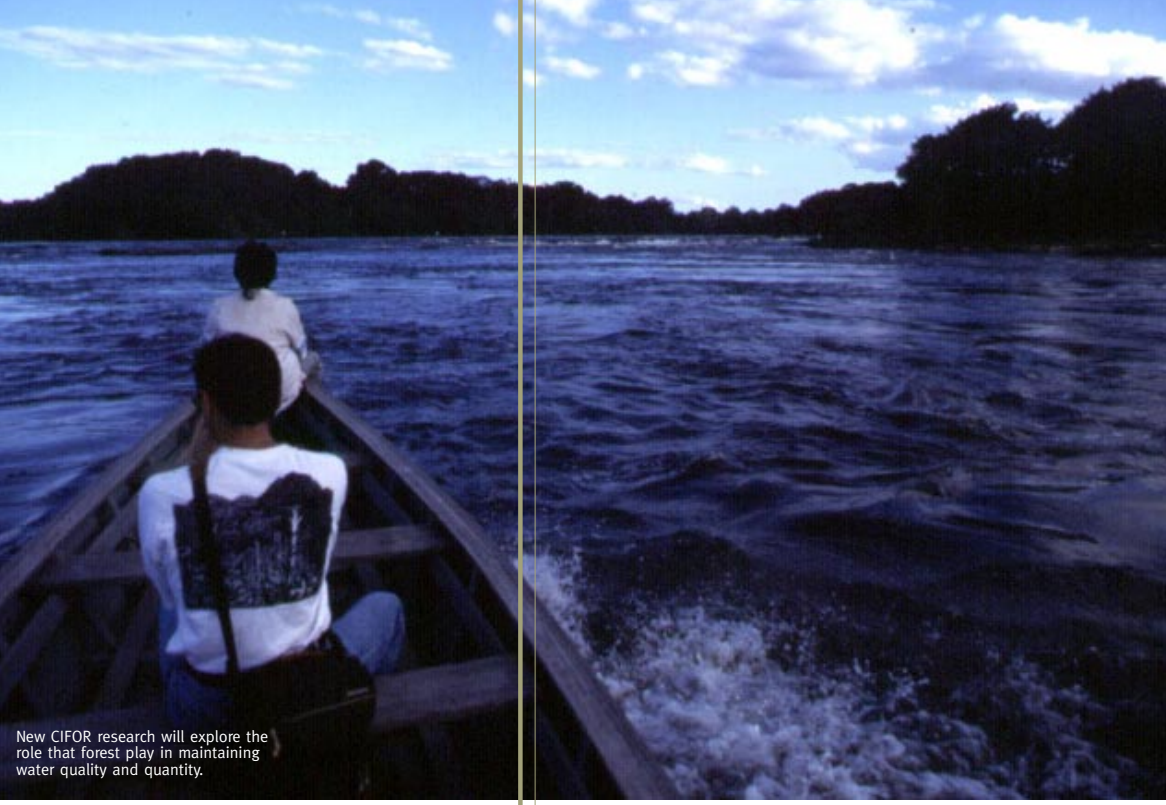
Numerous other projects have addressed fire-fighting capabilities, policy implications and other issues.

At the year's end, scientists from CIFOR and ICRAF met with representatives of the U.S. Government to plan an in-depth, three-year study of the causes and effect of the fires, to be financed by the U.S. Forest Service and the U.S. Agency for International Development. A combination of remote sensing and local social studies will be done to help analyse the causes of the fires and provide the basis developing better fire control programmes.

Initial studies will be done at two sites where the 1997-98 forest fire were prevalent, Lampung in Sumatra and East Kalimantan. The U.S. Forest Service will coordinate the acquisition of remote sensing data, while CIFOR and ICRAF will do on the ground research to corroborate the data, determine land use practices and investigate social factors that may have contributed to the fires. Eventually, such work will be expanded to investigate more deeply the underlying causes of the fires.

