Center for International Forestry Research

CIFOR annual report 2001

Forests for the future

CIFOR's heart and soul

CIFOR is committed to supporting informed decision-making processes about forests that are transparent, accountable and incorporate the views of traditionally marginalized groups. That means good governance and decision-making that take into account a wide variety of interests are central objectives of CIFOR

CIFOR is committed to alleviating rural poverty by helping poor people retain and obtain access to forest resources, create new resources and earn greater incomes from the resources they have. That makes improving human well-being a central objective of CIFOR.

CIFOR is committed to ensuring continued economic and social benefits from forests and protecting forest ecosystems and biodiversity. That means sustainable forest management is a central objective of CIFOR.

CIFOR is committed to helping people recognize the importance of the links between forests and broader social issues. That means building bridges between people that focus on forests and those concerned with other sectors is a central objective of CIFOR.

CIFOR is committed to strengthening the capabilities and opportunities of developing country scientists, governments, civil society organizations and communities to develop and promote their own solutions for forestry problems. That means capacity building and providing opportunities for developing countries to share their research and perspectives are central objectives of CIFOR.

CIFOR is committed to using collaborative research to achieve these objectives. Our research seeks to provide high quality, unbiased and timely information to policymakers, national and international development and conservation agencies, local communities and their organizations, researchers and academics, industry groups and private companies. It also permits scientists in developing country institutions to take advantage of tools, methods and other resources that CIFOR can make available.

CIFOR is committed to being a learning organization that constantly strives to push its own institutional frontiers by discussing, incorporating and fostering new ideas and practices, born out of its experiences and diversity in disciplinary traditions, cultures, gender and innovative partnerships.

Most importantly, CIFOR is committed to making a difference in peoples' lives and the health of the forest. An important element in this approach is assisting poor people and their organizations to learn how to achieve their own goals more effectively. For us, research is a tool that lets us build a better tomorrow, not an end in itself. As a 'Centre without wall" we invite everyone to join us in that process.

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Center for International Forestry Research

CIFOR annual report 2001

Forests

for the future

Message from the Chair of the Board of Trustees

Jagmohan S. Maini,
Chair, Board of Trustees

In its ninth year of operation and with a new Director General, CIFOR is entering a new phase in its development. The Centre has emerged as one of the leading tropical forest research organizations that is generating research results with impact far beyond its size. In addition to highly significant scientific achievements during the past year, I am very pleased to highlight CIFOR's increasing involvement with many of the major international initiatives to address issues related to forests, in terms of both the development and implementation of policies, as well as strengthened partnerships with many key multilateral organizations, institutions and countries.

As an international forest research organization, CIFOR's research projects continue to respond directly to the needs identified by stakeholders in forests. Accordingly, the outputs by CIFOR scientists clearly demonstrate their commitment to generating knowledge that is policy relevant and to provide results with direct, useful impact at the ground level. This report highlights CIFOR's collaboration with partners at all levels, global, regional and national. One look at the list of collaborators clearly demonstrates that CIFOR is increasingly successful in involving organizations around the world in its research.

One of the Centre's strategic objectives is to support and influence international forest policy deliberations at the highest political and international levels by providing timely and objective analyses. This approach has proven very successful in 2001. By capitalizing on its experience and expertise, CIFOR is responding to requests for advice and making very significant contributions to the development of international treaties, agreements and forest-related policies, as reflected in the plans of action of the Intergovernmental Panel on Forests/Intergovernmental Forum on Forests (IPF/IFF), the CBD work programme, and other similar agreements.

Strategic advice by CIFOR staff has influenced intergovernmental forest policy development in numerous fora. For example, issues related to forests and forestry are now included in the agenda of the Secretariat of the Convention on Biodiversity. The Global Environment Facility has adopted a broader approach to forest biodiversity. CIFOR contributed to the work plan of the Framework Convention on Climate Change and clarified some aspects of the Clean Development Mechanism of the Kyoto Protocol.

CIFOR recognizes that addressing complex forest issues requires effective partnerships and the collective efforts of many organizations. CIFOR is an active member of the Collaborative Partnership on Forests, established to support the UN Forum on Forests (UNFF), and has responded directly to several IPF/IFF proposals for action, in particular those dealing with forest science in the national, regional, and international forest policy context; encouraging innovative financing and partnerships to support sustainable forest management; promoting participative forest research and policy making; and increasing access to information on forests through networks.

The strength of CIFOR lies in its continued focus on forest-related policies, practices and partnerships, in response to the priorities identified by its clients at the national, regional and global levels. Operating at this wide range of geographic scales means that CIFOR is able to leverage its expertise and exert influence far beyond its size. This involves multiplying the positive benefits of its work as well as raising its profile on the world stage.

I am proud to be involved with CIFOR and feel privileged to be able to influence the Centre through the Board's advice to the Director General. I am confident that CIFOR will continue to gain strength and enhance its influence under the dynamic leadership of its new Director General. I would like to take this opportunity to congratulate David Kaimowitz and the whole of the CIFOR staff, for their valuable contributions during 2001.

Message from the Director General

The world today faces huge challenges. Extreme poverty, disease, corruption, violence and environmental destruction remain as widespread and worrisome as ever, despite all our efforts to find solutions. These are the problems that concern the international community. To be relevant, people that work with forests and forestry must address these challenges.

In fact, the links between forests and the global challenges are surprisingly strong. Hundreds of millions of poor people depend heavily on forest products to survive. They use forests for food, fodder, firewood, fertilizer, shelter and as a source of cash; and they use them most in their times of greatest need. Medicinal plants and animals remain the primary defense against sickness for rural families that lack access to formal health care systems. Unfortunately, the huge natural wealth in forests, combined with government ownership and over-regulation of forests has made the forestry sector a major magnet for corruption. From Aceh to Mindanao, the Congo to Colombia, forests have become centres of violent conflict in several dozen countries. The weak presence of government, poorly defined rights over natural resources, inaccessibility, and ethnic diversity fuel those conflicts. Forest loss also plays a central role in global warming and climate change, biodiversity loss, soil degradation and the growing difficulties with freshwater supplies.

To address these problems requires good information, serious thinking, informed dialogue, experimentation and learning from past mistakes. This is what research means at CIFOR. We see it as a dynamic and engaged process through which people with diverse interests and perspectives come together to analyze and solve their problems. High quality credible information and analyzing issues systematically is an important part of that process; but it is not an end in itself.

By generating new ideas, providing high quality analysis, provoking dialogue and encouraging learning, research about forests can achieve impact and make a difference. Good ideas, strong arguments and critical thinking are more powerful than people often realize. One often hears there is too much talking. It is time to act. But people ***have*** been acting. They have been making laws, creating parks, funding projects and planting trees. The problem is that many of these actions have not provided the results they hoped for. That is why it is better to act, seriously assess the results and then act again. Good research, well disseminated and widely discussed, can help.

That is where CIFOR is going, together with the many other researchers and research organizations we work with. We and our partners are working hard to find new ways for forests to contribute to alleviating poverty, to peace and prosperity, and to providing environmental services. One key part of that is to provide developing country researchers and opinion leaders with the information, tools and support they need to better address the problems in their countries. Another important aspect is to work closely with national and local governments, NGOs and community organizations.

As I look forward to the coming years, I am excited about CIFOR's prospects. I hope that reading this report will give you an idea of what we are all about, and will inspire you to become just a little bit more involved with our work.

David Kaimowitz,
Director General

Working to conserve forest biodiversity

The Global Environment Facility (GEF) is the financial mechanism of the CBD, making it one of the biggest biodiversity donors in the world. Between 1992 and 2000, GEF put $1.2 billion into 395 projects in 123 countries, with forest projects receiving over $500 million. The GEF provides a large portion of the world's funding for tropical biodiversity.

www.gefweb.org

CIFOR's policy research relates forestry to wider issues such as the environment, biodiversity, poverty and economic development. This approach will be central to continuing international dialogue about forestry. During 2000 and 2001, CIFOR collaborated with GEF's Secretariat to broaden its approach to forest biodiversity. GEF had been focusing mostly on supporting national parks and other protected areas. Protected areas are a very important part of conserving biodiversity, but they are not enough. Their areas are unlikely to ever include more than 10-15% of the world's tropical forests, and many existing protected areas are under threat. Internal reviews had shown GEF that 75% of its forest projects focus on protected areas, and suggested that the Facility could focus more on the environment around the areas.

"Creating protected areas is buying time," said CIFOR's Robert Nasi. "To maintain them in the long term you need to look at what is happening in the surrounding landscape." CIFOR proposed looking at protected areas in relation to the political and socio-economic environment surrounding parks, then collaborated with GEF to organize a workshop in Bogor in April 2001 that explored the ways that GEF could approach forest biodiversity conservation.

"Forested landscapes around the world are moving towards human-dominated use and this evolution needs to be understood," said Nasi. Conserving plants and animals that are endangered or important for poor people to use requires ways to better manage the 80-90% of the tropical forests that are outside protected areas. The workshop highlighted two strategic moves for GEF in conserving biodiversity that could be very useful: to extend its work to include forest areas where production takes place and to integrate this approach into its projects to increase the chances of successfully conserving biodiversity in the long term.

Dry forest in La Trancas, Eastern Bolivia (Photo: Carol J.P. Colfer)

Examining the economics of plantations (Photo: Takeshi Toma)

Putting a cap on carbon

In 1997 the Kyoto Protocol was drafted as the first international agreement to put legally binding limits on greenhouse gas emissions from developed countries. One of the most important concerns of the developing countries is to make sure that any efforts to solve the climate change problem also help them to develop their own economies and reduce rural poverty. So the Conference of the Parties (COP) of the UN Framework Convention on Climate Change (UNFCCC) agreed to set up the Clean Development Mechanism (CDM) as part of the Kyoto Protocol. This was supposed to help developed countries meet their goals for reducing emissions by allowing them to support activities in developing countries that would remove carbon from the atmosphere, otherwise known as carbon sequestration. There are already more than 30 forestry carbon sequestration projects worldwide covering more than 3 million ha with funding of about $350 million.

Many people, especially negotiators in COP6, were concerned that including forestry projects in the CDM would allow the developed countries to avoid reducing their own use of fossil fuels by starting large numbers of forestry projects in developing countries instead. Further, these CDM forestry projects might actually hurt poor people, for example if a CDM project established protected areas that excluded poor people or supported large industrial plantations that forced small farmers off their land.

CIFOR research showed that the concern about forestry projects substituting for serious efforts in developed countries was exaggerated. Even in the most optimistic scenarios forest carbon projects would never amount to 20% of total emission reductions. Country delegates in the COP wanted to put a cap on the number of projects a country could claim credit for that was low enough to ensure that energy sector activities would still be addressed but high enough to allow good projects to go ahead.

Financing sustainable forest management

Many developing countries will probably continue to use large areas of their forests to produce timber and other forest products to meet their local needs and to earn foreign exchange. That is not necessarily bad if they manage those forests sustainably. It is technically possible to do that, but in most cases it is more profitable for companies to log the forests in unsustainable ways. Companies will probably need clear incentives to change their behaviour. Those might take the form of higher prices for their products, cheaper access to capital, being able to sell to new markets, or simply direct payments.

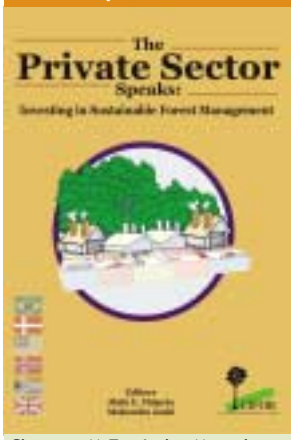
All the incentives would require new sources of money. Many countries around the world have been thinking about innovative ways to come up with that money. They have come together in the United Nations Forum on Forests (UNFF), which was established in October 2000 as the main forum for the world's governments to work together on finding solutions to major forest problems.

As part of the process the UNFF decided to bring together some of the top people from both the public and private sectors around the world to examine different ways to generate the money that was needed. CIFOR's Mafa Chipeta chaired the Steering Committee that organised a meeting in January 2001 in Oslo, Norway. The meeting was co-funded by the governments of Norway and the UK and jointly sponsored by Brazil, Denmark, Malaysia, Norway, South Africa and the UK. The Committee interacted closely with the Food and Agriculture Organization, the UN Development Programme, the UNFF and the World Bank.

At the meeting the participants looked at a number of imaginative ways to finance sustainable forest management, such as forest certification, incentives for developing new forest plantations and creating a new Investment Promotion Entity. Based on these discussions, CIFOR put together a report that highlights various options that governments and private companies can consider to move ahead. The UNFF is relying on that report as it decides what concrete actions it wants to support in this area.

"The private sector is reluctant to adopt sustainable forest management because of high investment costs, technical complexity and lower profit margins," said Chipeta. "But these forests have considerable public benefit for society, so there is a strong justification for domestic and international funding for natural forest management."

Related publication



Chipeta, M.E., Joshi, M., eds. 2001. Financing sustainable forest management: Proceedings of an international workshop, Oslo, Norway, 22-25 January 2001. Bogor, Indonesia, CIFOR. Book and CD-ROM.

CIFOR researcher Claudio Forner evaluated two basic kinds of caps; capping how many credits a developing country could produce for any given client and limiting how many credits a client could use to meet their Kyoto commitments. "We argued that a 5 percent cap on the percentage of emissions reductions resulting from forestry activities would be more than adequate to take care of these concerns," said Ken MacDicken, CIFOR's Director of Research. "And our analysis shows there that there were no disadvantages to imposing caps at these levels."

In the end, the UNFCCC Conference of the Parties was able to agree that only a relatively small percentage of the CDM funds would go to forests. That satisfied both the concerns of people who want funding for forests and of those that do not want funding for forests to keep developed countries from having to reduce their own fuel emissions.

Converting landscape forest into agriculture and secondary plantation areas, Indonesia (Photo: Antonius Djogo)

Getting forests on the global agenda

Fires destroy forests and damage perennial crops, fences, etc. Successful reforestation needs good management, involving local people to bring benefits in the future (Photo: Carol J.P. Colfer)

The Convention on Biological Diversity (CBD) with its 180 plus Parties was established to protect biodiversity, use it sustainably and make sure the benefits are equitably distributed. CIFOR has been collaborating with the Secretariat of the CBD to strengthen the conservation of forest biodiversity within the existing structures of the Convention.

The Secretariat had requested CIFOR's assistance in looking at ways the CDB could conserve forest biological diversity. Partly as a result of that collaboration the Convention's *Ad hoc* Technical Expert Group on Forest Biological Diversity was formed. The Expert Group has helped the CBD think through the issues and provided key support in developing the CBD's action plan. CIFOR also made two widely distributed studies for the CBD Secretariat on non-timber forest resources and on forest fires, in collaboration with the Australian National University, the US Forest Service, the World Conservation Union and the World Wide Fund for Nature. These made the subjects very prominent on the CBD agenda.

Non-timber forest products are very important for all three aspects of what the CBD is about. Managing them sustainably can help the millions of poor people that sell and use them and help to protect biodiversity. But this raises a lot of complex issues. In the case of bush meat, for example, hunting in forests is killing off the monkeys, birds and other large animals, but it is also very important as a source of protein for many people. Forest fires are another major issue. Millions of hectares of forest are lost each year, particularly during El Niño years. Habitat loss is one of the main causes of the decline in forest biodiversity, and the fires also damage human health and destroy perennial crops and fences.

CIFOR's Robert Nasi gave a keynote address at SBSTTA 7 on NTFPs (see Table 1) that triggered a lot of reactions from the Parties and gave the issue a high profile in the CBD's deliberations. The action plan will orient the biodiversity protection activities of many countries over the next few years. In this way, new action required at the government level on forest biodiversity will be backed up by the full authority of the CBD.

Table 1. The value of the international trade in non-timber forest products[1]
The economic value of NTFP is rarely taken into account in assessing gross domestic product, but their international trade involves global networks and major earnings

Products from NTFP	World's import (million US$)	Notes
Natural rubber	4 221.8	Tropical moist forest regions, from intensively managed plantations, agroforestry systems and natural stands (extractive reserves) of *Hevea brasiliensis*
Ginseng roots	389.3	Tropical or subtropical, both from wild and plantations
Essential oils	319.4	Various regions, both from wild and cultivated resources
Cork	310.7	Mediterranean regions from managed natural stands and plantations of Quercus suber
Honey	268.2	Worldwide product from intensively or extensively managed and wild resources
Walnut	215.9	Temperate from cultivated populations of *Juglans spp.*
Mushrooms	206.5	Temperate and sub-tropical both from wild and cultivated populations
Rattan	119.0	Tropical rainforests, mostly from natural stands, few plantations in Asia
Gum arabic	101.3	Tropical arid regions, mostly from wild or extensively managed natural stands of *Acacia senegal* and *A. seyal*
Brazil nuts	44.3	Amazonian rainforests, from wild or semi-intensively managed natural stands of *Bertholetia excelsa*
TOTAL NTFP	**11 108.7**	

[1] From a presentation made by CIFOR's Robert Nasi to the CBD's Subsidiary Body on Scientific, Technical and Technological Advice on 'Harvesting Non-timber Forest Resources; is sustainability achievable?' Table modified from FAO data – original data from the UN Conference on Trade and Development.