FURTHER LEADERSHIP AND INFLUENCE

IN AUGUST, CIFOR CONTRIBUTED significantly to the second meeting of the Intergovernmental Forum on Forests and staff



New CIFOR research will explore the role that forest play in maintaining water quality and quantity.

made presentations at several satellite meetings. They also took part in discussions of the Interagency Task Force on Forests.

The U.N. Environment Programme has commissioned CIFOR to provide analysis of the underlying causes of deforestation for presentation at the third meeting of the IFF, scheduled for May 1999. Initial findings of this work were presented in sessions of the IFF's 1998 meeting in Geneva.

Also in Geneva, CIFOR collaborated with the International of Academy of the Environment to hold a policy dialogue on some of the difficult issues associated with application of the "Kyoto Principles" to forests. A paper that resulted from the discussions was presented on CIFOR's behalf at a satellite meeting of the International Panel on Climate Change in Buenos Aires in November.

In November, CIFOR Director General Jeffrey Sayer travelled to Fontainebleau, France, for the 50th anniversary celebration of the World Conservation Union (IUCN). He delivered a keynote address, titled "Globalisation, Localisation and Protected Areas."

NEW DIRECTIONS

A NEW FOCUS OF PROPOSED research by CIFOR that was endorsed by its Board late in the year would investigate the interrelationship of water resources and forests. Many countries have development strategies for maximising access to water, but what do they mean in relation to forests and other natural resources, and to rural poverty and local well-being? What are the best strategies to promote effective land use and management of water resources at the landscape level?

Water flows across political boundaries and interconnects with systems in the atmosphere and below the ground: at local, catchment and river basin levels. These complex hydrological processes require an integrated approach to water management, but this is difficult because how these processes interact is not well understood, especially in tropical areas.

This new research initiative would investigate the role that forests play in maintaining water quality and quantity, and the effects on forest-related water development programmes of ecological disturbance, socioeconomic changes, equity in access and other issues. Important research questions would build upon many of CIFOR's ongoing projects. ■

CARBON MARKET INITIATIVES: CAN THEY BENEFIT TROPICAL FORESTS?

AMONG THE MANY BENEFITS that forests provide, there is growing appreciation of their role as major repositories of carbon. The biomass of trees and vegetation in forests harbours vast reserves of carbon that help to keep in balance the carbon cycle on which life on Earth depends.

Industrial emissions are the major culprit of carbon buildup in the atmosphere that is contributing to "global warming" and climate change. The 1997 Kyoto Protocol of the United Nations Framework Convention on Climate Change paves the way to mechanisms that would allow industrial countries and major polluters to offset their carbon emissions by paying developing countries to preserve their tropical forests, thereby "sequestering," or storing, vast amounts of carbon.

Projects such as this are an attractive prospect to many people who believe that conservation of tropical forests will be difficult unless the environmental benefits they provide are, like other services for society, properly valued through payment schemes.

Much of this research on this issue has focused on technical aspects of making carbon markets feasible, such as methodologies for measuring carbon and evaluating the cost of emission-reduction projects. In contrast, CIFOR in 1998 explored social and environmental issues related to carbon markets – aspects that so far have received little attention.

In 1998, CIFOR worked with the University of Maryland to lay the groundwork for an international dialogue that will consider carbon sequestration projects and devise guidelines for ensuring that they provide positive social and environmental impacts. Unlike most other policy initiatives in this area, the dialogue will include the views of representatives from a broad array of groups with a direct stake in tropical forest use.

The results of the conference will provide important background information for efforts in the year 2000 to decide mechanisms for implementing the carbon sequestration provisions of the Kyoto Protocol. The findings should also be of considerable interest to the many forestry, environmental and economic development institutions involved in this important policy issue.

With funding from the U.S. Agency for International Development, CIFOR undertook two studies in 1998 that provided insights from host country and investor perspectives that should be useful in efforts to design and promote adoption of carbon sequestration initiatives. In both of the projects, CIFOR scientists and Research Centre (CATIE) and the Centre for Social and Economic Research on the Environment (CSERGE) at University College London.

The first study investigated the effects of an innovative national programme in Costa Rica that gives private landowners periodic payments for ceding to the government the right to "sell" the environmental services their forested land provides (including carbon sequestration). The researchers interviewed forest owners and others in the Cordillera Volcanica Central Conservation Area, which is covered by the programme. A number of ecological, social and economic criteria and indicators were devised by which to analyse perceptions about benefits of forest protection and regeneration and forestry plantations in areas covered by the compensation programme, as compared with the most common land use alternative: extensive cattle ranching.

The researchers found that the Costa Rican programme offered a model that could enable host countries to take advantage of the funding opportunities provided by carbon markets without distorting their own national land use plans. They cautioned, however, that the model may not be appropriate for poorer countries that, unlike Costa Rica, are unwilling or unable to tax their people to finance such a programme, or for countries where forest conservation is not high on the list of national priorities.

The second study was designed to determine the motivations and concerns that influence decisions to participate in carbon sequestration projects. Those interviewed were 27 major pioneering investors in the emerging market of carbon sequestration services, including investors, brokers, project developers, fund managers and government agencies in the United States, the United Kingdom and Europe.

Although those surveyed indicated that public relations was the main reason for participating in a carbon market programme, cost effectiveness was nonetheless an important primary consideration. The researchers say their findings suggest that an unregulated, purely market-driven approach is likely to focus on carbon efficiency and ignore social and environmental considerations, despite encouraging signs that pioneer investors give some importance to environmental and social benefits.

Based on the studies, the researchers concluded that initial assessments of carbon markets as a "win-win" situation for all stakeholders may have been overly optimistic. Their analysis of this work identifies some of the conditions under which forestry carbon sequestration projects may be appropriate and highlights

The Information Services Group of CIFOR consists of computer services, the library, GIS and remote sensing activities, multimedia services and Management Information System support.

INFORMATION SERVICES GROUP

THE COMPUTER SERVICES UNIT supports 120 users at CIFOR and 50 more at the neighbouring Southeast Asia

Information and Communications

office of the International Centre for Research in Agroforestry (ICRAF), which moved to CIFOR's headquarters complex in early 1998. With the completion of Phase 2 of the headquarters complex, CIFOR's computer network was expanded to all buildings. Another major accomplishment was shifting all PC desktop computers to 32-bit operating systems and ensuring that all computers are Year 2000 compliant.

In 1998, CIFOR switched its e-mail system to Exchange and replaced its e-mail client software from MS Mail to MS Outlook. Mailboxes can now be accessed from the Internet, and this remote-access capability is heavily used by staff during travel. CIFOR's many databases set up in Lotus Notes are also accessible through the Internet, with a recent upgrade to Domino. Finally, the Computer Services' workshop and office space was redesigned and expanded to accommodate increased staff and operations.

In January, Ian Wallace, head of the Information Center at the International Rice Research Institute (IRRI), completed a review of CIFOR's library. Several of his recommendations were later implemented. The library space was expanded and rearranged to accommodate additional reading space, a new reception area and two computers for library users. New Ariel software (an electronic document delivery system) and a scanner were purchased in 1998. A copy of the software was donated to the Center for Agricultural Library and Research Communication (CALREC) in Bogor to improve document delivery to Indonesian researchers.

The library also developed a new database for the inventory of all CIFOR publications, both in-house and external, using Lotus Notes. Almost all publications since 1993 have been included in this database. It also allows outputs in different formats according to users' specific needs.

GIS services at CIFOR undertook two major activities in 1998. The first was a spatially explicit model of deforestation in Bolivia. Conducted in the Province of Santa Cruz, the study is looking at the impact of past road construction on deforestation and land use, expected impacts from future road construction, impacts of zoning policies such as forest concessions and protected areas, and the influence of cultural factors on forest clearing and fragmentation. Preliminary findings of the analysis were presented at a major modelling conference in Jakarta in October 1998, which was co-sponsored by CIFOR.