Women making money from forest products

Around the world, women harvest and process non-timber forest products (NTFPs) for sale. For the poor women of Maranhao, Brazil, extracting palm kernels from the babacu palm is their single most important source of income. The activity involves over 300 000 families. Women in Botswana, India, Malaysia and many other countries weave baskets, mats and plates made of forest products. Women in forests throughout the tropics also collect or process wild nuts and fruits, medicinal plants and palm hearts.

Commercial opportunities for these products are emerging throughout the world as urbanization and economic growth open new markets and devolution of control over forests allows communities to play a greater role in managing forest resources. An underlying assumption is that forest communities will protect forest resources if they can earn money by selling what they gather. But the history of extracting products from the forest shows that it can lead to overharvesting of the product combined with exploitation of the forest dwellers actually doing the work. In particular, if women are involved they earn little for their labour and they typically use very rudimentary and laborious processing technologies.

"Our earlier work generated a number of hypotheses, theories and conclusions on the effects of commercialization," said Brian Belcher, the leader of CIFOR's programme on Forest Products and People. "For example, many non-timber forest products are important to poor people as buffers during times of hardship." However, the poor usually do not have the knowledge, capital or legal rights to be able to exploit market opportunities where they exist. Those with the abilities, knowledge and concessions usually earn the most from the benefits of commercialisation.

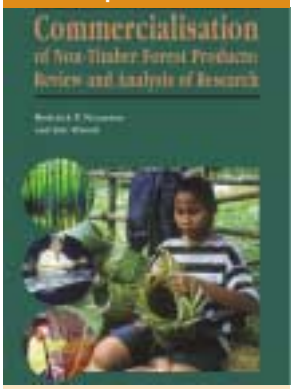
Much of the work goes on at home or in nearby forests, fallow areas and home gardens. That allows women to combine their income-generating activities with child raising and other domestic chores, but can also keep them politically and culturally isolated and deprive them of access to jobs and products located farther away. Unless they are carefully designed, projects to encourage the processing and sale of non-timber forest products can actually have a negative impact on women. For example, when machines replaced hand stitching of sal plates in India, men took the place of many of the women and left them without work. Similarly, women could not participate in a galip nut project in Papua New Guinea because processing activities were centralized in a town distant from the women's households.

Current initiatives are attempting to avoid the social exploitation of the past. Projects that include specific components for women can help them increase their political power and their ability to defend their economic interests. In Ghana, women have enthusiastically embraced a leaf-gatherers association that increased their ability to negotiate with the forestry department and their political influence within their villages.

Managing NTFPs covers a wide range of social, economic, political and social issues, many of which need investigation. Future research on the socio-political aspects of commercialization needs to look at the relationship among NTFP commercialisation, land tenure change, resource conservation and increased production needs. Research should also address how to incorporate customary practices into commercial forest management, especially the effects of increased amounts of cash being injected into local economies. By making progress on the most critical constraints, researchers will be able to increase the role of women in the production of non-timber forest products and also raise their incomes.

Women wearing traditional costume collecting forest products, in East Kalimantan, Indonesia (Photo: Alain Compost)

Related publication



This article is based on the book Commercialisation of Non-timber Forest Products: Review and Analysis of Research. (2000) R.P. Neuman and E. Hirsch. CIFOR, Indonesia and FAO, Italy. Gender aspects are only a small part of the topics it covers. Among other things, it looks at who benefits from these activities, whether they deplete the natural resources involved and what governments, NGOs and grassroots organizations can do to help people manage them better. Downloadable from www.cifor.org/ publications/ Books_and_ Monograph.htm.

Clarifying a complicated concept

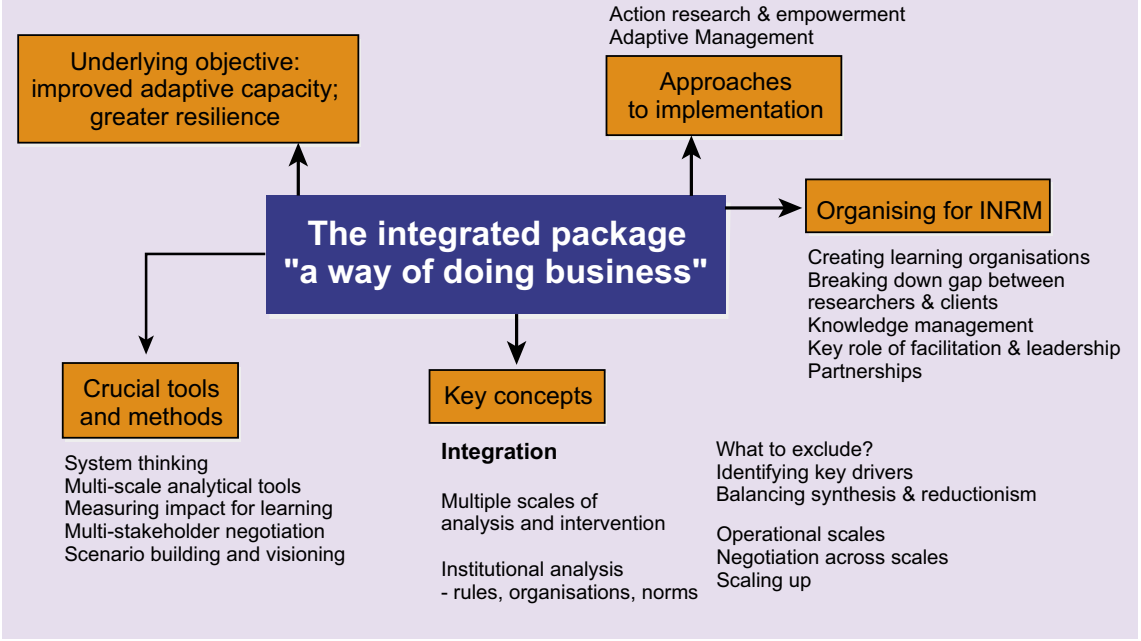
Many large-scale environmental problems are threatening agricultural, forestry, livestock and fisheries systems (Photos: Carmen Garcia, Herwasono Soedjito, Christian Cossalter, Edmond Dounias)

Scientists have always assumed they can predict the behaviour of complex systems with enough precision to control them. "This view is utopian," said CIFOR's Bruce Campbell in a provocative paper that he wrote with ex-CIFOR Director General Jeff Sayer. "We are putting forward a new vision of managing natural resources that requires us to reexamine our scientific objectives, concepts, leadership abilities, organizational principles, implementation approaches and methodological tools" (Figure 1).

Many large-scale environmental problems are threatening agricultural, forestry, livestock and fisheries systems. Maintaining forestry into the twenty-first century, for example, means dealing with problems like deforestation, unsustainable logging, fire, soil erosion and poverty. On top of that, agricultural advances may have disastrous impacts on the global environment, like the pollution of waterways from the run-off of nitrogen fertilizers. This mismanagement of natural resources may be the 'Achilles heel' of long-term sustainable development. To meet this challenge, the Future Harvest centres of the Consultative Group on International Agricultural Research (CGIAR) have been working together to harness the power of integrated natural resources management (INRM).

INRM research focuses on agriculture, forestry and fisheries to solve major human and environmental problems. It differs from much earlier work on natural resources because it takes a relatively integrated approach but focuses on solving only the most important problems. The scope of the new science is vast, from individual farmer's fields up to international agreements and the global climate. The CGIAR has already started three specific INRM projects.

Figure 1. Organizational principles, implementation approaches and methodological tools



Integration is the central concept in the approach. "In developing INRM research, we must consider the interactive effects of agro-ecosystems, social systems and economic systems," said Brian Walker from the Resilience Alliance at a 2001 workshop (see box, right). "However, pragmatism dictates that we only integrate the elements that are essential to solving the problem at hand." The costs of adding each additional element to a research framework have to be less than the benefits. The most difficult problem facing practitioners of integrated research and management is deciding when to stop adding components to the system.

"We need an approach to natural resources research that is driven by actual problems and based on the shared knowledge that comes from real life situations," said Sayer. The linkages that occur in natural resource systems create the need to work across large areas. For example the answer to the widespread deforestation in Borneo probably lies in giving more power to the local communities, working with district officials to establish a regulatory system and with international NGOs to deliver biodiversity payments to local people.

Natural resource management requires constant improvisation and there is no single correct answer. This means that researchers cannot stay as external actors, but need to involve themselves in developing solutions together with the resource users. One of the key lessons in dealing with complex systems is therefore that management must be organised to promote active individual and social learning.

Resource management systems are extremely complex. A common criticism of the previous attempts at INRM is that they try to describe a multi-component system in which everything is connected to everything else. This becomes so complex it is no longer useful. In fact, there may well be limits to the complexity. As few as five key variables may be involved. "We need to be able to identify and focus on the key drivers of particular systems, the key response variables and the key intervention points," said Campbell.

Measuring the impact of natural resources research is as complex as measuring the impact of education. Impact will show in the improved performance of the system and the improved ability of farmers and other resource managers at various levels to adapt to external changes. This presupposes an ability to measure and manage those outcomes. That will require extensive data collection, data management and monitoring.

If the real needs of poor farmers in developing countries are to be met then integrated approaches are essential. "We are proposing a revolution in science," said Sayer. "We must rethink the whole of our current scientific culture. Many research organisations may lose their identities and become part of management organisations." Research organisations will need to reflect on their *modus operandi* and scientific culture, and rise to the challenge of re-organising for maximum effectiveness in a complex world.

"In this paper we present the elements of a framework for integrated research," wrote Campbell and Sayer. "There are major challenges to experiment with this framework and work out how to carry out effective integrated research. This in itself will be a major learning effort that requires new competencies of researchers and ways of organising research. But the benefits will be tremendous."

Related publication

Jeff Sayer and John Poulsen (2001) Local Livelihoods and the Global Environment – a Time to Reassess the Role of Science? In: Workshop on Integrated Natural Resources Management Integrated Management for Sustainable Agriculture, Forestry and Fisheries, 28-31 August 2001, CIAT, Cali, Colombia (www.inrm.cgiar.org/documents/cali_workshop.htm).

Closing ceremony after research exercises, Participatory Systems Analysis Workshop, Transkei, South Africa, March 2001 (Photo: Bruce Campbell)

Communicating with the world


CIFOR's redesigned web site: www.cifor.cgiar.org

Getting CIFOR's key findings and messages reported through the media can be a powerful way of reaching policy makers, opinion leaders, NGOs, donors and other stakeholders that influence decisions that affect forests. As well as serving to distribute information very widely, media stories increase the public's awareness of the importance of forestry issues as well as raise the profile of CIFOR as an institution and the value of its research.

CIFOR received coverage in prominent international media such as The Economist, Financial Times, International Herald Tribune, National Geographic, Asian Wall Street Journal, International Financing Review Asia, the Manchester Guardian, Far Eastern Economic Review and several trade journals. National papers in Indonesia, Brazil and Cameroon also carried CIFOR stories.

In addition to the press reports on CIFOR's activities, the Centre developed a number of interesting articles and editorials from staff and professional writers, many of which were published around the world (see the table for highlights – the full text available from the Media section of CIFOR's Web site, www.cifor.cgiar.org).

CIFOR in the news 2001 – highlights		
International Herald Tribune	14 Feb.	*Get the forest people on your side*
Jakarta Post	20 Mar.	*Whirr of chain saws goes on in East Kalimantan rain forests*
Financial Times	11 Aug.	*The chainsaw's last stand?*
Asian Wall Street Journal	12 Sep.	*Losing sight of the forest for the trees*
International Herald Tribune	30 Nov.	*Get serious about averting trouble in the forest*
National Geographic News	3 Dec.	*Study links logging with severity of forest fires*

Study links logging with severity of forest fires

Hillary Mayell for National Geographic News 3 Dec. 2001

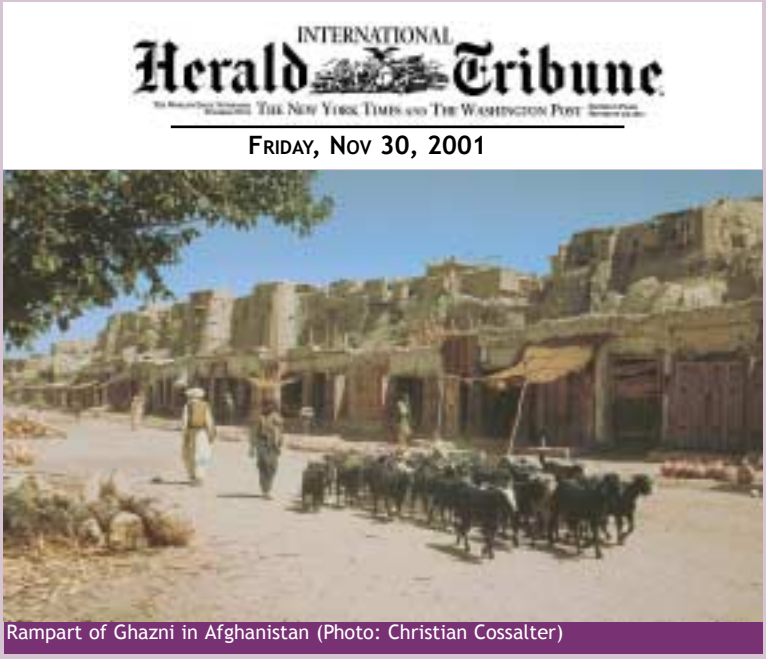
"Researchers have confirmed a long-suspected link between logging and the devastation of forest fires in tropical rain forests. Forest fires that ripped through East Kalimantan, Indonesia, in 1998 burned more than 12 million acres (5 million hectares). The Center for International Forestry Research (CIFOR), based in Bogor, Indonesia, estimated that the economic loss to Indonesia exceeded U.S. $9 billion and that carbon emissions were high enough to make the country one of the largest polluters in the world."

http://news.nationalgeographic.com/news/2001/12/1203_loggingfires.html

Get serious about averting trouble in the forest

David Kaimowitz in the International Herald Tribune 30 Nov. 2001

"With much of the world's attention riveted on Afghanistan, it is easy to forget that armed conflicts are bringing death and misery to millions of people in scores of countries around the world. Since 1989 the number of civil wars has tripled. Some are minor affairs, but others have paralyzed whole nations and have the potential to spark off wider violence. If the world wants to avoid endless turmoil, it needs to understand what causes such conflicts. It is often claimed that the wars of the future will result from rapidly rising populations fighting over increasingly scarce resources, such as water and land. At present, though, what we see is that the desire to control natural resources such as timber, diamonds and petroleum lies behind many conflicts."


INTERNATIONAL Herald Tribune

THE NEW YORK TIMES AND THE WASHINGTON POST

FRIDAY, NOV 30, 2001

Rampart of Ghazni in Afghanistan (Photo: Christian Cossalter)

The chainsaw's last stand?

Charlie Pye-Smith for the Financial Times, 11 Aug. 2001

"Fly over East Kalimantan, in Indonesia, and you witness the processes that are destroying, worldwide, an area of tropical forest the size of Greece each year. Much is being cleared to make way for agriculture, for crops such as palm oil and rice. Great swathes are being felled for timber and pulpwood, and even in areas protected as national parks, illegal logging is rampant. Another 10 years of this and there will be precious little left. The way market forces operate at present it makes sense to chop forests down. Or so it seems. However, during the past decade a variety of environmental groups and conservation-minded businesses have begun to challenge this conventional wisdom. They believe tropical forests, if intelligently harvested, could be worth far more left standing than if they were turned into plywood and paper, floorboards and furniture."

Making a success of devolution in Africa

In the Chobe Enclave Trust in Botswana, 45 families share about US$125 000 a year from wildlife tourism. In Gengma, China, entrepreneurs working with local government seized large tracts of land from the forest people for rubber and fruit tree plantations, leaving them with little worth managing. These are the two extremes of devolution, the process that gives control of natural resources to regional and local authorities.

Dry forest, Zimbabwe, Africa (Photo: Carol J.P. Colfer)

Devolution benefits

Direct
- Share of revenues from hunting, tourism, timber and forest products
- Share of incomes from permit and license fees
- Employment
- More production from resources
- Better infrastructure

Indirect
- Organisational development
- New alliances
- New channels of communication
- Technical and managerial capacity building
- Diversification of livelihoods
- Political power
- Greater visibility
- Pride and identity

In 2001, continuing research by CIFOR's Adaptive Collaborative Management Programme gave the clearest indications yet of the potential pitfalls of devolution. The work also revealed the key requirements for success. Almost 60 case studies spread over 11 countries in southern Africa and Asia evaluated the impact of devolution policies. Many local organisations and government agencies participated in the research. What is unique in the studies is that they look at the process from the perspective of the local people, who usually see devolution as a way to increase their income and power.

In Asia devolution policies have been working for up to 20 years; in Africa for 3-10 years. "In nearly every site that we studied, local people expressed their frustrations and disappointment that devolution often maintained government control over forests and that benefits were less than expected," said CIFOR's Lini Wollenberg. Devolution can deliver a range of tangible and intangible benefits (see box) but the amount of benefit that local people received varied widely from case to case.

In many countries, communities responded enthusiastically to devolution because it promised more control and income than existing restrictive regimes. However, they were soon disillusioned as bureaucracies failed to meet their expectations. Less than anticipated financial benefits were another disappointment. In some cases, devolution policies even disrupted local enterprises and social relations. Overall, however, the greatest weakness was the failure to transfer significant authority. In each site, the more powerful local elite consistently attempted to seize any increase in authority or benefits.

Motivated by the negatives in the devolution equation, the researchers looked for the most positive outcomes of their research. From their analyses, they developed a clear set of requirements for success. "We found that giving authority directly to disadvantaged people tended to be more responsive to local needs than those that allocated control to local government or district structures," said Sheona Shackleton of Rhodes University in South Africa, who was a close collaborator in the African studies.

The degree of organisation amongst poor resource users and their knowledge of their rights was critical in influencing devolution outcomes. Where local people were well organized and allied with NGOs or other influential groups, they secured greater control and benefits. Where local people were aware of their rights and knew of the constitutions that guided their committees, they could challenge elitist and self-serving behaviour within these committees. Local users also fared better where they had secure tenure rights.

For devolution to be most responsive to local users' interests, control, responsibility and benefits must be shared between them and the government. The state, the communities and other stakeholders need to develop shared aims. The government needs to be accountable to local interests, especially to the poorest people. Natural resource departments, in particular, must reorientate themselves away from commercially valuable species and resource protection towards supporting livelihood activities. Where policy modification is needed, governments need to find mechanisms that provide local people with some voice in policy formulation at both local and national levels. Implementation should build on what exists rather than applying standardised arrangements, with the state guiding issues of equity and accountability. The state, often in cooperation with NGOs or local organisations of local committees, can also help resolve conflicts, provide technical assistance and enforcement.

"We have identified ways to give the local

communities more power and bring together local and state interests," said CIFOR's Bruce Campbell, "A measure of true devolution will be when demands begin to filter up from a strong civil society and governments respond constructively to them."

David Edmunds, a consultant who has been working on the project since it started, is optimistic that change will come. "Change may begin in areas where local and state interests already converge," he said. "This is already happening in isolated cases in our study sites. Far-reaching change is likely to come about as a result of the political work of forest users themselves, to organize at the local level, establish networks with other local organizations and build alliances with sympathetic government officials, private capital, NGOs, donors and researchers." CIFOR's work is intended to hasten this process.

Giving local people control in Zimbabwe

In semiarid regions, resources in watersheds, such as water for irrigated gardens, forest products and grazing resources, are critical to livelihoods, but managing these common resources is often difficult. Jurisdictions overlap, bylaws may be contradictory and the interests of the different user groups may conflict with each other.

CIFOR and its research partners are working hand in hand with development agencies such as CARE to explore ways to improve the management of water catchments. As Alois Mandondo, researcher at the Institute of Environmental Studies in Zimbabwe says, "Institutional arrangements affect many parts of the system. When they function properly they can improve livelihoods far more than individual technologies."

Moves to give local communities the power to manage the resources they depend on are widespread in the region, but they have had limited success. In Zimbabwe, for example, efforts to decentralize state control have largely recentralized control at the district level. "This defeats the purpose of decentralization as it does not allow the local communities to influence the decisions that directly affect their lives," says Bruce Campbell, the CIFOR researcher responsible for the project, which has been funded by the Department for International Develop-ment (UK), the European Union and the Swiss Agency for Development Cooperation.

In Chivi, Zimbabwe, CIFOR and its partners have built up a long-standing relationship with the district authorities and local communities. Because of this trust, they could bring everyone together to examine the existing systems of governance at and below the district level. The process was so successful that in a pioneering decision, the district council decided to give responsibility for managing natural resources to local villages under a new system of locally led management.

"The work has given the community groups the power to manage the catchment resources better," says Campbell. Indications are that the work that CIFOR and its partners are doing is having a direct impact on the people who depend on catchment resources for their livelihoods.

Mr Chagonda, the chief executive officer of Chivi district, Zimbabwe, explaining to the researchers from CIFOR and the Institute of Environmental Studies, the proposed changes in regulations regarding natural resource use (Photo: Bruce Campbell)

Stirring it up in Central America

The Panama Canal is heavily used by cargo and passenger ships. Even though it is dredged continuously, there is no evidence that deforestation activities are threatening the canal with silting up from sediment runoff
(Photo: Panama Canal authority)

The Panama Canal is not in danger of silting up any time soon. Deforesting large areas may have only a slight effect on large-scale flooding downstream. Clearing forest may actually increase water supply in the dry season. These are some of the provocative conclusions that CIFOR's David Kaimowitz presented in a highly influential keynote presentation to the Central American Forestry Congress in Nicaragua.

The research created a lot of discussion and the Nicaraguan newspaper *El Nuevo Diario* wrote a long article on the controversy. The Centro Agronómico Tropical de Investigación y Enseñanza in Costa Rica included the presentation in a special issue of its *Revista Forestal Centroamericana*. "Before the congress, the Inter-American Development Bank invited me to Washington DC to present my findings to the experts that develop watershed management programmes for the Bank in Central America, " Kaimowitz said.

Public concern about watershed degradation is well intentioned and well founded. However, there are many myths and misunderstandings about how forest cover affects sedimentation, rainfall and water flow. Deforestation probably has only a limited effect on regional rainfall. Sedimentation poses little medium-term threat to Central America's hydroelectric plants and the Panama Canal. Where sediment *is* a problem, road construction, urbanization and other non-agricultural activities often generate as much or more sediment as agricultural activities.

Forests do provide many useful watershed functions. Even though sedimentation problems will not close central America's hydroelectric plants soon, the long-term costs of soil erosion are probably substantial. It may well be more cost-effective to prevent siltation of the water supply than to build expensive water treatment plants. "But no one has a good handle on these issues, much less a clear cost-effective solution for dealing with them," said Kaimowitz.

Concerns about soil erosion, sedimentation and hydrological impact of forest clearing in Central America can be traced as far back as the 1920s. During the early 1970s, several agencies began promoting watershed management in Central America. These initiatives failed to catch policymakers' imagination. It took alarmist reports about sedimentation in the Panama Canal and the region's main hydroelectric dams to put watersheds on the political agenda in Costa Rica, El Salvador, Guatemala, Honduras and Panama. "But the evidence suggests that many of the claims about deforestation leading to reduced rainfall and dry season flows, and greater flooding are exaggerated," said Kaimowitz. Hurricane Mitch is a good example (see box).

Basing projects on myths and half-truths is probably not a good idea. But the myths have yielded positive results. The link between forests and water in the minds of policymakers and the public has been very useful in generating support for environmental issues. The real question is what to do next.

Kaimowitz gave a presentation to a later conference in Nicaragua on "Payment for Environmental Services" with constructive suggestions on how to design more scientifically based payments for watershed functions. Despite the myths there is still a strong argument for investing money to use forests to protect watershed functions. Conserving these hydrological services implies a long-term commitment to sympathetic land use and agriculture. Water quality and urban watershed issues deserve greater attention, because forest cover can help maintain water quality.

Political, institutional and technical factors have interacted to produce positive but sub-optimal results. Now, as Kaimowitz says "We clearly need to move away from responding to immediate crises and exaggerated press reports and take a longer-term approach based on careful analysis and monitoring."

Hurricane Mitch's real effect

Days after Hurricane Mitch swept through Central America in late October 1998, the media, academics and NGOs began blaming hillside deforestation for much of the destruction. They used two major arguments to support that idea. First, deforestation and subsequent soil compaction had reduced the soil's capacity to retain water, which left more water to create floods. Second, removing plant cover had made the slopes more prone to landslides. To avoid similar disasters in the future, they proposed massive reforestation efforts, greater restrictions on forest clearing and soil conservation measures.

Despite all the rhetoric, deforestation probably had little to do with the flooding or the spectacular landslides that occurred. Tree cover does make slopes less prone to landslides, but only up to a point. Hurricane Mitch struck well into the rainy season when most of the soils were already saturated. Between 300 and 1900 mm of rain pounded the hillsides for almost a week. Given what is known about the links between deforestation and flooding in large watersheds, it is fairly certain that so much rain for so long would have caused the same amount of flooding whether or not forests covered the hillsides.

Publication: David Kaimowitz 2001. Cuatro medio verdales: la relacion bosques y agua en Centroamericana. Revista Forestal Centroamericana (33): 6-10.

Secondary forests are valuable in Asia

Secondary forests grow in areas where the original forest is regenerating after being logged or cleared for agriculture. Frequently dismissed as wasteland, secondary forests "…may be very useful to local communities, and potentially for the corporate sector as well," says CIFOR forest ecologist Unna Chokkalingam, "but governments, foresters and conservationists often ignore them."

They are spreading throughout Africa, Asia and Latin America, particularly in countries where tropical primary forest continues to be logged. Accurate figures are hard to obtain. About a third of Asia's tropical forest area is now occupied by secondary forests; in 1996 the UN's Food and Agriculture Organization estimated that Africa had 90 million ha and Latin America 165 million ha.

There are several types of secondary forest. Among the most significant are the areas created by commercial logging. For example, nearly 100 million ha of this type of forest exist in the lower Mekong subregion in Vietnam. Secondary forests that grow on land that has been used by shifting cultivators can cover large areas, especially in Indonesia and Thailand. Shifting cultivators often create secondary forest gardens by planting fallow areas with trees that provide fruits, nuts, resins and other products.

Secondary forests are especially important for the rural poor, and for those who live outside the cash economy. "They provide local people with many of the same goods and services as primary forests," says Chokkalingam, "and they may also contain large numbers of desirable species, many of them deliberately planted or encouraged."

Take, for example, the secondary forests of East Kalimantan in Indonesia. They provide food, fibre, medicinal herbs and building materials for the local Dayak communities. "The species composition is different to primary forest so there are some species you seldom find in secondary forests," explained Wil de Jong, a social forester at CIFOR. He cites the example of ironwood, a tree used by the Dayaks in East Kalimantan to support their longhouse roofs.

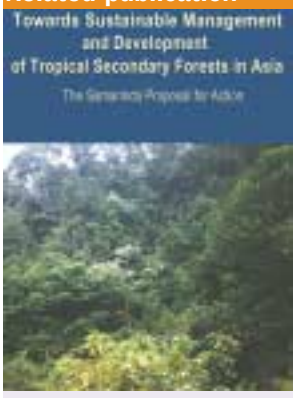
Some secondary forests also provide good hunting grounds. Many animals that usually live in undisturbed forests, the orang utan for example, are regularly found in secondary forests. Certain browsing mammals and birds actually prefer the more open secondary forests.

Attitudes towards secondary forests are gradually beginning to change. Countries like Nepal, India and China, where little original forest remains, are recognising the significance of secondary forests for environmental, local livelihood and industrial purposes. In these countries, most forest products are obtained from secondary forests and governments realise that the welfare of rural people and the environment often depends on their regeneration and wise management.

In contrast, countries that still possess significant areas of primary forest have tended to ignore their secondary forests. "It is vital that forest agencies start thinking about the management of these areas now," says de Jong, "rather than in 20 years time, when much of the forest will have gone." Governments need to establish where secondary forests are, what they are threatened by, who has rights to use them and who is using them. Only then will they be in a position to work out how best they should be managed for future generations.

De Jong also believes that it is time for conservation groups to recognise the important role which secondary forests can play in conserving biodiversity. Future goods and services that society obtains from tropical forests will come increasingly from secondary forests, including timber, biodiversity conservation and forest products for the poor. They could also deliver many of the same environmental services as primary forests. For example, secondary forests could be important in terms of watershed and soil protection. Not that this should in any way diminish the need to preserve and protect primary rainforest. "That should be an absolute priority," he says, "but we must also recognise the increasing significance of secondary forests."

Related publication



Working with the German Agency for International Development (GTZ) and the Dutch National Reference Centre for Agriculture, Nature and Fisheries (EC LNVA), CIFOR organised a week-long workshop in April 2000 on Asia's tropical secondary forests in Samarinda, Indonesia. This landmark meeting was attended by 39 forest experts from 12 countries, revealing the extensive work that had been done in tropical Asia on this type of forest. Late in 2001, the *Journal of Tropical Forest Science* published the papers developed from the presentations at the workshop as a special issue. See *J. Trop. For. Sci.* (2001) 13, 4. "Secondary forests in Asia: their diversity, importance and role in future environmental management."

Health care threatened in eastern Amazon

In Quiandeva, a village along atributary of the Brazilian Amazon, women use oils, barks and leaves collected from forest species to prepare medicines for use against the common ailments (Photo: Patricia Shanley)

Millions of poor people depend on the forest for medicines. They are often the only form of health care the people can afford. New results from a long-term study in the eastern Amazon show clearly how forest exploitation may threaten some essential medicinal plants.

In Amazonia, medicinal plants are the main form of health care for most of the population, because of both preference and the prohibitive cost of pharmaceutical products. "For large numbers of rural and urban poor in this region, medicinal plants offer the only available treatment for minor and serious ailments," said CIFOR's Patricia Shanley.

She and Leda Luz, a Brazilian forester working on a project funded by Deutsche Gesellschaft für Technische Zusammenarbeit GmbH in the threatened Atlantic Forest in Brazil, have been collaborating for 6 years to collect information from the same 23 establishments in the long-established open-air river market, Ver-o-Peso, in Belém in eastern Amazonia. There 100 tightly-crammed booths display fresh plant material, tonics, roots, oils, tree barks and animal parts. "You can buy treatments for virtually every ailment imaginable," said Lutz.

The market is selling products made from over 200 medicinal herbs, shrubs and trees. But nine of the 12 most popular products sold come from trees that are native to Amazonia; eight of these occur in primary forests, and five are actively cut for timber.

Of the five leading medicinals from primary forest trees, three are exported for timber. *Carapa guianensis*, of the mahogany family, and *Tabebuia* spp. are especially prized. The eastern Amazon is emerging as Brazil's dominant source of sawn timber. This rapid expansion of the timber industry has brought about a decline in the availability of some medicinal species. Particularly vulnerable are those species occurring in low densities and those whose roots are harvested. Fire, ranching and shifting agriculture are further threats.

One consequence of the high biodiversity characteristic of Amazonia is the low density of any one species. Many popular medicinal tree species grow in densities of less than one individual per hectare. The copaíba oil sold in one of Belém's largest medicinal plant establishments is harvested from the neighboring state of Amazonas, 1200 km away, because of local logging and destructive harvesting. "Some of the oils are so valued that rural residents guard stands of the medicinal oil tree, *Carapa guianensis*, plant it in their home gardens, and tend it when it sprouts spontaneously," said Leda Lutz.

Table 1. 12 Leading medicinal plants commercialized in Belém, Brazil, 1994-2000

Scientific Name	Common name	Plant part used	Principal uses
Carapa guianensis Aublet	andiroba	seed oil (native tree)	sprains, bruises, insect repellent, rheumatism
Chenopodium ambrosioides L.	mastruz	leaf/seed (non-native herb)	worms
Copaifera reticulata Ducke	copaíba	oleoresin (native tree)	wounds, sore throat
Croton cajucara Benth	sacaca	bark/leaf (native tree)	diabetes, cholesterol
Dalbergia subcymosa Ducke	verônica	inner bark (native vine)	vaginal infections, uterine inflammation
Himatanthus sucuuba (Spruce) Woods	sucuúba	bark/exudates (native tree)	worms, herpes, uterine inflammation
Paullinia cupana Kunth	guaraná	seed (native shrub)	stimulant, diuretic weakness
Phyllanthus niruri L.	quebrapedra	root (non-native herb)	urinary infections, kidney stones
Portulaca pilosa L.	amorcrescida	leaf (non-native herb)	burns, wounds, diuretic
Ptychopetalum olacoides Benth	marapuama	root (native shrub)	nerve diseases, impotence
Stryphnodendren barbatiman Mart	barbatimão	bark (native tree)	hemorrhage, uterine, vaginal infections
Tabebuia impetiginosa Standley	pau d'arco	bark (native tree)	inflammations, ulcers, skin ailments

Researchers have tested the effect of some of the native species. For example, *Ptychopetalum olacoides* is used for diseases of the nervous system and impotence. In rodents, extracts from *P. olacoides* reduced experimentally induced tremors. Certain medicines are not only highly effective but much more affordable as well. Some herbaceous plants that are highly effective, such as the worm treatment from *Chenopodium ambrosiodes*, are a quarter the price of the pharmaceutical product.

Currently most packets of herbs or bark cost the consumer less than US$ .50. To meet the needs of the very poor, merchants sell barks in small quantities and oils and honeys by the spoonful. Although such small volumes seem trivial, modest stores and laboratories may attend to over 50 persons per hour. In 1994 the 23 stores sold over 30 tonnes of five medicinal barks. Annual sales of the popular *andiroba* and *copaíba* oils reached 10 000 litres. However, prices are rising for species that have become difficult to find because of pressures like logging and over-harvesting. In 2000, good quality *copaíba* oil sold for roughly US$12 a litre, reflecting its relative scarcity.