A second major GIS project produced a spatial characterisation of non-timber forest product markets in the Humid Forest Zone of Cameroon. It encompassed 25 markets, highlighting their various types, links among them and areas of influence. The study demonstrated the usefulness of spatial components to analyse relationships between forest resource endowments and socioeconomic demands. Four main types of markets based on size, role and functional connections were identified, and thematic maps were constructed showing, among other things, the distribution of selling markets by size of the market and types of commodities sold; the distribution of NTFP trading grouped by value; and the intensity of NTFP trading in the area surveyed.

Apart from these two major projects, other GIS work was conducted to support CIFOR research in the Alto Juruá Reserve in Acre, Brazil, and in Bulungan Research Forest in East Kalimantan, Indonesia.

CIFOR's multimedia services were heavily used in 1998. A number of computer-generated presentations both for in-house and international conferences and meetings were produced using graphic design and multimedia software. The division was also busy in 1998 catering to increased demand for electronic publishing. In December, CIFOR launched a new CD-ROM containing

full documents of most of CIFOR's internal publications as well as a complete reference list of external publications by CIFOR staff and partners. A total of 68 internal publications and 300 references of external publications were included.

The CD-ROM product was developed jointly by the Information Services Group and the Communications Unit. The 12-member team worked intensely for nine months to complete the task. It was CIFOR's first electronic archiving experience, and the data preparation stage – collecting and verifying all documents and publication references – was a challenge. Where electronic files for documents were unavailable, publications had to be scanned using optical character recognition (OCR) software. Editing and reconstruction of some original files was also necessary to make sure that the pictures, illustrations and text were in publishable form. The CD-ROM's navigation system for users is provided in PDF format with an attractive graphic design. The CD is also equipped with full-text search facility.

In 1998, additional features were developed for CIFOR's Management Information System (MIS), which was formed in 1997. These include improved accessibility for staff through remote access while travelling, flexibility in regard to different outputs and formats (electronic and printed), and improved links with other CIFOR operations. Software was updated in relation to this.

Also in 1998, several new databases were created for the library to archive CIFOR publications. The total number of data records is currently about 300; they will eventually be linked to CIFOR's "publications pipeline" database, a workflow application set up in Lotus Notes to monitor the status of research papers and articles under preparation by CIFOR staff. This database was introduced in 1998 and is jointly managed by the Communications Unit and the Research Division, with technical support from the MIS unit.

PUBLICATION AND DISSEMINATION

IN 1998, CIFOR'S OUTPUT of internally published documents included two monographs, eight Occasional Papers and a compilation of research abstracts summarizing 84 articles and papers by CIFOR staff that appeared in major scientific journals, books and conference proceedings. As described in detail above, CIFOR also issued for the first time a CD-ROM containing the full text of all the centre's technical and corporate publications published since 1993.

With the increased interest in electronic publications, CIFOR developed other CD-ROM products for various research projects, including the criteria and indicators and the non-timber forest products programmes.

The quarterly newsletter, *CIFOR News*, and the centre's annual report continued to be produced in three languages: English, French and Spanish. A summary of the 1997 annual report was also published in Bahasa Indonesia.

All of CIFOR's major scientific publications and public information materials were posted on the centre's Web page. This resource, which was upgraded and expanded in 1998, has become a major channel for distribution of information about CIFOR, drawing an ever growing number of readers.

The Communications Unit produced a wide array of public awareness materials in 1998, including the CIFOR brochure in several languages, posters and exhibition panels for various conferences and events, an annual calendar and a compilation of briefs on major research achievements.

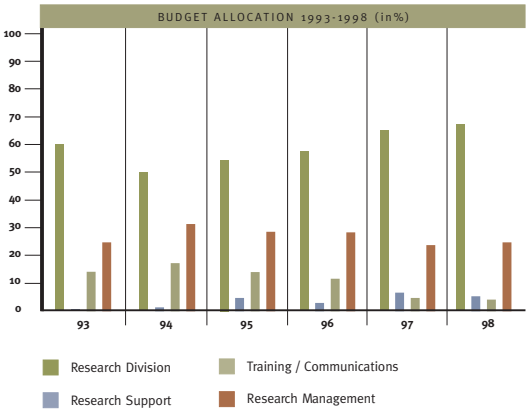
CIFOR's headquarters complex is situated in a small forest, and in 1998 the centre completed a project to identify, classify and label about 90 tree species in the area for the benefit of visitors. A detailed pamphlet providing botanical and other interesting information about the forest is under preparation.