The decline in the most popular species will inevitably most affect those least able to afford it. In addition, few substitutes for many medicinal plants exist. The pharmaceutical industry has manufactured some active compounds, but none of the 45 plant drugs known to have been developed from tropical rain forest species worldwide is presently synthesised.

"If we want to protect medicinal biodiversity In the Amazon," says Shanley, "research agendas must be developed that focus on the significance of traditionally used, valuable primary and secondary forest medicinal species. Some of these essential species occur in low densities, are slow to reach reproductive age, and are particularly vulnerable to logging, fire and land use change. What we need to remember is that transformation of forests can signity not only loss of potential pharmaceutica drugs for people in the developed world, but erosion of the sole health care option for many urban and rural poor today.

This research was initiated under the auspices of The Woods Hole Research Center/ EMBRAPA and completed with the Center for International Forestry Research, CIFOR. Other collaborators and supporters included the Educational Foundation of America, The Biodiversity Support Program of the US Augency for International Development, the Educational Foundation of America, Tom's of Maine and the Merck.

(Left and below) Medicinal barks, root, herbs, and oils for sale at two of the largest retails of medicinal plants in Belem, Brazil

(Right) Capim river caboclo showing medicine bark of Pau D'arco (*Tabebuia* sp.), Eastern Amazon, Ipixuna (Photos: Patricia Shanley)

Rehabilitating tropical forests

Burnt *Acacia mangium* plantation in the province of Sumatra Selatan, Indonesia (Photo: Christian Cossalter)

Tropical forests are being destroyed at an alarming rate all over the world. More than 5 million ha a year are being converted into poorly managed secondary vegetation. As well as habitat loss, this degradation reduces the potential for future timber production and plays a role in many natural disasters.

A collaboration between the Japanese Government and CIFOR is developing ways to reduce forest degradation and rehabilitate degraded lands that are technically feasible, economically viable and socially acceptable. "The project focuses on a real problem that is central to successful and sustainable forest management in many parts of the tropics," said project leader Takeshi Toma. "The pressure of human activities do not allow rehabilitated lands to develop well. To rehabilitate forests that have been degraded, and conserve the remaining natural forests in the tropics, the relationship between people and the forests needs to be improved."

The research, funded by Japan's Official Development Assistance, has produced some very valuable insights into ways to reduce the impact of logging on forest land. *Eucalyptus* plantations are putting a heavy burden on the soil in Brazil, but removing just the trunks of the trees from the logging site leaves behind almost half the mineral nutrients the tree contains. This is highly beneficial for the soil. In Argentina, researchers have developed improved methods of harvesting trees that have less impact on the forest, increasing seedling regeneration and reducing the soil compaction that slows new growth. In the Peruvian Amazon, project staff have worked out the best conditions to establish economically valuable native tree species on degraded areas abandoned after past intensive agricultural use.

The project research is also challenging some accepted knowledge. Eucalypts are generally thought to change soil quality and prevent plant growth. But in the Congo, successive rotations in managed *Eucalyptus* plantations, when starting from a poor savanna soil, increased organic matter, undergrowth vegetation and soil fauna. Another, apparently illogical, finding in Brazil is that clear cutting eucalypts at 12 years of age takes less minerals from the soil than after 7 years.

From the beginning it has been CIFOR's partners who have driven the research agenda based on their own needs. This has increased the chances of the results being applied locally. In one instance, research in Brazil recommended reduced tillage to avoid damaging existing trees. "A local plantation company enthusiastically adopted our proposals when they were establishing a plantation because it cut down their overheads," points out Renanto A. Dedecek of Embrapa, Brazil.

The first phase of the project ran between 1996 and 2000 with partner organizations in Argentina, Brazil, Congo, Indonesia, Malaysia, Papua New Guinea, Peru and Thailand. The second phase of the project that started in 2001 is continuing to monitor the Phase I experiments and build on them. Researchers are also starting socioeconomic analysis to identify approaches that will have a good chance of being adopted. Community-based initiatives will be essential to decrease the pressure for forest degradation and to enhance forest-rehabilitation activities. Rehabilitation activities should bring benefits to local communities.

In the long term the project is also looking at the possibility of integrating the rehabilitation of degraded forests into regional strategies for environment conservation. "But what we really need, " says Toma, "is to rehabilitate the relationship between the forests and the humans who caused the forest degradation in the first place. Building a consensus is a complex and time-consuming process, compared to merely planting trees. However, if we do not bolster and explain the local and global benefits to get a consensus for forest rehabilitation, no one will take care of the rehabilitated forests and there will be no chance for the replanted areas to become forests."

Publications from this project

Kobayashi, S., Turnbull, J.W., Toma, T., Mari, T., Majid, N.M.N.A., eds. 2001. Rehabilitation of degraded tropical forest ecosystems: workshop proceedings, 2-4 November 1999, Bogor, Indonesia, CIFOR. 226p.

F. Bernhard-Reversat (ed.) 2001. Effect of Exotic Tree Plantations on Plant Diversity and Biological Soil Fertility in the Congo Savanna: with Special Reference to Eucalypts. CIFOR.

Increasing income in the Brazilian Amazon

Most communities in the eastern Amazon region who depend on natural resources live in poor conditions, despite being surrounded by a huge variety of valuable timber and forest products such as latex, fruits, fibers, medicines, oils and tinctures. Food is sometimes scarce. There is no telephone, electricity or good quality water. The health and education situation is precarious.

A few products such as timber, palm heart, Brazilian nut or latex are marketed but many other products are used mainly for subsistence. "We wanted to find out why local communities don't commercialize forest products more intensively," said Benno Pokorny, an Embrapa Associate Researcher working in CIFOR's Regional Office in Belém, Brazil. "So we started a pilot project with three rural communities on the riversides of Marajó Island. We also wanted to help the communities to use their forest resources to earn additional income to improve their very poor living conditions."

Working together, and with the researchers, the communities developed a local research strategy. "They identified the oil from the fruits of the palm patauá (*Jessenia bataua*) and the timber species andiroba (*Carapa guianensis*) as forest products with potential commercial value," said Guilhermina Cayres, who is working for CIFOR as a local expert in social development, "Then they identified the lack of an attractive market as the main constraint." By collaborating closely and working locally, a small number of community representatives or local researchers group (LRG) defined a two-phase research plan. First they decided on fair prices for the products based on the costs of production. Then they explored the possibilities for commercializing these products in local and regional markets.

This is where they came up against some major difficulties. Offering competitive products demands a high degree of organization, standardization of product quality and large quantities of the product. As well as these factors, high transport costs, limited demand and low prices did not make the commercialization of NTFPs seem very attractive. Another problem was the restricted access to the resources. Many families did not have rights to the resources and therefore depended on the good will of the landowner for access. Despite these difficulties, the LRG identified specific markets for patauá oil with attractive prices and a reasonable demand.

The communities quickly realized the importance of information in planning any research. They went ahead and organised activities such as commercialising pataua oil more widely and managing stands of açaí palm (*Euterpe oleracea*). Then they formed women's groups to produce local handicrafts and assist in day to day agriculture. Their dynamism and success attracted the attention of other communities, the district government and local non-governmental organizations, who are now all interested in extending the local research approach.

Rubber press, in Restauracao, Alto Jurua, Acre, Brazil (Photo: Manual Ruiz Perez)

Brazil nut is one of the most popular NTFPs sold in the market (Photo: Manual Ruiz Perez)

"This project taught us two important lessons," said Westphalen Nunes, who is now coordinating the department of sustainable development in the Ministry of Environment's National Fund for Environment, which supports communities working with natural resources. "Firstly, how important it is to support communities in overcoming their isolation from information and creating and establishing local networks. Second it showed us the limited practical impact of pure scientific research."

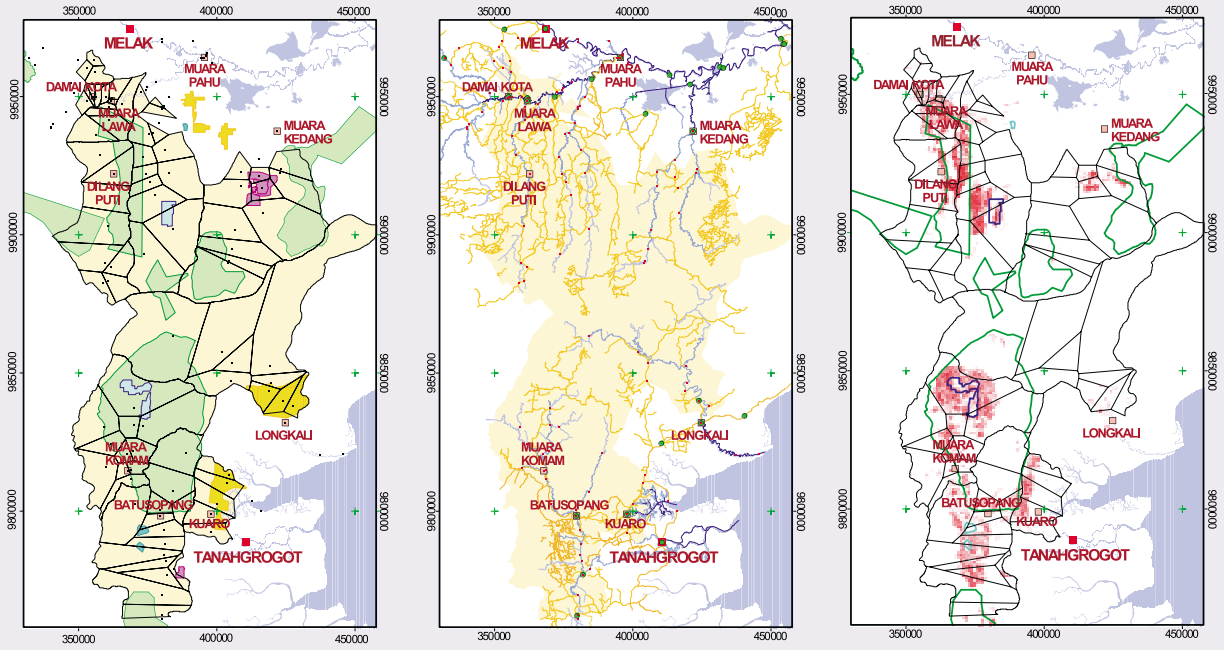
A research strategy that focuses on helping the communities themselves to identify solutions is probably the most successful approach, based on local knowledge and competence. "This is an interesting new way to start a process of sustainable development," said Pokorny. "We hope to intensify our activities in this area to have a direct effect on raising people's incomes."

Modelling deforestation in East Kalimantan

New decentralization policies in Indonesia have given local governments unprecedented responsibilities to manage their natural resources. The number of forest harvesting permits issued by the local authorities has increased sharply, with inevitable conflicts over rights and rewards. Prior to desentralization, during the last 12 years, pulp plantations, estate crop development, logging, smallholders and transmigrants have consumed 4 million hectares of forest in East Kalimantan, displacing the Dayak people who have always lived in the forest practicing shifting cultivation.

In the years before decentralization, CIFOR had worked in East Kalimantan with the Centre for Social Forestry, Mulawarman University collecting socioeconomic data and mapping the area with the local people. One of CIFOR's collaborators at the university subsequently moved to the Forestry Department of the new district of West Kutai. He found that the department needed better information on the impact of deforestation on the livelihoods of local people and conservation of one of the main forest areas in the country. So the district authorities asked CIFOR to collaborate in planning ways to manage local forest resources. The offer was a tremendous opportunity to provide information to the local government, with a very high potential for positive impact. Many other groups had worked in the area but mostly at the village level. This was an opportunity to work on a regional scale.

CIFOR collaborated with local authorities and Forresasia in research that measured how changes in forest cover affected people's livelihoods and forest conservation. The research combined detailed socioeconomic and ecological information with data from a geographic information system to produce a model that could predict the areas most likely to be deforested and the impact of these activities. In work funded by the Canadian International Development Agency, the University of Manitoba's Center for Earth Observation Science acquired satellite images and processed them into land use and cover maps. CIFOR combined an existing forest model with new information in a database to produce computer-based models of changes in land use



Three linked maps showing the relationships between active large-scale projects, road and river transportation networks and areas of highest deforestation risk in West Kutai and Paser, East Kalimantan (Maps: Sonya Dewi)

Farmers transporting their rattan to market in East Kalimatan (Photo: Brian Belcher)

and forest cover. "This produced a model that should accurately predict the impact of deforestation on people's livelihoods." said CIFOR's Sonya Dewi, who is running the project.

The work showed that any large-scale project has a major effect on forest cover. The roads that are built also open up the forest to other influences, such as traders and transmigrant farmers. Local villagers take advantage of transportation facilities developed by large-scale projects for their livelihood activities, such as traveling to their agricultural plots and the forest, and marketing their products. Local staff and forest dwellers provided knowledge to build up the model so that it can now successfully show how land use will change over time. "This close collaboration meant a more usable product that will have a high impact," said Dewi. The model can evaluate the effect of changes in forest cover on the livelihood of the communities.

"For CIFOR the main question is to understand how all these processes affect the forest-dependent people's livelihood." said Dewi. Removing the forest cover threatens the livelihoods of people who depend on the forest, but also provides other opportunities for the people to earn income. "We will be developing an easy-to-use tool for decision-makers that will show them the consequences of deforestation."

The district staff are realizing how important the work is to managing the natural resources of the area. The project is training local government staff so that they will be able to work with the model without the input from CIFOR. The work has the additional benefits that it can easily be applied to other regions, in Indonesia in particular, but also in other tropical forest countries undergoing similar changes in land use.

Hornbill carving in gate to Kenyah village, East Kalimantan (Photo: Miriam Van Heist)

An East Kalimantan hunter returning from the forest with half of a wild boar (Kuala Rian), middle Tubu, Bulungan, Indonesia (Photo: Nicolas Cesard)

Local control of forests in Nicaragua

Many national governments throughout Latin America, Asia and Africa are shifting the responsibilities for managing natural resources to municipal governments. This is generally assumed to be a good thing, though it is not an easy task. As Anne Larson, one of CIFOR's collaborators working in Nicaragua wrote in a recent paper, "Decentralization is a highly complex, situation-specific process fraught with obstacles. Add natural resources to the equation and the complexity and obstacles multiply accordingly."

So are the changes good or bad? According to Larson and her Nicaraguan colleagues, results from the shift from centralized to more decentralized management so far have been decidedly mixed. This is partly because of local issues and partly because of problems in the design of decentralized resource management itself.

Larson's work was based on several research projects conducted under the supervision of CIFOR's David Kaimowitz from 1998 to 2000 with several local partners, particularly the Nitlapán Institute at Managua's Central American University (UCA).The donor were the UK's Department of International Development, Protierra-Inifrm, Profor and an EPA-STAR Fellowship.

At the local level, providing services is usually the top government priority; forestry issues, and particularly conservation, are often much less important. Only the larger, more urban municipalities and those supported by donor projects and non-governmental organizations have the human and financial resources to do the job well, partly because the central government has transferred additional responsibilities but almost no funding to local authorities. Nevertheless, most municipal governments get involved in resource management in some way. The opportunity to increase municipal incomes, prodding from NGOs, projects, or community groups, and pressing conflicts or crises provide most of the incentives.

Theoretically, the goals of decentralization coincide with the needs of effective natural resource management. Resource allocation should be more efficient. Local groups are likely to have a greater sense of ownership of decisions

Chainsawing of timber when not much capital is available, Nicaragua (Photo: Cesar Sabogal)

made locally. It should be easier to monitor resource use and marginalized groups could have greater influence on policy.

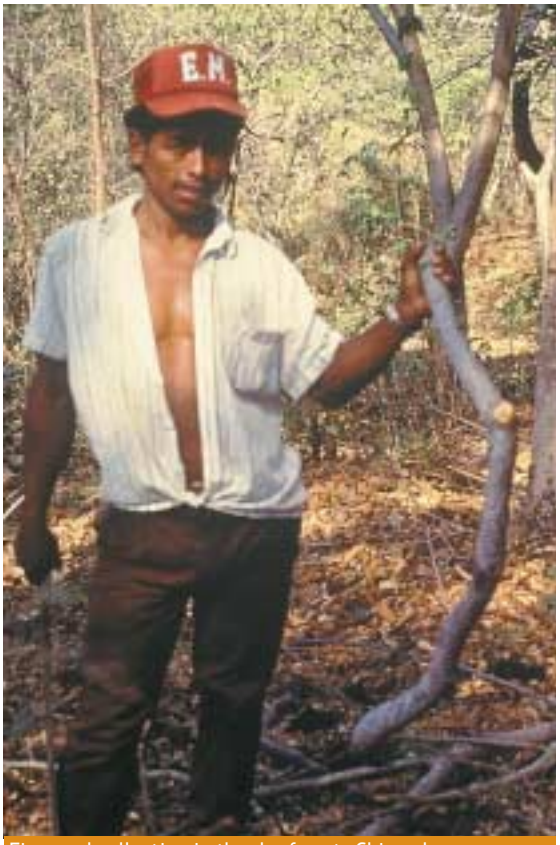
Larson and her colleagues analysed forest management in 21 of Nicaragua's 151 municipalities. Many had started to manage the forest resources in their territory. Most had instigated some kind of control over forest fires and wood extraction permits. Over half had a municipal nursery or had promoted at least one reforestation project. The majority charged resource users fees or had introduced other controls over extraction.

At least four municipalities had made important progress. All had passed environmental or forestry ordinances and had municipal environmental councils with representatives from both government agencies and NGOs. Three had at least one full-time person working on natural resource issues. Chinandega had municipal tree nurseries, fire brigades and forest inspectors. Achuapa established municipal ecological brigades and passed a broad municipal ordinance that regulates the use of forest, water, fauna and fire. Jalapa had tried to increase forestry benefits to the municipality by requiring logs to be processed at local mills.

The fourth municipality, Bonanza, is an agricultural frontier municipality in the North Atlantic Autonomous Region. Mining is a major activity there. It is also exceptional because the indigenous Mayangna population has taken an active role in local government. As of 2000, the municipal council had passed 32 different ordinances relating to natural resources, the majority regulating mining. At least two are related directly to forests. These arose from the active community in the municipality and the support of two consecutive mayors.

Larson concludes that local governments need three key factors for successful resource management: capacity, incentive and commitment. Capacity includes the necessary financial and human technical resources. Capacity also includes an appropriate legal framework, still lacking in Nicaragua, to establish clear local decision-making authority. Incentives may include increasing municipal income; pressure or aid from NGOs and projects; the need to solve a pressing conflict or crisis. The missing element is commitment, but a commitment to the long-term sustainable use or protection of forest resources is a leap that probably no municipal government in Nicaragua has yet made. This requires not just a concern with natural resources but a new vision of municipal government for both political leaders and civil society.

The studies had an immediate impact, because CIFOR and Nitlapán were able to use them advise the World Bank and the Nicaraguan Ministry of Environment on how to formulate the environmental component of the second phase of the Bank's Rural Municipalities project (Protierra).



Firewood collection in the dry forest, Chinandega, Nicaragua (Photo: Cesar Sabogal)

Given the generalized movement toward decentralization today, it is no longer a question of asking whether natural resource management will be better or worse under local governments, but rather how it can be made to work. "The experiences we have seen in places like Bonanza suggest a learning process that is clearly moving in the right direction," said Larson.

Related publications

*Anne Larson 2002. Natural Resources and Decentralization in Nicaragua: Are Local Governments Up to the Job? World Development, 30,1.

D. Kaimowitz, P. Pacheco, R. Mendoza and T. Barahona 2001. Municipal governments and forest management in Bolivia and Nicaragua. in: Palo, M., Uusivuori, J. and Mery, G. (eds.). World Forests; v.3 World forests, markets and policies. 279-288. Kluwer Academic Publishers, Dordrecht, The Netherlands.

Something for (almost) nothing in Kalimantan

In west Kalimantan, local villagers are producing valuable charcoal from trees that grow untended in abandoned areas. *Vitex pubescens*, a tree that springs up on land after fires or abandoned farming, yields a charcoal that is as good as that from mangrove trees. Rice does not grow well on the land and farmers find weeding the rough fields too labour-intensive. But establishing small local industries to grow *Vitex* for charcoal offers a way of making the land productive again.

"The idea of developing a *Vitex* industry originally came from a local non-governmental organization," said CIFOR researcher Wil de Jong. "We work with Yayasan Dian Tama (YDT) and they involved the local Tanjungpura University in Pontianak to explore how the local farmers can best profit from these grasslands. The collaboration capitalizes on the strengths of each partner to multiply its impact." YDT is the pivotal organisation; they run the research with the university and CIFOR collaborates to provide the scientific input. YDT uses the good rapport they have with the local people and their contacts in the regional government; CIFOR makes connections to outside parties. The Australian Centre for International Agricultural Research funds the project.

The technology needed to produce the charcoal is relatively simple and inexpensive; at most, communities have to invest in constructing kilns. After 4 years, 1 hectare of *V. pubescens* could yield up to 18 tonnes of charcoal, which would earn farmers several hundred dollars when sold to charcoal factories in Pontianak, the closest city.

Four villages are participating in field trials, helping researchers to answer questions about the best planting methods, seed stock, fertilizer requirements and labour needs. Recognizing the strong market potential, farmers are working with the researchers to find ways to cultivate the trees in small plantations and the best way to produce the charcoal.

The activity is very attractive to swidden farmers in west Kalimantan because they can grow the tree alongside their regular fields without much extra work. Another advantage is that *V. pubescens* tolerates fire much better than many other tree crops, reducing the risk that farmers will lose their investment. A positive side effect is that the trees actually form a barrier to the wildfires that plague the area.

"This research is improving the life of the community, so I am making an effort to disseminate the positive impacts of these activities to a large number of parties," said Donatus Rantan, leader of the *Vitex* project at YDT. "Oxfam in the UK is one of the organizations that is interested in supporting similar work in Yogyajakarta. Their interest lies in community involvement and the direct benefits to the local community."

Apart from its local impact, the collaboration has greater potential. "These grasslands are common in Indonesia and other countries, so the results of this work will have wide implications," said de Jong. In fact, CIFOR has already been approached by development agencies from New Zealand and by the business sector interested in the process. These interests are now working with YDT to apply the process more widely.

Villagers unpacking a kiln (Photo: Yayasan Dian Tama)

The finished charcoal (Photo: Yayasan Dian Tama)

A *Vitex* sapling growing through a thick cover of *Imperata* grass (Photo: Wil de Jong)

Revitalising tropical forestry in Gabon

Gabon is a small country on the Atlantic coast of central Africa. Dense, humid forests and woodland occupy about 80 percent of its surface area, and over 10 percent of that 200 000 km^2 is protected. Oil earns 81 percent of total export revenue. After that comes timber, making up 12 percent of total export revenue.

Gabon has a natural environment of great richness. It is also one of the few countries in the world with exceptional conservation potential. The environment shelters over 2200 endemic plant species and more that 150 major animal species, with significant populations of elephants, gorillas and chimpanzees. Deforestation is not severe, but illegal logging and agricultural activities around main communication axes and near the major urban centers are continually encroaching on the forest. Hunting for bushmeat is a major threat, mainly because of the low population density of the target species.

Over the past few years, CIFOR has been working closely with the Delegation of the European Commission and the Institut de Recherche en Ecologie Tropicale (IRET) of the Centre National de la Recherche Scientifique et Technologique to develop a project to rehabilitate the Makokou Research Station in Gabon. The World Wide Fund for Nature (WWF) and the Programme régional Ecosystèmes Forestières d'Afrique Centrale (ECOFAC) are also collaborating in the work.

The Makokou Station was created in 1971 in the northeast of Gabon. By the end of 1980, Gabonese and foreign scientists had investigated the surrounding rainforest and generated more than 400 publications, making the area one of the best studied sites in Africa. But the budget of the Station began to decline and its research activities came to a near halt. With just a skeleton staff the buildings slowly began to fall into disrepair, until in 1998 IRET, ECOFAC and WWF contributed to installing a manager and enough equipment to allow the Station to remain open to support the Minkebe and Odzala protected areas. L'Institut pour la Pharmacopée Traditionnelle (IPHAMETRA) started a project entitled BIODIVALOR to locate and develop forest products with medicinal value, with the technical support of the commercial company ProNatura International, with additional financing from the French GEF (Fonds Français pour l'Environnement Mondial) and the French Foreign Affairs Department.

The many collaborators and donors involved in realizing the potential of the Station met in 2000 to discuss the future objectives of the revived Station and its scientific direction. The site, for example, will make an excellent base for a regional project to monitor elephant poaching as well as a focus of scientific support for a forthcoming trinational Gabon/Cameroun/Congo project on forest conservation.

Gabon forests have significant populations of gorilla (Photo: Tim Geer, WWF)

From this meeting came the idea of CIFOR using its expertise in the region to guide a project to restore the Station's scientific activities. The overall objective is to develop the scientific and technical capacity of the Station in sustainable forest management and biodiversity, in Gabon and the subregion. "This will mean completely renovating the infrastructure and training technical and research personnel," said CIRAD's Robert Nasi, "As well as capitalizing on the scientific strengths of CIFOR staff to initiate a collaborative research programme, focusing on the dense forests of Central Africa."

"Once it is fully operational, this new collaborative project will give a great boost to research in Central Africa," said Filippo Saracco, officer-in-charge of the forest-environment sector for the European Commission in the Central Africa region. Research will focus on reinforcing the scientific bases behind sustainable forest management taking into account both biophysical and sociological issues. The results will be immediately useful to the forest sector of Gabon itself and the surrounding region. Ultimately the Station is intended to become part of the global network of institutions working to conserve the resources of tropical forest ecosystems as well as a place where young people of the region and elsewhere will be trained to become the next generation of scientists.

Trees, moons and daal bhaat in Nepal

Woman from Kaski district, Nepal (Photo: Carol J.P. Colfer)

In a community in the middle hills of Nepal, members of the Bamdibhir forest user group decided that they needed to plant trees to stop landslides. To get the trees and some finance they approached a bilateral forestry project, which generally pays communities a daily wage for planting. When the group received the assistance, rather than taking all the wages for themselves, the members took only half the pay and pooled the rest for forest user group activities like small-scale loans for the poorest members of the community. This strategic cooperation in a harsh environment is one of the effects that an approach to forestry called 'adaptive collaborative management' (ACM) is producing.

The Community Forestry Programme of Nepal has established more than 10 000 community-based forest user groups that have significantly increased forest cover. CIFOR teamed up with the Nepal Ministry of Forests and Soil Conservation and many other partners (see box opposite) to work with user groups in different areas of Nepal to improving rural livelihoods or equity.

"Community forestry in Nepal is complex, involving many groups with different interests, abilities and resources," said CIFOR's ACM Nepal team leader Cynthia McDougall. "At the beginning of the research, the four communities we were doing action research with all faced some of the same management problems: top-down decision-making by the local forest user committee, little information flow between the committee and the forest user group members, low participation, especially by women, and few benefits to the more marginalized families."

The four forest user groups have been starting to use the techniques of adaptive collaborative management in their community forests. The technique encourages people or groups with common interests to work together as part of the management process. A key aspect is explicit joint reflection on the past, present and future. In particular, management groups create 'self-monitoring' processes to track the changes in their situation. The groups ideally approach management activities as 'trials' or 'experiments' so they can make beneficial actions more rapidly than usual, and continuously improve how they do things.

In March 2001, the four user groups organized local workshops with members of the Federation of Community Forest User Groups and district forest office staff. The user groups created a common vision of their forest and community to develop simple 'indicators' for a self-monitoring system. The concept of self-monitoring as a tool for joint learning and improvement in management was explored through experiential games such as the "Book Passing Game" (see box left).

The different ethnic and caste group members discussed their perceptions and priorities in depth to agree on the indicators. For some people, this was the first time they had been able to express their opinion on these issues in a public forum. Group members then made a self-assessment of their current situation, scoring the indicators on a pictorial scale of 'new moon' to a 'full moon' (to avoid any difficulties with numerical literacy). Based on this self-monitoring process, the members identified and prioritized actions, such as establishing certain income generating activities, increasing the participation of women in the user group and establishing a committee to resolve a boundary dispute.

Since the workshop, the groups have been following up on their action plans and most have already gone through a second self-monitoring cycle. While it is too soon to see long-term outcomes, a number of changes are evident in the user group processes and actions. The communities have an increased sense of ownership of the forest management

Passing the book: a learning game

Four teams are racing to pass a large book down a long line of people without dropping it and without using their hands. It's not easy, books are dropped, people get stuck, some even cheat. In the successive attempts, most groups make little progress, but one all-woman team improves dramatically, eventually beating all the other teams.

So how did the winning team do it? Almost all the teams saw their original way of doing things did not work, so a few individuals on all teams improved their individual passing, many tried doing the same things only faster. Nobody got much better, except for the winning team. They were the only ones to act together to use what they learned to change their approach. That team noticed that some of members were more effective 'book passers' because they adjusted their height to match the next person. They applied that in the last round by re-organizing themselves by height to minimize the difference between players. This reduced the chances of dropping the book and they finished fastest.

The game illustrates the critical importance of applying conscious learning and collaboration to reach a shared goal. It is one of several learning activities in CIFOR's participatory action research project on adaptive collaborative management.

process; decision-making arrangements and processes are more inclusive and equitable; internal conflicts about fund transparency are being resolved; forest management activities have increased. In the Manakamana forest user group, 30% more women participate in general assemblies since the research started. In Andheri Bhajana, the user group has planted trials in two areas of 50 seedlings of various types.

Forester and researcher Raj Kumar Pandey remarked that in his experience to date, the time and energy required is worth the output. "In my experience, the cost of the ACM process in community forestry is as indispensable as the cost required for cooking daal and bhaat (rice) completely. Without … ACM, community forestry becomes like half-cooked daal and bhaat and gives you a stomach ache. At the initial stage, the technique takes more of the time of the committee and tole representatives. But as the user group adapts the process … there is an increase in respect, trust, capacity in decision making, transparency in forest management activities, sharing responsibility … that will reduce the degree of inertia of the group. Because of this, the facilitation work does not require as much time so the demands on the time of the committee and tole representatives will decrease gradually. Thus the user groups can devote more time to the process for their own better living in a sustainable way."

In addition to action research in the two districts, CIFOR is collaborating with the non-governmental organization ForestAction to capture experiences from a range of user groups. Results from eight groups showed several ACM-related processes are taking place, increasing livelihoods and benefiting forest ecosystems. Together these offer a great potential for learning and improvement.

This research will continue to generate insights valuable to the many other forest user groups in Nepal seeking better livelihoods from forests. Furthermore, adds McDougall, "Nepal is an established leader in community forestry, so we believe that the work will also contribute to establishing some guiding 'beacons' for people-oriented resource management worldwide."

"We would like to thank all our partners …"

The work in Nepal is part of the wider ACM project, which has been supported by the Asian Development Bank, European Union, the UK's Department of International development, Canada's International Development Research Center, the World Resources Institute and CIFOR, as well as the CGIAR System-wide Programme on Participatory Research and Gender Analysis. The work in Nepal alone involved many, many partners. Besides the Ministry of Forests and Soil Conservation, and CIFOR, the collaborating institutions include: the Forest Department and District Forest Offices, the Nepal-Australia Community Resource Management Project, the Natural Resource Management Sector Assistance Programme of the Danish International Development Agency, the Nepal-Swiss Community Forestry Project, the Livelihoods and Forestry Project and the Federation of Community Forestry User Groups of Nepal. The community partners which lead the way and make this learning possible are the four action research communities of Deurali-Bagedanda and Bamdibhir Khoriya Forest User Groups of Kaski District, and Andheri Bhajana and Manakamana CFUGs of Sankhuwasabha District, as well as comparative case study of eight communities. The participatory action researchers are a combination of New Era researchers and independent consultants (based in the office of the Natural and Organizational Research Management Services). The ACM Comparative Case Studies, and the Monitoring Review research is being lead by ForestAction staff in partnership with the Ministry of Forests. The research would be impossible without the contribution of ***all*** these partners.

Forest user group member, Kaski District, Nepal (Photo: Carol J.P. Colfer)

Money *does* grow on trees in Sumatra

Setting aside 25 percent of a concession as a conservation area captured about 80 percent of the regional tree species, Riau, Sumatra, Indonesia
(Photo: John Poulsen)

Growing fewer trees can increase the profitability of plantations. This is the startling conclusion reached by CIFOR researcher John Poulsen. "Plantation managers just want to make a profit and you can't blame them for that," said Poulsen. "Companies must think in the short term, which goes against the concept of long-term sustainability. Even so, our research shows them that they can increase the profitability of their plantations and still reduce the impact on the environment and the local people."

As deforestation continues, tropical plantations are becoming more important as a source of industrial wood and fuel throughout the tropics. They also reduce pressure on the remaining forest. However, monoculture plantations reduce biodiversity and local people's access to resources. So two of CIFOR's programmes, Plantations and Biodiversity, began to look at ways to balance profitable production with environmental conservation.

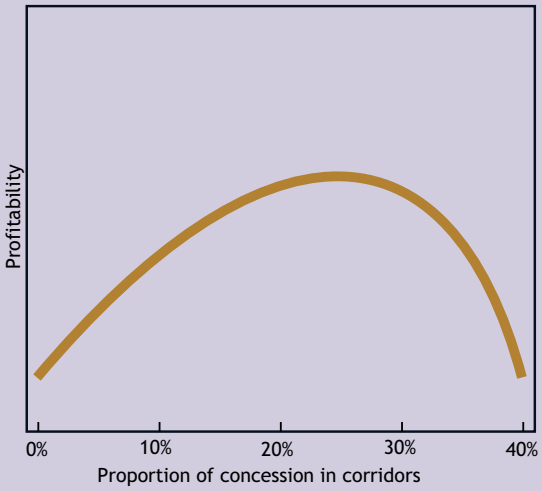
CIFOR capitalized on its extensive experience with tropical plantation research by collaborating with the Bogor Agricultural University and the large plantation company PT Riau Andalan Pulp and Paper in Riau, Sumatra, Indonesia.