CIFOR's electronic mailing list known as POLEX continued to attract additional subscribers in 1998. This cost-effective service has been a highly successful mechanism for circulating synopses of significant policy-related research findings from CIFOR and other organisations to policy makers, forest managers, government officials and NGOs.

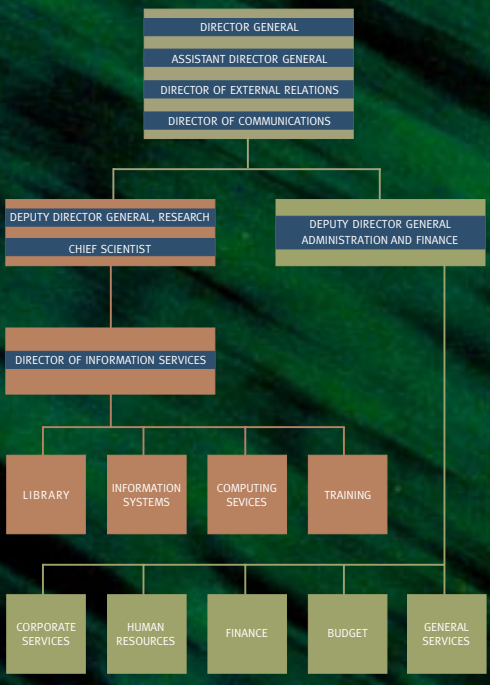
PUBLIC FORUM IN JAPAN

IN APRIL, CIFOR HELD a public forum on "Forests for the Next Generation" at the United Nations University in Tokyo, organised in conjunction with a meeting of CIFOR's Board of Trustees. About 200 people from universities, the government, the private sector, NGOs and the media attended the day-long event, which featured scientists from CIFOR and Japanese institutions. Japan is a major donor to CIFOR, and the forum, which was co-sponsored by the Japanese Ministry of Foreign Affairs and the Forestry and Forest Products Research Institute (FFPRI), was organised to convey to key audiences in Japan the benefits of overseas development assistance to the forestry, agriculture and other development sectors. ■

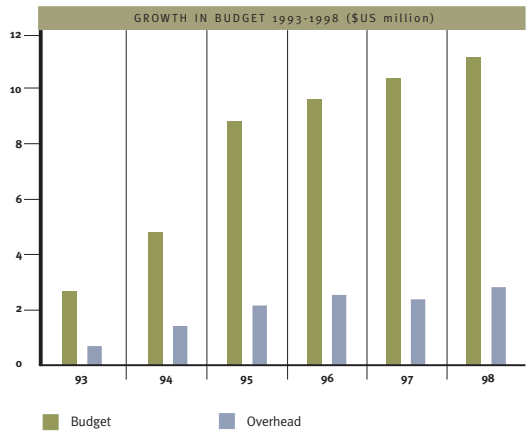
RESEARCH PROJECTS CHART

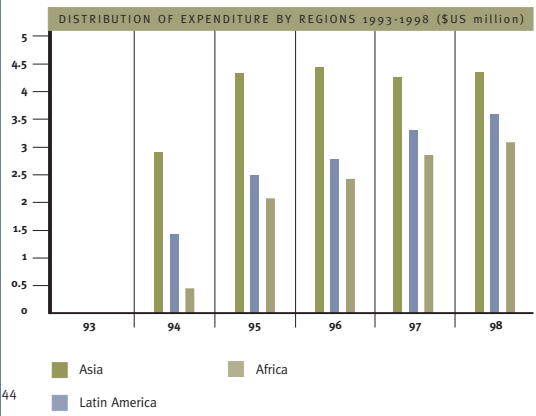


Finance and Administration



ORGANISATION CHART





SCHEDULE OF GRANT REVENUE

FOR THE YEARS ENDED 31 DECEMBER 1998 AND 31 DECEMBER 1997
(IN US $'000)