In Indonesia, plantations must set aside 15% of a concession as conservation areas. "We found that setting aside 25% of the area as natural forest captured about 80% of the regional tree species," said Poulsen. But to have any real benefits, especially on wildlife, these patches need to connect with each other. In new plantations the natural forest that is set aside must be carefully sited and well connected by corridors of natural forest. In existing plantations, the remnants of natural forest that still exist must be conserved and reconnected.

The good news was that profitability actually increased as more of the concession was set aside, up to the threshold of 25-30% (Figure 1). Corridors of natural trees created between the remnants acted as windbreaks. These protected the plantation trees from damage that was expensive to remedy. Plantation trees closer to the corridors also had much less insect damage because the corridors were acting as reservoirs for predators that fed on the major pest insects. This increased production.

These two effects alone increased the profitability of the plantation. But corridors can have many more benefits. The mature vegetation in the corridors along rivers and streams reduced run off and sediment in the water. They can reduce fire damage to the growing trees and also stop weeds invading the

Figure 1. Relationship between profitability and proportion of the concession set aside as corridors.



plantation area. The 25-30% natural forest area also retained up to 90% of the original primate species and reduced the production risks, such as sudden outbreaks of disease, normally associated with monocultures.

As well as the environmental advantages, these effects directly benefited the local people, with the indirect benefit to the concession owners of reducing opposition to the plantations. The local people had clear water. The density of the ten most important tree species used by the local communities also increased with the area of forest corridor. So they could continue to use the forest to collect products such as honey, firewood and medicinal plants, and hunt animals. "We even showed that siting corridors away from roads drastically reduce illegal logging," said Poulsen.

The impact of the work is obvious. Natural forest remnants and corridors in plantations can be used to maintain biodiversity, increase profitability, retain environmental services and minimize social tensions. "Since this approach is cost effective and can even increase profitability, it will be much easier to convince the industry to adopt our ideas," said Poulsen.

The research does not argue for plantations but it deals with the real situation. Many governments will plant large-scale industrial plantations despite their possible negative social and environmental impact. "So it is critical for us to work with governments and the private sector to find ways to reduce these effects," said Poulsen. Linking long-term sustainable ways of working that conserve environmental services yet still yield immediate economic benefits will encourage the industry to adopt the methods. "We are now making an intensive effort to bring the results to a wider audience by starting similar projects in the Philippines, Thailand and Vietnam."

Related publication

Poulsen, J., Applegate, G., Raymond, D. 2001. Linking C&I to a code of practice for industrial tropical tree plantations. Bogor, Indonesia, CIFOR. viii, 36; xi, 86p.

Growing tree seedlings under shade in a plantation clearing. Industrial plantations cover very large areas throughout the tropics and involve very intensive management at all stages of the development. CIFOR's research seeks to mitigate their negative impacts at the local and regional level (Photo: John Poulsen)

Slash and burn for more mahogany in Mexico

Hurricanes, fire and hot sun may not sound like the best recipe for sustainable forestry, but these are the conditions that favour mahogany (*Swietenia macrophylla* King). Mahogany trees need plenty of sunlight. As adults, their crowns emerge above the forest canopy, but seedlings cannot survive in the gloom down on the forest floor. So mahogany regenerates naturally after catastrophic disturbances, for example when a hurricane followed by a fire produces large clearings in the forest. Other species are killed, but the mahogany survives and produces seed. These germinate and the seedlings get started in the sun.

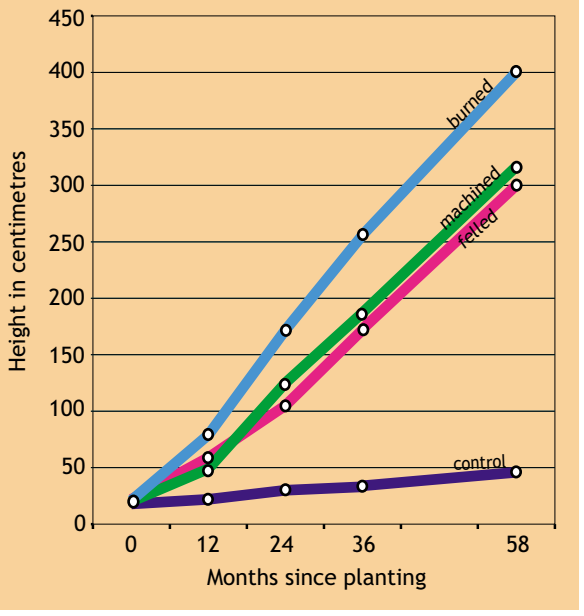
Mahogany is the most valuable neotropical hardwood on the international market. It has been harvested from the forests of Mexico's Yucatan peninsula for centuries and it is still a major source of revenue for forest communities there. In the past, mahogany loggers moved into new areas of forest to find the mature trees they needed, but today there is no unlogged forest frontier. Mahogany trees can take over 80 years to reach maturity, so the only way to sustain harvests is to make sure new mahogany trees regenerate in the forest from which it is logged. "This is easier said than done" says CIFOR's Laura Snook, "Mahogany seeds only survive for a few months, so removing mature trees depletes seed sources; and selective timber harvesting produces conditions exactly the opposite of those required for successful regeneration." Since mahogany trees occur at densities averaging only one tree per hectare, harvesting them leaves the forest canopy essentially intact, so any seedlings that may germinate do not get enough sunlight to survive.

Growing mahogany seedlings under the forest canopy, known as "enrichment planting", has been widely practiced, but is typically futile. "Forest departments have invested millions of dollars over many years, doing something that doesn't work," said Snook. So she and Patricia Negreros-Castillo of the Forestry Department, Iowa State University, set out to find a better approach.

The Organización de Ejidos Productores Forestales de la Zona Maya collaborated in the studies, which were support financially by the World Wild Fund for Nature, US, the US Forest Service, US Department of Agriculture, the Biodiversity Support Program, a consortium of World Wide Fund for Nature, the Nature Conservancy, the World Resources Institute, USAID, the US Department of Education, Duke University, the Rockefeller Foundation, Iowa State University and CIFOR.

To mimic the conditions that favour natural regeneration 5000 m^2 clearings were carved out of production forests in Quintana Roo, Mexico by complete felling; slashing, felling and burning; or uprooting all the existing vegetation with machines. The researchers planted 20 mahogany seedlings in the centre of each clearing and another 20 the next year. Seedlings were also planted both years in plots under the forest canopy. Five years later, half the seedlings survived in the clearings produced by felling and burning or by machine, and had grown to 5 metres or more on burned clearings. Seedlings planted a year later grew only a third as fast, outcompeted by regrowing vegetation. Under the canopy, only 5 percent of the seedlings survived and those few survivors had grown only 30 cm (see Figure 1).

Figure 1. Seedling growth by treatment



"The results were clear," said Negreros-Castillo. "The best conditions for mahogany survival and growth were produced by slashing, felling and burning." Thousands of local farmers use this technique every year to create agricultural clearings, where they grow maize and other crops for a year or two before the area is abandoned to regenerate naturally. These clearings are the perfect environment for mahogany seedlings. So now the researchers are encouraging the Mayan Indians who harvest mahogany to plant seedlings in their slash and burn fields the year the clearings are burned, along with their agricultural crops. This will ensure the best survival and growth for seedlings.

The research is having a wider effect in the area. Many of the communal land ownerships that currently harvest timber use machines to open clearings for log yards in each cutting area. These, too, are excellent environments for regeneration. They have already started planting mahogany in these clearings "If they're planted the same year clearings are opened, no further treatments are necessary or desirable," said Snook. "The seedlings do best undisturbed, rapidly growing to re-establish mahogany harvests for the future"

The co-authors measured seedlings, rain or shine

(Left) All trees were felled for complete felling treatment. Felled trees and slash were left on site on the felled treatment and burned on the burned treatment

(Right) Trees were uprooted and pushed away to produce clearings

(Left) Felled trees and understory slash were burned to create burned treatment. Complete burning reduced trees to white ash

(Right) First cohort seedlings were planted in 100 m^2 plots at the center of each clearing within 2 months

(Left) Mahogany seedlings on half the plots were cleaned at 12 months and again at 19 months. Competing vegetation around the seedlings was cut to ground level by machete

(Right) Corn along with mahogony in some burned and machine-cleared experimental plots

All photos by Laura Snook

Cause and effect of fire in Indonesia

Fire in Kalimantan, Indonesia
(Photo: Herwasono Soedjito)

The fires that ravaged Indonesia in 1997/98 turned into a major environmental and economic disaster. Some 10 million hectares of forest, scrub and grassland were burned, much of it deliberately. A pall of acrid smoke covered large swathes of Sumatra and Kalimantan, as well as Singapore and parts of Malaysia and Thailand. About 75 million people suffered smoke-related medical complaints.

Burning peat in Indonesia released more carbon into the atmosphere than the United States emits in a year. "That made Indonesia one of the world's worst polluters during the period," said CIFOR fire researcher Grahame Applegate. Yet no one really understood the underlying causes of the fires. The Ministry of Forests, for example, blamed shifting cultivators for the fires in Kalimantan. Environmentalists, on the other hand, attributed the fires to poor forest management. Later the government blamed "nomadic tribes" practising shifting cultivation for the fires. Environmental organisations blamed logging and plantation companies.

In 1998, CIFOR, the International Centre for Research in Agroforestry and the United States Forest Service, with additional funding from the European Union, started a multi-disciplinary study focused on eight fire-prone sites in Sumatra and Kalimantan to establish why fires are set, who is responsible, how they spread and which types of habitat are most at risk.

Much of the fire hot-spot data and satellite imagery suggested that the largest conflagrations were set by pulp and oil palm companies, who habitually use fire to clear land. However, it was also clear that fires started for a whole variety of reasons. Logging concessions, transmigration and the development of agro-industrial plantations have opened up access to previously remote regions. This has led to an increase in the scale and number of fires. The research identified four direct causes of fires, and six underlying forces (see box). "These are not neat, mutually exclusive categories, and many of the causes of fires are closely related to one another," said Applegate.

A lack of formal rules governing public and private property rights has led to fire being used as a weapon in land tenure conflicts. Fire is also used by small landholders clearing land to plant food and cash crops, by transmigrants, by shifting cultivators and by hunters and fishermen. Deforestation and the degradation of natural forest has provided an abundance of flammable debris and created a dry, more fire-prone landscape.

However the picture is not entirely gloomy. "Our study found that in rare instances where traditional social structures remain intact, and where ownership of land is clearly defined, the forests have been protected from destructive fires," said Grahame Applegate. Why? "Because local people have a vested interest in protecting resources over which they have sole use." In most cases, these communities are still operating under a system of traditional or *adat* law, and this has fostered a sense of stewardship.

If disasters of the sort experienced in 1997/98 are to be avoided in future, major changes in land management practices and land tenure arrangements will be required. In addition, the government will need to encourage better forestry practices and provide economic incentives which encourage sustainable land use practices.

Fire - direct causes

Land clearing
Fire provides a cheap and effective means of clearing land, and has been much favoured by large-scale operations wishing to clear low-value woody material prior to establishing crops such as rubber and oil palm. The area of oil palm plantations in Indonesia increased from 120 000 hectares in 1989 to almost 3 million hectares by 1999.

Accidental fires
Accidental or escaped fires are the second most important cause.

Fire as a weapon
Arson has become a significant factor in rural Indonesia in recent years. Farmers and local communities who feel that they were unfairly deprived of their land by plantation companies are now using fire to reclaim land and destroy property.

Improving access
Local people frequently set fires to clear underbrush to improve access to coveted resources. For example, in the Danau Sentarum area in West Kalimantan many of the fires in the 1990s were caused by fishermen burning bush to give them access to the valuable *arowana* fish that inhabits swamp forests.

Fire - underlying forces

Land tenure
A lack of formal rules on who owns and uses land has led to an increase in the scale, severity and frequency of fires in Indonesia.

Land use allocation
Local, traditional law is often at odds with the government system of land allocation.

Economic incentives
Perverse incentives, such as those which reward companies that transform production forests into plantations, encourage clearing of natural forests.

Poor forest practices
Woody debris left on the forest floor after timber extraction provides kindling for future fires. Draining swamps creates a more fire-prone environment.

Shifting populations
Fire is widely used both by transmigrants and by the authorities to clear forested land for settlement.

Inadequate fire suppression
All too often, no competent agency exists to suppress fires properly.

Reforming forest policy in China

China has been reforming policy in all sectors of its economy since 1978, so it has a lot of experience in the area. "Many of China's experiences provide lessons for the rest of the world," said Mafa Chipeta, CIFOR's former Deputy Director General. The country is huge and reforms have been implemented differently in different places.

The resulting changes in forest resources and livelihood have been very extensive. "There was a need to develop a fuller understanding of the implications of these changes," said Brian Belcher, leader of CIFOR's Forest Products and People Programme, so with long-time Chinese collaborators he organized a symposium on "Policy reform and forestry in China: lessons for China and the world" in Sichuan Province in June 2001.

The collaborators and sponsors of the meeting reflected the wide interest that policy reform in China had generated. Sponsors included the State Forestry Administration, the Research Center for Ecological and Environmental Economics of the Chinese Academy of Social Sciences, the Chinese Academy of Forestry (CAF) and the Center for Chinese Agricultural Policy of the Chinese Academy of Sciences, CAF and the Sichuan Forestry Department. The Ford Foundation, Canada's International Development Research Centre, the Australian Centre for International Agricultural Research and the World Wide Fund for Nature, China all provided support for the meeting.

Reform has moved through several main phases in China; growth, emerging new problems, pragmatic pull back, and then a push forward with new reforms. Administrative decentralisation and greater private household autonomy both had major impacts on the forestry sector. Different contractual arrangements have been tried with households and forest managers, sometimes in the same place and in rapid succession. "Farm households responded enthusiastically to the new opportunities and greater private rights by planting trees, for profit and for non-market environmental reasons," said William Hyde, CIFOR Senior Associate Scientist, "but only so long as they were confident of their long-term property rights."

Agricultural and other incentives may have been even more important than new forest policies in stimulating household forestry activity. This is because farmers responded enthusiastically where reforms increased incomes and improved market access, especially for fast-growing non-timber products like bamboo, fruits and nuts. Even though the increases in income to households and regions are not evenly distributed, most rural regions and households showed some improvement. Markets stagnated where reforms have not progressed as far, notably in the timber subsector. A complex and burdensome system of taxes is also deterring further improvement in that sector.

Less is known about the environmental benefits of the reforms. Erosion and watershed management probably improved but biodiversity may have declined. Important new issues emerging from the success of the reforms concern ways to ensure that the benefits of forestry development are shared equally, increasing the supply of products to meet demand without damaging the forest, the rights of local people in terms of tenure and the issue of what is the most socially beneficial way to obtain the full benefit of forest-based environmental services.

CIFOR intends to build on this meeting with more collaborative research in China. "One of the successes of the symposium was that the very broad range of participants went far beyond the boundaries of forestry to consider the wider factors that influence resource management and development," said Belcher.

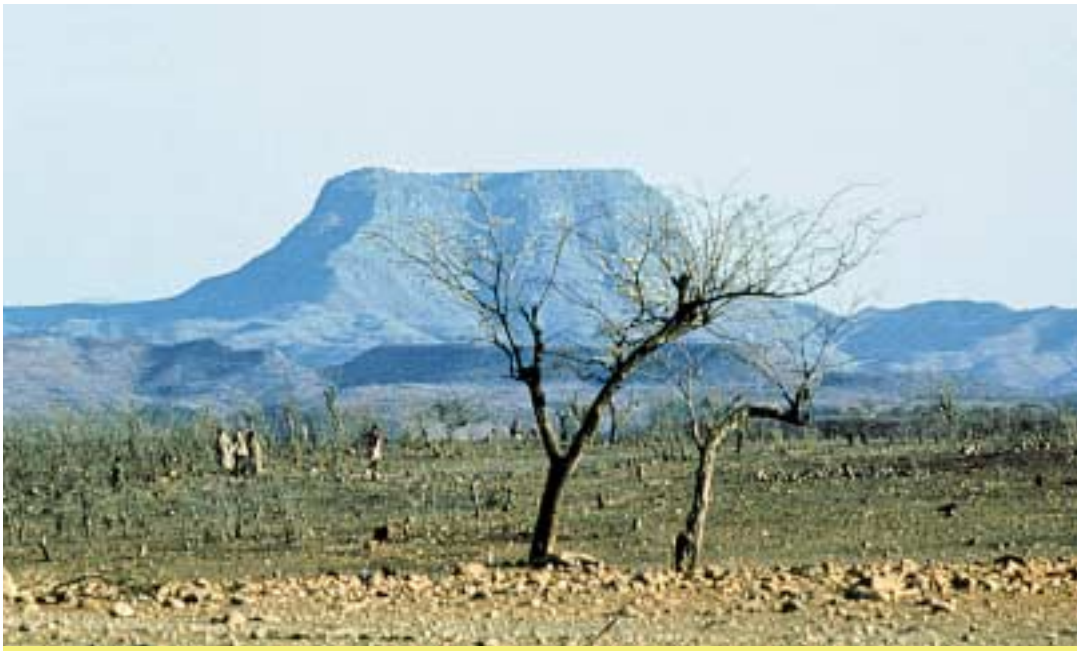
Increasing the value of bamboo by processing it into commercial paper (Photo: Brian Belcher)

CIFOR participates in high-level Chinese policy-making body

In the China Council for International Cooperation on Environment and Development high-level advisers report directly to the President. The Council is made up of a number of elements, one of which is the Task Force on Forests and Grasslands. CIFOR's former Deputy Director General Mafa Chipeta is a member of the Task Force, which has given CIFOR direct access to a highly influential policy-making body. The conference in Sichuan provided substantial background material for the Task Force, which is analysing key policy and technical issues, building support for policy reform and strengthening China's capacity for policy analysis. The Council praised the rigorous fieldwork the Task Force based its recommendations on, as well as the Task Force's identification of key policy and technical issues fundamental to reforming the forest and grassland sectors in China.

Mafa Chipeta also played a prominent role in the politically important meeting entitled "The 21st Century Forum: Forestry and Environmental Protection, 2001" which the National Committee of the Chinese Peoples' Political Consultative Conference organised in Beijing 4-6 September 2001. "I co-chaired one session and made a presentation on how managing for environment also protects economic productivity and sustainable development," said Chipeta. The Committee is a highly influential group that organises fora from time to time to discuss major issues that are important for national strategy.

Local control benefits community forestry in Tanzania



Cleared woodland in central Tanzania (Photo: John Turnbull)

Not long ago the forests of Duru-Haitemba, in northern Tanzania, were being seriously degraded by steady encroachment, frequent fires and excessive timber harvesting. Today the picture is very different. The forests are regenerating well, soil erosion is much reduced and streams that had dried up in the past are flowing again.

These dramatic changes can be simply explained. A decade ago the government controlled the forests. Now they are being managed by local communities. "When the forests belonged to the government, we felt we were being cheated, and there was no incentive for us to look after them," explains Kwaslema Kwathay, chairman of Ayasanda Village Forest Committee. "But now the forests belong to us, and we are determined to manage them well."

Around 100 million people in Central and Southern Africa depend on the Miombo woodlands for their livelihood, yet half a million hectares are lost each year. Saving the Miombo woodlands is now a regional priority, and a major CIFOR project, funded by the European Union, is examining, among other things, how community-based forest management could help to ensure their survival. Towards the end of the 1980s, forest officers in Babati District realised that Duru-Haitemba's 9000 ha of miombo woodland were threatened by a whole range of activities. In 1990 the government announced its intention to gazette the forests as conservation areas, believing that this would help to save them from further degradation. The local villagers, who relied on the forests for fuelwood, fodder, honey and a range of other products, were understandably aggrieved. "They knew that gazettement would limit their access," recalls Anatory Ruiza, the District Forest Officer, "and they reacted by grabbing everything they could from the forests before it was too late."

Ruiza came to the conclusion that if the forests were to survive, the villagers would have to be involved in managing them. Gazettement was suspended and a pilot programme was established in eight villages that had traditionally made use of the Duru-Haitemba forests. Under the guidance of Ruiza and district officials, the villagers assessed the damage to the forests, drew up management plans and rules for their use and protection, and elected Village Forest Committees.

The forest rules fall into three categories. First, there are rules banning activities such as charcoal making and setting fire to the forests. Second, there are rules governing activities for which permits must be obtained from Village Forest Committees. These include cutting poles for building, collecting medicinal herbs and felling unprotected species to make axe handles and tools. The third category of rules covers activities such as fuelwood and fruit collection, which are freely permitted providing no damage is done.

Each village has appointed guards, who patrol the forest up to three times a day. Those individuals who break the rules - they have become increasingly few in number - are subject to a range of penalties whose severity depends on the offence. For example, illegally harvested timber is confiscated, and the offender will generally be fined. Fines are deposited in village bank accounts and used for forest-related activities. Lighter penalties are imposed for the illegal collection of fuelwood.

Encroachment, charcoal burning and illegal felling have almost entirely ceased in the area, and the forests are now making a good recovery. The initiative has proved such a success that it is now being extended to other villages in the district. One of these is Himiti. According to

Juma Bakari Jumbe, the village executive officer, the benefits are already much in evidence, even though the community only took over the management of its forests in 1998. "Now we're getting thatch grass in places where there wasn't any before, and dry season springs are beginning to appear again," he explains. By the end of this year, District Forest Officer Anatory Ruiza hopes that over 25 000 hectares of forest in Babati District will be under community management.

The development of community-based forestry in Babati District has been closely monitored by social scientists from Sokoine University of Agriculture, in Morogoro. "What this shows," says Professor George Kajembe, "is that the whole idea of sustainability is correlated with ownership. Without ownership, there is no sense of responsibility."

Tanzania's 1998 Forest Policy, informed in part by the experiences in Duru-Haitemba, actively promotes community involvement in forest management. It is particularly significant that villages can be given tenure over the forests they use. Most of the villages of Babati District now have title to the forests, and this, according to Kajembe, has been central to the success of the community-based forest management approach.

Nobody is suggesting that the shift from government to community management is a simple process. In Babati District the villagers have been fortunate in a number of ways. Much of the success can be attributed to the District Forest Officer's visionary approach, and technical and financial support has been readily available. "What we don't know yet," says Kajembe, "is whether other districts can raise sufficient revenues to finance and facilitate the sort of initiative we have seen here."

A women's agroforestry group preparing land around Kisawasawa, Udzungwa Mountains National Park,Tanzania (Photo: John Turnbull)

Woman transporting firewood, Kondoa, Tanzania (Photo: John Turnbull)

Forest fruit in East Kalimantan, Indonesia (Photo: Herwasono Soedjito)

Understanding the forest – a long-term partnership

Achieving a secure forest estate is a complex challenge because of the range and diversity of the stakeholders involved and their overlapping interests. The people living near forests need access to forest products and services. Private companies must be convinced they can benefit from adopting less damaging forestry practices. Government agencies require new rules and regulations based on solid economic and ecological data that reduce private companies' administrative burdens and operating costs while minimizing the environmental impact of production activities.

The groups rarely agree about how to manage the forest. Even small groups will differ on whether they need the forest or are willing to cut it down. When there is competition for increasingly valuable resources then the groups disagree about their claims and entitlements. Somehow the conflicts must be resolved, which, in turn, requires a better understanding of the needs and expectations of all the stakeholders involved.

In 1996, the Indonesian government demarcated a 320 000-ha area of forest in Bulungan District for CIFOR to use as a long-term research area. The International Tropical Timber Organisation (ITTO) funded a 3-year project on forest management and sustainability in a large forest landscape that attracted a number of other partners (see box opposite). Over the years a unique partnership has evolved in the district of Malinau in East Kalimantan. Researchers and local groups are collaborating to identify and address the needs of the stakeholders by finding the best ways to manage a large forest. "The lessons we have learned are providing us with baseline information that will support longer-term research." said CIFOR's Kuswata Kartawinata, who has led the project. "These results are laying the basis for finding negotiated solutions that will last into the future."

The Bulungan work progressed along several different lines that highlighted the need to understand in detail the effect that forest management techniques have on species and sites important to local people.

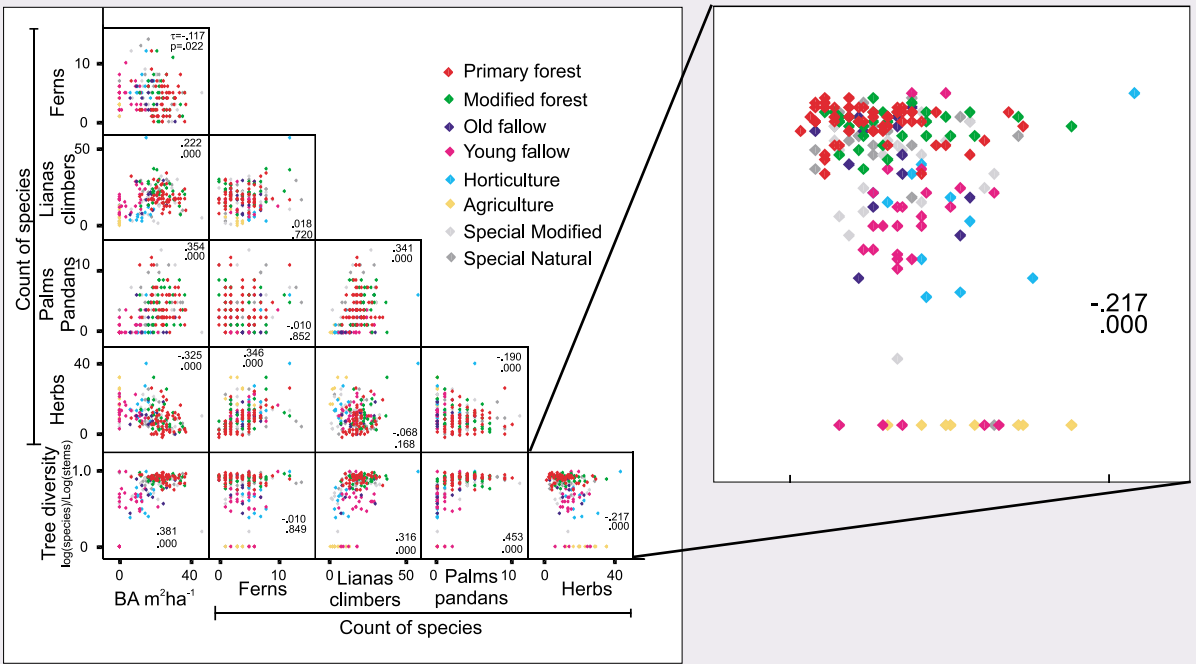
Biodiversity across the landscape

CIFOR's biodiversity research in Bulungan helped define the priorities of the local people and assist in a wide range of processes, from developing reduced-impact logging guidelines to setting forest conservation policy.

"We have developed a suite of methods to assess biodiversity and landscape information and what matters to local communities," said Doug Sheil, CIFOR's biodiversity specialist. "The characteristics of forested landscapes are usually critical to their inhabitants, but the significance of these relationships is largely hidden from outsiders, including policy makers. The challenge is to understand what aspects of

Biodiversity across the landscape

This figure from the biodiversity research in Bulungan forest illustrates the highly complex data that were gathered. As well as showing overall trends in the relationships between species richness among groups in different locations (large figure), the inset highlights the depth of detail that was captured by the work.



Community members from Langap discuss plants with other members of the field team, East Kalimantan (Photo: Douglas Sheil)

the landscape local people care about, why they matter and how much. These methods can be used to guide future research and to make recommendations on options about land use and policy. The methods we have found also provide a foundation for deeper dialogue with the forest communities."

By using a new technique called 'multi-disciplinary landscape assessment' project researchers could work out which animals and plants the different groups of local people used or valued and how important these species were to them (see box left). These efforts gave special attention to previously marginalized groups such as the Punan, who have traditionally been hunters and gatherers and depend very heavily on the forests.

The assessments are now serving the basis for discussions about land use planning. They are also contributing to new forestry practices and regulations that can help to protect those plant and animal species that communities value the most. For example, regulations that require concession holders to repeatedly slash all undergrowth and climbers after felling are intended to reduce aggressive 'weeds' to encourage regeneration. In practice, it cuts many useful species, including rattan and timber seedlings. "This slashing may be more damaging to the forest than the harvesting itself and we are suggesting that this policy be reviewed," said Doug.

Reducing the impact of logging on the forest

Using techniques that reduce the impact of logging on the forest allowed companies working in Bulungan to harvest 7-9 trees per hectare and still keep damage to the soil and water resources to a minimum. Controlling how trees fall and how they are taken out of the forest reduced damage to the remaining trees by up to half. This means that the logging companies probably do not need to pay for costly regeneration treatments. Lower operational costs actually outweighed the expense of training and supervision. And the

A concatenation of collaborators

The initial initiative for this partnership came from the Ministry of Forestry of Indonesia and the ITTO. The strong political support from the Ministry and the generous financial support and technical advice from ITTO provided a framework in which it was possible to attract additional contributions from the MacArthur and Ford Foundations, the Australian Centre for International Agricultural Research, the UN's International fund for Agricultural development, Département Forestier du Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD-Forêt), PT Inhutani II, PT Trakindo Utama, Caterpillar Co., Lembaga Ilmu Pengetahuan Indonesia (the Indonesian Institute of Sciences or LIPI) and others. Within the partnership, Indonesia's Forestry Research and Development Agency (FORDA) and CIFOR have played the leading role in the research. LIPI, CIRAD-Forêt, Institut de Recherche pour le Développement and several universities have also participated. PT Inhutani II, PT Trakindo Utama, Caterpillar Co., the District Government of Malinau, several non-governmental organizations and dozens of local communities were also involved in the research.

Sago, fish, gaharu (eaglewood), rattans are parts of forest products which directly give alternatives for earning cash to the forest dwelling communities (Photos: Patrice Levang)

forest workers found that with the right planning they could meet the same daily volume in a shorter time than using conventional techniques. "Since several companies such as PT Inhutani II and PT Trakindo Utama were involved in the process from the start they feel completely confident about the reliability of the results," said Machfudh, a scientist from Indonesia's Forestry Research and Development Agency seconded to CIFOR, who was closely involved in the research.

Forest people's dependency on forest products

Complementing the biodiversity work was sociological research among the Punan people on their attitudes to forest products. This approach has provided key insights into the way forest dwellers regard forest resources and challenged some long-held assumptions. "Most of the people do not collect forest products on their own initiative," said Patrice Levang, a French scientist seconded to CIFOR from the Institut de Recherche pour le Développement. "Economic dependency on forest products is seldom the result of free choice; it is often the only option available to forest people to generate cash income."

There are also variations in the degree of dependence on forest products among ethnic groups and individual households. Forest products abound in isolated areas and provide much of the livelihood needs of the Punan hunter-gatherers, while downstream areas have other options available to the local Dayak swidden cultivators like agricultural and off-farm activities. This greater understanding will allow development initiatives to match more closely the attitudes of the forest dwelling communities, and hence greatly increase the likelihood of benefiting them.

Coordination and agreement in boundary negotiations

Boundary negotiations in Malinau highlighted the deeply political aspects of managing the forest landscape by local communities, government and the private sector in. "Three years of study showed that the more intense the underlying struggle, the more fluid the interests, agreements and coordination are

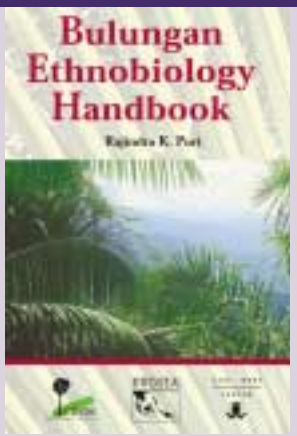
People were often eager to mark their boundaries, especially along the road (Photo: Miriam Van Heist)

likely to be," said CIFOR researcher Eva Wollenberg. Any change in the *status quo*, such as an increase in the value of local resources or a new regional leader, immediately intensified competition for resources. Meetings among the different groups concerned, coupled with participatory mapping of community land claims, were important tools in reducing conflict.

Workshops at the District level and mapping exercises in some 22 villages provided valuable lessons on the most effective approaches for the future. Mechanisms for constructive conflict management initially concentrated on using agreements to settle disputes. However, the agreement-building processes were not necessarily fair or acceptable to all the people concerned. The researchers realized that reaching agreement alone was not as useful for coordinating boundaries as focussing on building stronger relationships, creating opportunities for fairer negotiation and identifying institutional structures for helping to manage conflict.

CIFOR publication

The *Bulungan Ethnobiology Handbook* is a unique field manual of the knowledge and use of common plants and animals among 18 indigenous groups in northern East Kalimantan. Published by CIFOR in 2001, this collaboration with Plant Resources of South-East Asia (PROSEA) and the East-West Center includes illustrations and details the biology and uses of 164 plant species and 111 animal taxa which are the most important in the area. It is unique in that it brings together data from such a wide variety of indigenous groups. Indeed, "many residents were excited to have their knowledge of plants and animals recorded for future generations," writes the author Rajindra K. Putra. The volume will be invaluable in studying regional patterns of resource use, ethnobiological classification and comparing the many languages in the region.



Puri, R.K. 2001. Bulungan ethnobiology handbook. Bogor, Indonesia, CIFOR. 310p.

Wild pig – a feast for the forest gourmet

"Roasted pig fat is a feast for the forest gourmet," says CIFOR's biodiversity specialist Doug Sheil, who has been working in the forest in East Kalimantan for several years. He seems to have developed a particular admiration for wild pigs, even if he is a vegetarian. "It's true," said Doug, "Wild boars have an extremely important role in forest villages. Fit men go boar hunting as often as they can." These pigs are highly preferred food, and provide the bulk of vital animal fats and proteins. In the remote upper Tubu region in the north of Bulungan, pig fat is generally the only source of fat in the diet. While hunting, catching anything other than a bearded pig (*Sus barbatus*) is almost as bad as returning with nothing. Hunters who catch a deer early in the morning will kill it to satisfy their dogs, then leave it behind. If they end up empty-handed in the afternoon they will come back and take the hindquarters and the antlers home. Outstanding hunters also enjoy great prestige within and even outside their communities.