DONORS	1998	1997
Agreed Research Agenda		
Unrestricted		
Australia	262	348
Austria	80	80
Canada	232	226
Denmark	224	231
European Union	840	750
Finland	683	401
France	107	84
Germany	294	284
Indonesia	125	500
Japan	1,420	1,445
Netherlands	787	512
Norway	333	204
Philippines	13	23
Spain	25	50
Sweden	192	191
Switzerland	243	270
USA	500	500
World Bank	1,200	900
Sub-total	7,560	6,999
Restricted		
Australia (ACIAR)	86	97
Brazil (EMBRAPA)	34	30
Denmark	126	0
European Union	856	208
Finland	28	0
Food and Agriculture Organization	0	5
Ford Foundation	34	82
Germany (GTZ/BMZ)	86	376
ICRAF	28	141
Inter-American Development Bank	84	141
International Development Research Centre	58	0
IFAD	88	0
International Tropical Timber Organization	225	0
Japan	347	567
MacArthur Foundation	47	0
Netherlands	(19)	(29)
Norway	58	70
Rockefeller Foundation	91	27
Spain	80	75
Sweden	537	87
Switzerland	80	107
USA	215	838
United Kingdom (DfID)	448	427
United Nations Environment Programme	8	0
USDA Forest Service	41	0
United Nations Educational, Scientific and Cultural Organization	29	0
World Wildlife Fund	31	0
Sub-total	3,726	3,249
Total Grants	11,286	10,248
Complementary		
United Kingdom (DfID)	0	64
Sub-total	0	64
Total Grants	11,286	10,312

STATEMENT OF FINANCIAL POSITION

AS AT 31 DECEMBER 1998
(IN US $'000)

	1998	1997
ASSETS		
Current assets		
Cash and banks	7,188	4,640
Accounts receivable :		
Donors	2,271	3,553
Employees	111	176
Others	644	389
Prepaid expenses	336	522
Total current assets	10,550	9,280
Fixed assets		
Property, plant and equipment	3,711	3,170
Less : accumulated depreciation	(1,796)	(1,322)
Total fixed assets - net	1,915	1,848
TOTAL ASSETS	12,465	11,128
LIABILITIES AND NET ASSETS		
Current liabilities		
Accounts payable :		
Donors	1,948	1,449
Others	34	60
Accruals and provisions	2,215	1,988
Total current liabilities	4,197	3,497
Net assets		
Capital invested in fixed assets	1,915	1,848
Capital fund	1,088	1,155
Operating fund	5,265	4,628
Total net assets	8,268	7,631
TOTAL LIABILITIES AND NET ASSETS	12,465	11,128

STATEMENT OF ACTIVITIES AND OPERATING FUND

FOR THE YEARS ENDED 31 DECEMBER 1998 AND 31 DECEMBER 1997
(IN US $'000)

	1998			1997
	Agreed Research Agenda			
	Unrestricted	Restricted	Total	Total
Revenues				
Grants	7,560	3,726	11,286	10,312
Other revenues	413	-	413	376
Total revenues	7,973	3,726	11,699	10,688
Operating expenses				
Research programmes	3,735	3,726	7,461	7,024
Research support	899	-	899	1,054
General administration	2,702	-	2,702	2,495
Total operating expenses	7,336	3,726	11,062	10,573
Changes in operating fund	637	-	637	115
Operating fund at the beginning of the year	4,628	-	4,628	4,513
Operating fund at the end of the year	5,265	-	5,265	4,628
Operating expenses :				
Personnel costs	3,621	1,006	4,627	4,442
Supplies and services	2,278	126	2,404	2,010
Collaborative activities	437	2,387	2,824	3,057
Operational travel	520	207	727	601
Depreciation of fixed assets	480	-	480	463
Total operating expenses	7,336	3,726	11,062	10,573

CIFOR STAFF 1998

DIRECTOR GENERAL'S OFFICE	
Jeffrey A. Sayer (UK)	Director General
Neil Byron (Australia)	Assistant Director General (until June 1998)
Bambang Soekartiko (Indonesia)	Director, External Relations
Ninta Karina Bangun (Indonesia)	Executive Officer
Ketty Kustiyawati (Indonesia)	Secretary
COMMUNICATIONS UNIT	
Sharmini Blok (Sri Lanka)	Director of Communications
Yani Saloh (Indonesia)	Secretary
Gideon Suharyanto (Indonesia)	Desktop Publishing Officer (from September 1998)
Johannes Manangkil (Indonesia)	Secretary (Mail & Distribution)
RESEARCH DIVISION	
Dennis Dykstra (USA)	Deputy Director General Research
John W. Turnbull (Australia)	Chief Scientist
Kuswata Kartawinata (Indonesia)	Director, Bulungan Research Project
Reidar Persson (Sweden)	Assistant Director General
Carol Colfer (USA)	Anthropologist
Christian Cossalter (France)	Silviculturist
Esther Katz (France)	Ethnologist
Godwin Kowero (Tanzania)	Forestry Economist
Jerome Vanclay (Australia)	Systems Modeller
Ravindra Prabhu (India)	Silviculturist
Andrew Gillison (Australia)	Plant Ecologist (up to May 1998)
Eva Wollenberg (USA)	Local Forest Management Specialist
César Sabogal (Peru)	Silviculturist
Manuel Ruiz Pérez (Spain)	Ecologist & Natural Resources Specialist
Michael Spilsbury (UK)	Forest Scientist
David Kaimowitz (USA)	Agricultural Economist
Wilhelmus A. de Jong (Netherlands)	Social Forester/Human Ecologist
William Sunderlin (USA)	Rural Sociologist
Plinio Sist (France)	Forest Ecologist
Shigeo Kobayashi (Japan)	Forest Ecologist
Joyotee Smith (India)	Resources Economist
Arild Angelsen (Norway)	Economist
Brian Belcher (Canada)	Natural Resources Economist
Sonya Dewi (Indonesia)	Theoretical Ecologist and Modeller
John G. Poulsen (Denmark)	Ecologist
David Edmunds (USA)	Social Scientist
Philippe Guizol (French)	Socio-Economist Silviculturist
Ousseynou Ndoye (Senegal)	Agricultural Economist (Cameroon)
Francois Ekoko (Cameroon)	Scientist (Cameroon)
Eyebe Antoine (Cameroon)	Economist (Cameroon)
Danielle Ngono Lema (Cameroon)	Sociologist (Cameroon)
Robert Nasi (France)	Silviculturist (Gabon)
Timothy Boyle (Canada)	Forest Geneticist (until June)
Daju Pradnja Resosudarmo (Indonesia)	Environmental & Resources Policy Specialist
Nining Liswanti (Indonesia)	Silviculturist
Herlina Hartanto (Indonesia)	Ecologist
Cynthia McDougall (Canada)	Social Scientist
Manuel Guariguata (Venezuela)	Silviculturist (Costa Rica)
Yudi Iskandarsyah (Indonesia)	Silviculturist
Delman de Almeida Octavio Gonzales (Brazil)	Research Assistant (Brasil)
Rita Mustikasari (Indonesia)	IUFRO Liaison Officer
Panca Ambarwati (Indonesia)	Secretary
Rosita Go (Indonesia)	Secretary
Syarfiana Herawati (Indonesia)	Secretary
Rahayu Koesnadi (Indonesia)	Secretary
Indah Susilanasari (Indonesia)	Secretary
Meilinda Wan (Indonesia)	Secretary
Titin Suhartini (Indonesia)	Secretary
Patricia Radjiman (Indonesia)	Secretary (until April 1998)
Lucya Yamin (Indonesia)	Secretary (until March 1998)
Florence Munoh (Cameroon)	Secretary (Cameroon)
Graci Cunha de Oliveira (Brazil)	Secretary (Brazil)
RESEARCH FELLOWS	
Nicolette Burford de Oliviera (UK)	Social Forester
Hariyatno Dwiprabowo (Indonesia)	Systems Analyst
Doddy Sukadri (Indonesia)	Forest Policy Analyst
Douglas Sheil (Ireland)	Ecologist
Aulia Auruan (Indonesia)	Forest Scientist
Titiek Setyawati (Indonesia)	Forest Ecologist