The forest dwellers ranked bearded pig higher than most other forest products, even cash-earning ones. According to the communities, the pigs decline in logged areas. When there are fewer pigs the people are forced to find other ways to supplement their diets by eating less-preferred and often protected species, such as monkeys. This is more common in active concession areas. Thus, by understanding the importance of the wild pig, researchers will be able to include ways to protect this prized resources in any future conservation strategy.

Sus barbatus, commonly known as the bearded pig, investigating a tasty snack (Photo: Bako Margaret Kinnaird, WCS)

Donors

Schedule of grant revenue

For the years ended 31 December 2001 and 2000 (In US dollar 000s)

Unrestricted	2001	2000
Australia	197	254
Austria	80	80
Belgium	132	163
Canada	259	267
China	10	-
Denmark	116	128
Finland	284	317
France	108	89
Germany	140	196
Indonesia	48	57
Japan	606	636
Korea	42	-
Netherlands	903	973
Norway	274	291
Philippines	9	12
Spain	-	25
Sweden	299	224
Switzerland	232	220
USA	600	575
World Bank	1 550	1 670
Sub total	**5 889**	**6 177**

Restricted	2001	2000
African Timber Organization	11	51
Asian Development Bank	401	204
Australian Centre for International Agricultural Research	75	67
Berau Forest Management Project	-	6
Brazil (EMBRAPA)	51	30
Canada	41	43
CGIAR Secretariat	15	21
Chemonics International Inc	15	5
CIAT (PRGA Programme)	30	4
CIRAD-Forêt	40	-
Crawford Fund (CRF)	9	-
Denmark	84	76
European Commission	1 522	1 633
Food and Agriculture Organization of the UN	18	17
Ford Foundation	138	20
Forest Trends	6	6
France	170	194
Germany (GTZ/BMZ)	149	207
Institut de Recherche pour le Developpement	5	-
International Centre for Research in Agroforestry	68	44
International Development Research Centre	51	86
International Fund for Agricultural Development	91	403
International Plant Genetic Resources Institute	11	56
International Tropical Timber Organization	123	317
Japan	774	650
MacArthur Foundation	106	127
National Oceanic and Atmospheric Administration	9	11
Netherlands	-	45
Norway	204	73
Overseas Development Institute	1	4
Others	14	-
Rockefeller Foundation	-	10
Secretariat of the Convention on Biological Diversity	10	-
Sweden	220	302
Swiss National Science Foundation	6	1
Switzerland	112	104
The Nature Conservancy	-	23
Tropical Forest Foundation	96	70
USA	406	313
United Kingdom (DFID)	767	775
United Nations Environment Programme	51	6
United States Forest Service	228	160
University of Wales	2	5
World Bank	40	2
World Conservation Union (IUCN)	46	4
World Resources Institute	119	51
World Wildlife Fund	243	140
Sub total	**6 578**	**6 366**
Total Unrestricted and Restricted	**12 467**	**12 543**

Financial Statements

Statements of financial position

As at 31 December 2001 and 2000 (In US dollar 000s)

	2001	2000
Current assets		
Cash and cash equivalents	7 189	6 241
Accounts receivable:		
Donors	2 608	2 794
Employees	194	218
Others	612	676
Prepaid expenses	296	437
Total current assets	10 899	10 366
Non-current assets		
Fixed assets - net	2 058	2 178
Total assets	**12 957**	**12 544**
Current liabilities		
Accounts payable:		
Donors	2 291	2 106
Others	99	68
Accruals and provisions	2 771	2 652
Total current liabilities	**5 161**	**4 826**
Net assets		
Unrestricted		
Unappropriated	6 851	6 893
Appropriated	945	825
Total net assets	7 796	7 718
Total liabilities and net assets	**12 957**	**12 544**

Statements of activities

For the years ended 31 December 2001 and 2000 (In US dollar 000s)

	2001 Agreed Research Agenda			2000
	Unrestricted	Temporarily restricted	Total	Total
Revenues				
Grants	5 889	6 578	12 467	12 543
Other revenues	378	-	378	431
Total revenues	6 267	6 578	12 845	12 974
Operating expenses				
Research programs	3 487	6 578	10 065	9 802
Research support	859	-	859	971
Management and general expenses	2 248	-	2 248	2 481
Total operating expenses	6 594	6 578	13 172	13 254
Indirect cost recovery	(405)	-	(405)	(486)
Total operating expenses (net)	6 189	6 578	12 767	12 768
Change in net assets	78	-	78	206
Net assets at the beginning of the year	7 718	-	7 718	7 512
Net assets at the end of the year	7 796	-	7 796	7 718
Operating expenses by natural classification				
Personnel costs	3 678	2 190	5 868	5 897
Supplies and services	1 701	658	2 359	2 634
Collaborative activities	384	3 388	3 772	3 482
Operational travel	319	342	661	687
Depreciation of fixed assets	512	-	512	554
Total operating expenses	**6 594**	**6 578**	**13 172**	**13 254**

CIFOR's collaborators

Australia
Australian National University
Commonwealth Scientific and Industrial Research Organisation
Murdoch University, Asia Research Centre
People and Plants Initiative
Queensland Department of Primary Industry Forestry, Queensland Forest Research Institute
Southern Cross University
University of Adelaide
University of Victoria, Spatial Sciences Laboratory

Argentina
Universidad Nacional de Misiones, Facultad de Ciencias Forestales
Universidad Nacional de Misiones

Belgium
Université Libre de Bruxelles

Belize
Programme for Belize

Bolivia
Bolivia Sustainable Forestry Management Project
Foresta
Fundacion Amigos de la Naturaleza
Museo de Historia Natural Noel Kempff Mercado
Programa de Manejo de Bosques de la Amazonia Boliviana

Bostwana
Southern African Development Community Forestry Sector Technical Coordination Unit

Brazil
Cikel Brasil Verde SA
Empresa de Assistência Técnica e Extensão Rural, Paraná
Empresa Brasileira de Pesquisa Agropecuaria and its regional centres
Empresa Paraense de Assistência Técnica e Extensão Rural
Escola Superior de Agricultura Luiz de Queiroz
Fundação de Tecnologia do Estado do Acre
Fundação Floresta Tropical
Fundação Norte-Riograndese de Pesquisa e Cultura
Fundação para o Desenvolvimento Econômico Rural da Regiao Centro-Oeste do Paraná
Grupo de Pesquisa e Extensão em Sistemas Agroflorestais do Acre
Grupo Pesacre
Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis
Instituto Nacional de Pesquisas de Amazônia
Instituto do Homem e Meio Ambiente da Amazônia, Mulheres da Mata
Juruá Florestal Ltda
Laboratorio Agro-ecolólogico de Transamerica
Secretaria de Ciência, Tecnologia e Meio Ambiente do Estado do Pará
Superintendência para o Desenvolvimento da Amazônia
Universidade de Campinas
Universidade de São Paulo, Facultade de Ciências Agrárias do Pará
Universidade Federal de Santa Catarina, Departamento de Fitotecnia
Universidade Federal de Para
Universidade Federal de Paraná
Universidade Federal do Acre
Universidade Federal do Mato Grosso
Universidade Federal do Maranhao, Depto de Oceanografia e Limnologia

Cameroon
Agricultures Paysannes et Modernisation en Afrique
Association Terre et Développement
Centre International de Recherche Agricole pour le Développement, Projet Forêts et Terroirs
Centre International pour l'Agriculture Durable
Centre pour l'Environnement et le Développement
Centre Régional d'Appui et de Dévéloppement des Initiatives Féminines
Community Forestry Development Project
Confédération des organisations rurales
Global Environmental Facility, Campo-Ma'an Project
Initiative pour le Développement Rural et Urbain
Institut Africain pour le Développement Social-Formation
Institut de Recherche Agricole pour le Développement, and the Tree Domestication Programme
Limbe Botanic Garden
Ministry of Environment and Forestry
Office National de Développement des Forêts
Presidency of the Republic
Programme pour l'Utilisation Rationnelle des Ecosystemes Forestiers d'Afrique Centrale
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Canadian University Services Organisation
ESSA Corporation - Forestry
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University of Manitoba, Center for Earth Observation Science
University of Victoria

China
China Council for International Cooperation on Environment and Development, Task Force on Forests and Grasslands
Chinese Academy of Forestry
Chinese Academy of Sciences, Center for Chinese Agricultural Policy
Chinese Academy of Social Sciences, Research Center for Ecological and Environmental Economics
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Sichuan Forestry Department
State Forestry Administration

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Centro Agronomcia Tropical Agronomica de Investigacion y Ensenanza
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Royal Agricultural University

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Forest Research Institute
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Ministry of Agriculture and Forestry

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Institut National de la Recherche Agronomique, Centre de Nancy
Institut de Recherche pour le Développement
Unité de Recherché sur la Productivité des Plantations Industrielles

Gabon
Association pour le Développement de l'Information Environnementale
Carpe
Centre National de la Recherche Scientifique et Technologique, Institut de Recherche en Ecologie Tropicale

Germany
Deutsche Gesellschaft für Technische Zusammenarbeit GmbH
Federal Research Centre for Forestry and Forest Products
German Institute for Forests and Forest Products
Institute of Forest Policy, Markets and Marketing Section
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Ghana
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Forest Department of Ghana
University of Science and Technology, Kumasi

Honduras
Inter-American Development Bank Natural Resource Management Project in Priority Watersheds
World Bank Rural Areas Administration Project

India
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Forest Development Corporation, Conservatory of Forests
Indian Council of Forestry Research and Education
Indian Institute for Forest Management
Indian Institute of Sciences, Center for Ecological Sciences
Indian Institute of Technology
Jawaharlal Nehru University, New Delhi
Kerala Forestry Research Institute
Tata Energy Research Institute
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University of Agricultural Sciences, Bangalore
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Indonesia
APRIL
Balai Penelitian Kehutanan Kupang
Bandung Institute of Technology
Berau Forest Management Project, East Kalimantan
Bioma, East Kalimantan
Birdlife International
Bogor Agricultural University
Caterpillar Co.
Center for Population and Manpower Studies, the Indonesian Institute of Sciences (PPT-LIPI)
Center for Strategic and International Studies
Conservation International Indonesia Programme
Dinas Kehutanan Kutai Barat
District Government of Malinau
European Commission-sponsored fire projects
Forest Fire Management Project in East Kalimantan
Forestry Research and Development Agency
Forum Penyelamat Hutan Jambi
Indonesian Community Forum on Community Forestry
Indonesian Forest Concessionaires Association
Indonesian Forestry Research and Development Agency
Indonesian Peat Association
Indonesian Rattan Manufacturers Association Industry and Trade Department
Institut Pertanian Bogor
International Centre for Research in Agroforestry, Southeast Asia Programme
JICA/PKA Forest Fire Prevention and Management Project
Lembaga Alam Tropika Indonesia
Lembaga Bantuan Hukum
Lembaga Bina Benua Puti Aji
Lembaga Ekolabeling Indonesia
Lembaga Ilmu Pengetahuan Indonesia
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Ministry of Environment
Ministry of Forestry
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Pelangi Indonesia
Plant Resources of South-East Asia

PT Barito Pacific
PT Finnantara Intiga
PT INHUTANI (Tropical Forest Foundation) I and II
PT Musi Hutan Persada
PT Pratama Cipta Inaweb
PT Riau Andalan Pulp and Paper
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PT Trakindo Utama
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Pusat Penelitian Hutan Tropis
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Pusat Studi Hukum Kebijaksanaan Otonomi Daerah
Regional Development Planning Agency, East Kalimantan Province
Riau Andelan Pulp and Paper
Rimbawan Muda Indonesia
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Sistem Hutan Kemasyarakatan, East Kalimantan
South East Asia Regional Centre for Tropical Biology
Tanjungpura University, Pontianak
The government of Kutai Barat
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Tropical Rain Forest Research Center, University of Mulawarman
Universitas Cendrawasih
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Forest Resources Studies and Action Team
Himalayan Medicinal Plants
Hurdec
Ministry of Forests and Soil Conservation
Nepal-Australia Community Resource Management Project
Nepal-Swiss Community Forestry Project
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Women Acting Together for Change

Netherlands
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National Reference Center for Nature Management
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Tropenbos

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Ecosystems Research and Development Bureau
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Korea Forest Research Institute
North East Asia Forest Forum
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University of Transkei
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Swedish Agricultural University
Swedish University of Agricultural Sciences, Department of Forest Management and Products

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Swiss Federal Institute of Technology
World Wide Fund for Nature, International

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Regional Community Forestry Training Center
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Nature Conservation

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Wildlife Conservation Society
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Forestry Research Support programme for Asia and the Pacific
Non-timber Forest Products Centre, Hanoi
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Zambia
Copperbelt University, School of Forestry and Wood Science

Zimbabwe
Forestry Commission
Safire
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Tropical Resource Ecology Programme
University of Zimbabwe, Department of Economics, Institute of Environmental Studies and Tropical Resource Ecology Program
World Wild Fund for Nature–Zimbabwe

International and regional organisations
African Timber Organisation
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Asia Pacific Association of Forestry Research Institutes
Asian Development Bank
CAB International
Central Africa Regional Program for the Environment
Centro Internacional de Agricultura Tropical
Conservation International
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Nature Conservancy
People and Plants
Programme régional Ecosystèmes Forestières d'Afrique Centrale
Protected Areas Conservation Trust International
Southeast Asian Ministers of Education Organization – Regional Center for Graduate Study and Research in Africa
Southern African Alliance for Indigenous Resources
Spanish Agency for International Cooperation
Tropical Agricultural Centre for Research and Higher Education - CATIE
Tropical Forest Foundation
Tropical Rain Forest Information Center
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United Nations Framework Convention on Climate Change
United Nations Development Programme
United Nations Educational, Scientific and Cultural Organisation
United Nations Environment Programme
United Nations Food and Agriculture Organisation
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Publications in 2001

This list includes publications by CIFOR staff as well as non-CIFOR staff generated from research supported by CIFOR.

General

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Biodiversity

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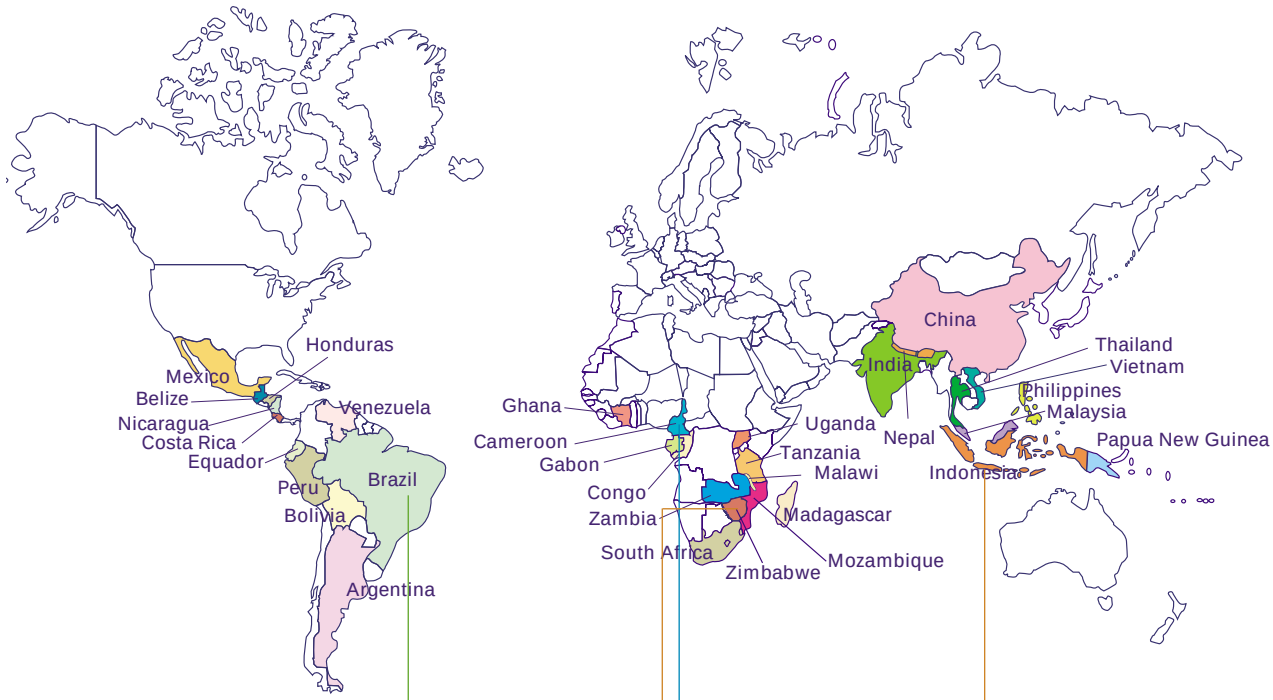

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Forests for the future

"Biodiversity is declining at an unprecedented rate... Half of the tropical rainforests and mangroves have already been lost ... We must reverse this process — preserving as many species as possible, and clamping down on illegal and unsustainable fishing and logging practices — while helping people who currently depend on such activities to make a transition to more sustainable ways of earning their living."

Kofi Annan

CIFOR
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