CIFOR STAFF 1998

RESEARCH ASSOCIATES	
Michael Arnold (UK)	Forest Economist (Oxford)
Louise Buck (USA)	Natural Resources Policy & Management Specialist (Cornell University)
Alexander Moad (USA)	Forest Ecologist (USDA Forest Service)
Bruce Campbell (Zimbabwe)	Ecologist (University of Zimbabwe)
Allan Tiarks (USA)	Soil Scientist (USDA Forest Service)
Francis Putz (USA)	Forest Ecologist (University of Florida)
Dean Current (USA)	Natural Resources Economist (CATIE, Costa Rica)
VISITING SCHOLARS	
Liu Dachang (China)	Social Scientist
Carmen Garcia (Spain)	Ecologist
Augustine Hellier (UK)	Forest Ecologist (until April 1998)
Narve Rio (Norway)	Economist
INFORMATION SERVICES GROUP	
Michael Ibach (Germany)	Director, Information Services (until June 1998)
Atie Puntodewo (Indonesia)	GIS Specialist
Sri Wahyuni Soeripto (Indonesia)	Librarian
Yuliardi Yuzar (Indonesia)	Manager, Computer Systems
Dina Satrio (Indonesia)	Information Services Assistant
Yahya Sampurna (Indonesia)	Computer Services Assistant
Tan Bandradi (Indonesia)	Computer System Assistant
Zaenal Abidin (Indonesia)	Computer System Administrator
Budhy Kristanty (Indonesia)	Secretary
Imam Budi Prasetiawan (Indonesia)	Librarian Assistant
FINANCE AND ADMINISTRATION	
Norman MacDonald (Canada)	Deputy Director General Finance & Administration
Jennifer Crocker (Canada)	Manager, Human Resources (from October 1998)
Marielle Paiement (Canada)	Manager, Human Resources (until October 1998)
Ramsey Omar (Indonesia)	Manager, Administration
Retno Utaira (Indonesia)	Manager, Finance
Gordon Christie (Australia)	Consultant
Susan Kabiling (Philippines)	Budget Officer
Edward Martin (Indonesia)	Assistant Manager, Finance
Soli Prijono (Indonesia)	Corporate Affairs Officer
Henny Saragih (Indonesia)	Executive Assistant
Ismed Mahmud (Indonesia)	Administrative Assistant
Murniati Sono (Indonesia)	Administrative Assistant
Lia Wan (Indonesia)	Travel/ Conference Coordinator
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Consilia Guaka (Zimbabwe)	Administrative Assistant (Zimbabwe)
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Karina Palar (Indonesia)	Cashier
Nina Handayani (Indonesia)	Receptionist
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Arina Suwandini (Indonesia)	Receptionist (until July 1998)
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Ata Sukanta (Indonesia)	Driver
Tatang (Indonesia)	Driver
Suratman (Indonesia)	Driver
Tonny (Indonesia)	Driver
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Ukat (Indonesia)	Office Assistant
Atang Sanjaya (Indonesia)	Office Assistant
Pendi (Indonesia)	Office Assistant
Siti Nadiroh (Indonesia)	Office Assistant
Supandi Rodjali (Indonesia)	Office Assistant
Tina (Indonesia)	Cook
Karmi Kurmiati (Indonesia)	Cook
Maman Suparman (Indonesia)	Cook
Komar Kosasih (Indonesia)	Clerk
Suhendar Husain (Indonesia)	Housekeeper
Kusnadi Muhi (Indonesia)	Housekeeper
Ali Bin Maud (Indonesia)	Gardener
Endang Kosasih (Indonesia)	Gardener & Night Watchman (until March 1998)

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CIFOR Annual Report 1998 is PRODUCED BY The Communications Unit, CIFOR
WRITTEN BY Diana Parsell, CIFOR • **DESIGNED BY** Equinox Art & Design, Singapore

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